

The Battle for the Smart Home: Open to All

Success in the burgeoning smart home market will require a combination of global and local capabilities. Anyone can win this battle—provided they team up with the right partners.



Ready for Takeoff: Four Tectonic Shifts

Writing back in 1950, science fiction author Ray Bradbury spoke of a smart home that automatically wakes the family, prepares its breakfast, clears the table, vacuums the floors, and attends to myriad other needs. Bradbury set his short story, "There Will Come Soft Rains," 76 years in the future, in 2026. His prescience was impressive, but it looks like he may have overestimated the time frame by a decade.

The smart home industry today is experiencing four major shifts that are accelerating market expansion.

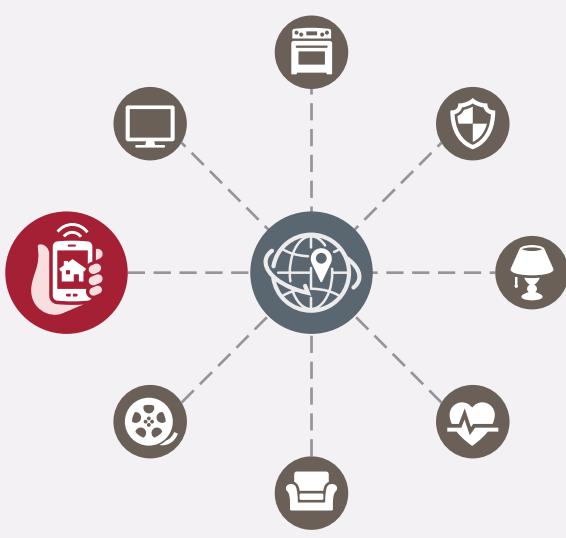
Connectedness and intelligence

First, home automation applications have become much **easier to use** in recent years. Thanks to smartphones, homes have become much more connected: today, consumers are able to control their applications from anywhere and at any time, with often excellent user interfaces that respond not only to touch but also to voice. By design, smartphones are lowering market entry barriers for new service providers, triggering competition on quality and even greater usability. And with the incorporation of big data and artificial intelligence (AI), homes have become more intelligent, too. Indeed, some applications are learning to anticipate the users' wants and needs—much like a well-trained personal assistant (see figure 1).

Figure 1
The connected, intelligent home is becoming a reality

Connectivity

Connect to anywhere from everywhere, anytime



Intelligence

Spend less time thinking and more time enjoying

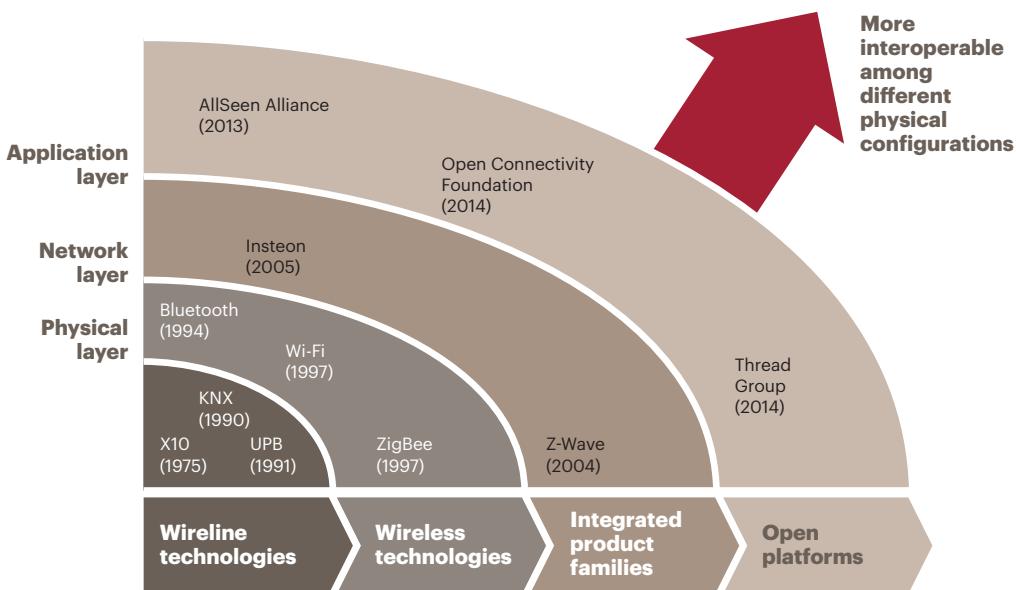
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- The diagram shows a human head icon with circuit board lines inside, connected by dashed lines to a cloud icon and a lightbulb icon. Below this, two colored boxes provide details:
- Big data**
 - Data collection from multiple sensors
 - Data storage using cloud technologies
 - Data analytics using text mining, statistical analysis, and predictive analysis
 - Artificial intelligence**
 - Image and pattern recognition
 - Neural network algorithm
 - Deep learning and machine self-learning

Interoperability

Second, smart home applications are becoming **more broadly useful** to consumers, as greater interoperability among products from different manufacturers becomes a reality. Product interoperability discussions are shifting toward the application layers, as industry ecosystems are being formed on top of existing communication protocols and being loosely connected to one another under an open platform concept (see figure 2 below, and sidebar: Standardized Protocols and Open Platforms Drive Greater Interoperability on page 4). Industry alliances are proliferating rapidly, and many manufacturers are participating in more than one, so progress toward greater interoperability will be gradual—but it is inexorable nonetheless.

Figure 2

Interoperability discussions are shifting toward the application layer



Source: A.T. Kearney analysis

Product availability and cost

Third, smart home technology is becoming **more available and increasingly affordable**.

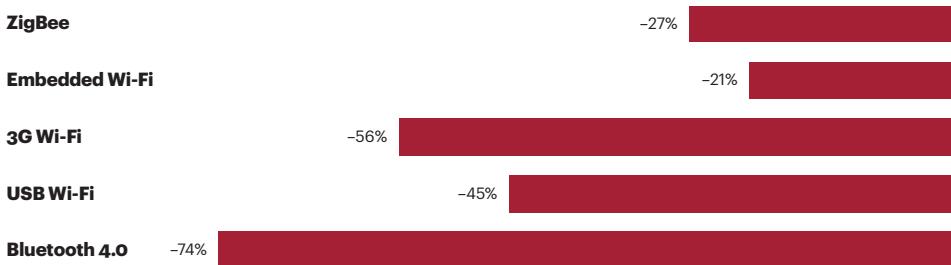
Nearly every aspect of home living is already covered by automated products: televisions, audio equipment, washing machines, toothbrushes, security cameras, thermostats, door locks, refrigerators, blinds, beds, and even mailboxes. In fact, we estimate that smart products are commercially available for 80 percent of key home applications. And although current market prices are high, declining costs for communication modules and sensors, together with the increasing availability of cloud-based back-end services, suggest that things will change in the near future (see figure 3 on page 3). Smart TV prices, for example, have been falling by about 10 percent each year; today, a smart TV costs half of what it did five years ago. The price premium for many other smart home products is typically no more than 100 percent, so they too may reach a tipping point over the next five years.

Figure 3

Declining costs will make smart home technology more affordable

Price evolution of communication modules

(CAGR, 2013–2015)



Sources: Electronic components' online prices; A.T. Kearney analysis

New monetization models

Finally, more smart home applications are connected not only within the home, but also to wider networks, making them more open to diversified monetization models for companies throughout the smart home ecosystem. New trends include applications that are:

- **Connected to the grid.** For example, smart meters and home energy management systems (HEMS) that are connected to the grid can allow utilities to monitor consumers' real-time energy usage. Using that information, utilities can seek to shift demand to off-peak periods, sparing them the need to invest in additional generation capacity while at the same time selling services to help their customers lower their electric bills.

The smart home is not a futuristic idea.
It is an area that already offers **significant opportunities for a variety of participants.**

- **Connected to the Internet.** An Internet-connected refrigerator with an LCD monitor built into the door can generate revenue from online advertisements or by selling subscriptions to Internet services. Another example is IFTTT. Originally a service to automate online activities (such as triggering an email) with simple "if-this, then-that" functions, today it is one of the most popular smart home platforms to automate the control of physical devices.
- **Connected to non-digital services.** Devices such as the Amazon Dash Replenishment Service button added to a washing machine can open revenue streams from the sale of physical goods that customers may not even have chosen to purchase in the absence of such convenient devices.

The smart home, then, is not a futuristic idea anymore. Rather, it is an area that promises large-scale business opportunities for a variety of market participants.

Standardized Protocols and Open Platforms Drive Greater Interoperability

Communication protocol standardization

Several industry alliances have been established to shape wireless communication technology standards at home, conforming to IEEE 802 standards (physical and data link layer protocol), but with no single winner.¹ Wi-Fi (1997) has broad penetration with high interoperability and bandwidth but tends to interfere with home broadband. ZigBee (1997), IEEE 802.15.4 base mesh technology, is widely used in home energy management systems because of its low energy consumption, but it presents interoperability issues. Bluetooth (1994), already widely known as a short-range communication protocol, recently released a version for low energy use—known as Bluetooth Low Energy (2010)—but it too continues to face interoperability and interference issues.

There are also wireline-based technologies. KNX (1990), initially established as a building automation network communication protocol, has recently begun to participate in the smart home arena. On the other hand, UPB (1991) and X10 (1975) are powerline communication technologies that have been incorporating the smart home concept for a while now. However, the industry attention is now shifting more toward wireless technologies.

Z-Wave (2004) and Insteon (2005) are other technologies established by single companies initially aiming to build a more universally interoperable product family. However, neither of these

protocols has managed so far to carve out a position as an industry standard.

Open platform

In order to build a more interoperable world in the smart home industry, leading global technology companies are forming ecosystems with an open platform concept. The communication protocols mentioned above define only the physical and data link compatibility, while open platforms define software or application layer compatibility through open source software frameworks or application programming interfaces (APIs).

The following key industry alliances have been recently established:

- AllSeen Alliance was established to disseminate AllJoyn's base system in 2013. AllJoyn is an open source software framework originally developed by Qualcomm and now managed by the Linux Foundation. The core members are Qualcomm, LG, Microsoft, Panasonic, Sony, Electrolux, and Sharp. With the AllJoyn framework, developers can write applications for interoperability regardless of transport layer or manufacturer, and without the need for Internet access.

- The Open Connectivity Foundation, formerly known as the Open Interconnect Consortium, was established in 2014. It covers not only home devices but also industry devices. Original core members of this consortium are Cisco, GE Software, Intel, MediaTek, and Samsung.

The Open Connectivity Foundation is trying to build a common communication framework for wireless connection, as well as providing open source IoT software named Apache 2.0.

- Thread Group was established in 2014 to build secure, low-energy wireless networks in collaboration with ZigBee. Core members are Google, Nest Labs, Samsung, Freescale, and ARM. Thread uses a reliable mesh network to wirelessly connect devices with banking-class encryption. Nest Labs has begun to provide APIs to developers.

The end state of smart home ecosystems is still unclear. Many firms participate in multiple alliances. For example, Qualcomm is an original member of the AllSeen Alliance and is now participating in the Open Connectivity Foundation. Moreover, the Open Connectivity Foundation itself is now collaborating with the AllSeen Alliance. On the other hand, movements to form new ecosystems continue to pop up on a regular basis. We believe multiple platforms are likely to coexist (while still being loosely connected with one another) for the foreseeable future, thus bringing the smart home industry toward a more interoperable world gradually.

¹ IEEE is the Institute of Electrical and Electronics Engineers.

Market Evolution: Dawn of the New World

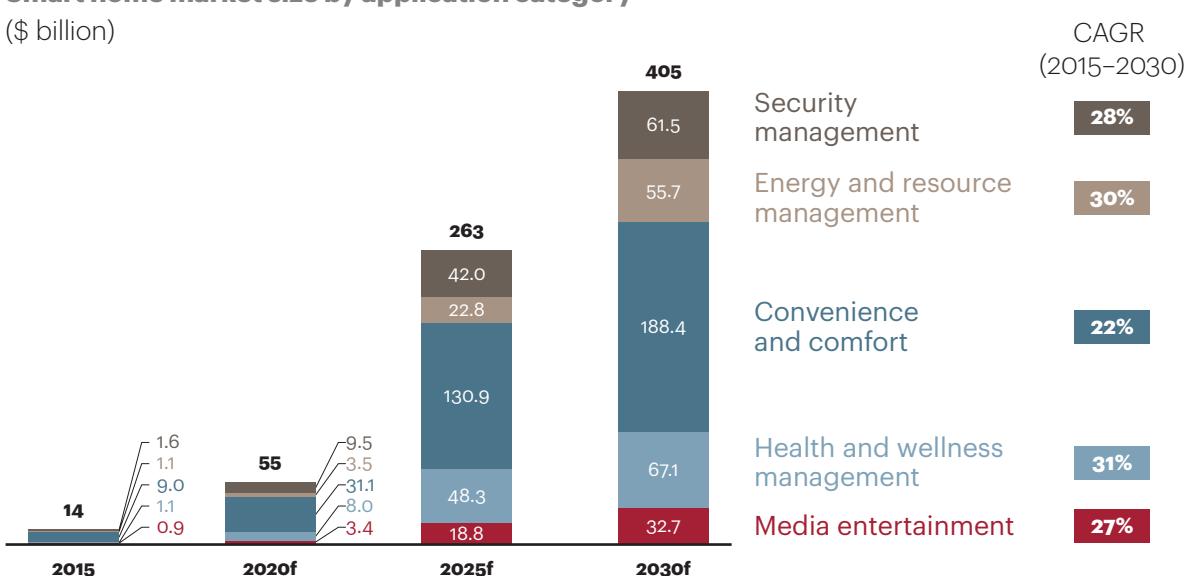
The current global smart home market is worth about \$15 billion—excluding smart TVs and residential solar power systems, which are inherently connected devices (see the appendix for the definition and scope of the market size). This number, while hardly negligible, represents a small share of the segments where smart home devices and applications compete. To take two examples, the global home appliance and furniture market value (including both smart and non-smart products) exceeds \$1 trillion, and the global home security solutions market clocks in at about \$30 billion. As smart home application prices drop and their availability increases, their penetration will increase too. We estimate the total smart home market will creep up to more than \$50 billion in 2020 and then explode in five application categories to about \$400 billion in 2030, when it will represent more than 40 percent of the total home appliance market (see figure 4).

Figure 4

Smart home market growth will explode after 2020

Smart home market size by application category

(\$ billion)



Source: A.T. Kearney analysis

Enormous market potential driven by five application categories

Security management

Smart security management devices enable users to remotely monitor their homes from a smart device. Users can also receive real-time updates of any safety or security breach (such as home intruders, water leaks, or fire hazards) when they are not at home. Examples of devices in this category include security cameras, motion sensors, smoke or gas detectors, door locks, and home safes.

The global smart security management market generated revenues of about \$1.6 billion in 2015. We expect the market to grow by 28 percent annually between now and 2030, when sales will reach more than \$60 billion, fueled by increased connectivity and growing insecurity (whether

real or perceived). In fact, we used the Institute for Economics and Peace's Global Peace Index as one indicator to identify countries with potentially higher penetration rates in the future.² In countries where security is less of an issue, an aging population may raise demand for connected cameras to provide children across town, or across the country, with greater peace of mind.

More specifically, we expect the US market will be the largest globally in this category, because of security concerns and a high proportion of detached houses despite its large economy.

Energy and resource management

Devices in this category help households to intelligently manage their energy usage and reduce their bill. Examples include thermostats, heating and cooling systems, lights, water heaters, utility meters, electricity outlets, and lawn sprinklers.

The size of the smart energy and resource management market was about \$1.1 billion in 2015. We project 30 percent annual average growth out to 2030, when the market will reach \$56 billion.³ The United States and Europe will lead market growth in this category, thanks to their greater willingness or ability to pay for environmentally friendly solutions. Penetration will be lower in Asia, where infrastructure is less prepared to accommodate intelligent HEMS.

The smart home market will explode to about \$400 billion in 2030, when it will represent more than 40 percent of the total home appliance market.

The main driver of growth in the energy and resource management category will be the adoption of demand-side management, which aims to smooth out energy demand by altering household energy consumption patterns. Demand-side management can benefit both utilities and residential users: utilities profit from the reduction of peak generation capacity requirements and lower stress on the transmission grid, while consumers cash in on lower energy bills as consumption is shifted to off-peak hours. This effect will be enhanced as homes become able to store energy using lithium batteries or electric vehicles, allowing them to "stock up" on electricity when demand is lower and tap into this locally stored energy when necessary.

Convenience and comfort

Convenience and comfort is the largest and the broadest category, as it covers the majority of electrical appliances: vacuum cleaners, washing machines, refrigerators, stoves, dishwashers, ovens, and coffeemakers, as well as curtains and blinds, wardrobes, mailboxes, and a host of other devices.

In 2015, smart convenience and comfort represented around \$9 billion, a rather small percentage of the more than \$200 billion consumer appliance market.⁴ But as smart appliances become available to simplify everyday household tasks, we expect the category to post sustained average annual growth of 22 percent, reaching global sales of nearly \$190 billion in 2030.

² See the Global Peace Index at www.visionofhumanity.org.

³ Our estimates for the energy and resource management category exclude solar battery systems.

⁴ Estimate by Euromonitor, excluding televisions

Another major trend will be the incorporation of links to services outside the home. The Amazon Dash Replenishment Service highlighted earlier showcases the possibility for smart appliances to become an online purchasing platform for consumer goods. And in the future, smart analytics may be used to monitor usage levels, helping ensure that more product arrives to the household just before it runs out.

Health and wellness management

Smart health and wellness devices help users track their health status and inform them of potential risks. They can also help track patient adherence to medical treatment. Examples include smart toothbrushes, bathroom scales, thermometers, and health-monitoring toilets. This \$1.1 billion market will grow by more than 30 percent annually between now and 2030, when it will account for nearly \$70 billion in global sales. The main drivers of growth in this category are an aging population, the earlier onset of chronic diseases, an increased emphasis on preventive care and home care to keep healthcare system costs in check, and greater patient interest in taking responsibility to preserve their own health and wellness.

The integration between home and hospitals is likely to be a major trend in this category. Governments in some advanced countries are focusing more on shifting the point of care from hospitals to patients' homes to reduce cost. Smart home devices will allow remote monitoring and remote consultation, while also enabling more accurate diagnoses and customized healthcare treatment with better data collection. Medtronic's remote diabetes monitoring solution is one example, and applications will expand as big data and AI progress. In short, there will be huge new service opportunities to generate subscription revenues.

Media entertainment

Given the very nature of the media entertainment industry, many of the devices most often used to access its services—set-top boxes, tablets, and PCs—are inherently connected. Even connected televisions are becoming a commodity. Less obvious devices included in this category are Internet-connected audio systems and speakers (often with voice recognition), smart mirrors (where entertainment can be viewed), smart tables, and smart home hubs. The much-publicized Amazon Echo and Google Home, which are connected to other home appliances and are voice-controlled, fall into the media entertainment category.

In 2015, the smart home media entertainment market was \$0.9 billion.⁵ Following 15 years of 27 percent annual average growth, we estimate that smart media entertainment revenues will reach more than \$30 billion in 2030. Countries such as the United States and Japan, with high household audio and video equipment spending, are likely to be early adopters and drive much of this growth.

In the future, smart media entertainment devices will become an integrated user interface for multiple smart home devices. In fact, some may already be connected to security systems, displaying a live feed of a visitor at the door when the doorbell rings. Moreover, smart devices can also evolve to become a "personal butler" that helps its owner do errands such as booking a taxi or calling a plumber.

Staggered growth across regions

The North American market will be an early adopter of smart homes, but Asia will gradually assume a dominant market position (see figure 5 on page 8). Specifically, we forecast that

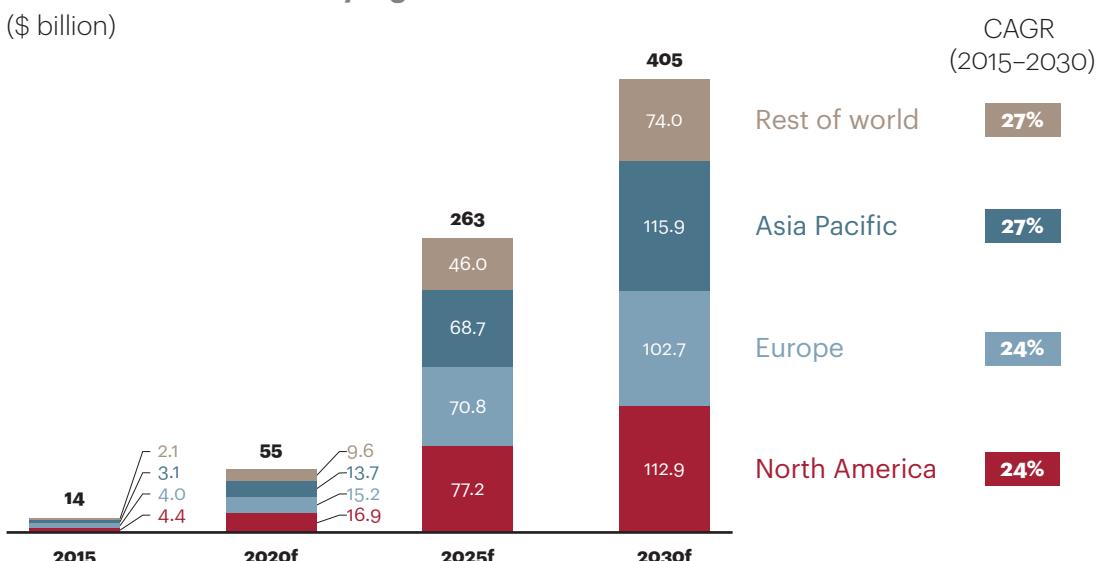
⁵ This number excludes the \$176 billion smart TV market, as well as set-top boxes and Wi-Fi routers—all of which are inherently connected.

Figure 5

Asia Pacific will gradually come to dominate the global smart home market

Smart home market size by region

(\$ billion)



Note: Numbers may not resolve because of rounding.

Source: A.T. Kearney analysis

Asia will overtake Europe by 2027 and North America by 2030. The majority of the growth will be driven by China and Japan.

North America

The **United States** has been an early adopter of smart home solutions globally. The fact that big data giants Apple, Google, and Amazon are headquartered in the United States, coupled with the existence of a strong start-up ecosystem, means that new innovations tend to be rolled out first in the US domestic market before they are distributed to the rest of the world. This trend is likely to continue over the next decade.

The US market is currently worth \$4 billion, and it is on track to reach \$100 billion by 2030 following average annual growth of around 25 percent. Given the wide range of service availability, high consumer spending, a high proportion of detached houses, and a strong do-it-yourself culture, the US market will lead the global market over the next decade in all the application categories.

Europe

Europe is the second largest region in terms of smart home revenue, with a current market size of \$4 billion that will grow to more than \$100 billion by 2030. Market characteristics differ by country due to different income levels, energy prices, consumer preferences, and product availabilities.

High healthcare expenditure per capita and aging populations in countries such as **Germany**, the **United Kingdom**, and **France** may make them ripe for health and wellness smart home systems. A connected home with health and wellness management will be able to help keep expenditures in check by aiding in illness prevention and early detection.

Households in Nordic countries such as **Denmark** and **Sweden** will lead in the penetration of smart HEMS, as these countries have long established themselves as leaders in green technology and have the highest energy consumption per capita in the region.

Asia Pacific

Asia Pacific will account for more than 25 percent of the global smart home market in 2030, when sales will reach nearly \$120 billion. Japan leads the smart home market in Asia, but China is expected to take over by 2020.

The rapid penetration of smart homes in **China** is being driven by rising household income. Among the 60 countries covered by the Economist Intelligence Unit, China will post the largest increase in the number of households with annual income of more than \$35,000 between 2014 and 2030: by 2030, 40 million Chinese households will have exceeded this threshold. Global tech firms such as Google and Amazon will have difficulty penetrating the smart home market in China due to licensing and censorship issues. Therefore, China will likely form its own ecosystem comprising homegrown tech giants such as Tencent, Baidu, and Alibaba, together with local device manufacturers such as Xiaomi and Haier, which have been actively involved in producing smart home hardware.

The North American market will be an early adopter of smart homes, but **Asia will gradually assume a dominant market position**, driven by China's strong growth.

Japan is among the top five global markets in terms of smart home penetration, which stands at 1.3 percent in 2016. The aging population and high health expenditure per capita in Japan will entice households to install connected health and wellness solutions at home. Local product manufacturers such as Panasonic, Sharp, Toshiba, Sony, Hitachi, and Mitsubishi Electric are likely to dominate the product market. Another major Japanese player in the Internet of Things (IoT) market will be Softbank after its recent \$32 billion acquisition of ARM.

Major Asian economies such as **South Korea** and **Taiwan** are expected to achieve high smart home penetration rates, given their large proportion of high-income households. Moreover, Seoul and Taipei have been placing continued emphasis on building smart nations. For example, the South Korean government recently built Songdo, a \$35 billion smart city that includes sensors to monitor temperature, energy use, and traffic flow, among many other smart features. Take-up may also be swift in GCC member countries, where governments also have ambitious plans for smart city development.⁶

Smart home penetration in **Southeast Asia** and **India** is estimated to be low due to the limited percentage of high-income families and the lack of major domestic smart home companies. The only exception is **Singapore**, where we expect smart home penetration to be high. The Singaporean government has been promoting its smart nation initiative, which aims to transform the city-state into a connected nation to improve mobility, health, living, and service standards for its residents.

⁶ GCC is the Gulf Cooperation Council. Its member countries are Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, and United Arab Emirates.

Industry Landscape: Potential Strategic Directions

As smart home platforms evolve, the industry will gradually coalesce around three key roles resembling the smart phone industry (see figure 6):

- Today, Samsung, LG, and the like are **application providers**, a category that provides end products. Many application providers, however, are also local vertical service providers such as security companies, utilities, telcos, and hospitals.
- **Platform providers** are emerging to offer smart home hubs or back-end smart home platforms. Amazon, Google, and Apple are perhaps the best known, but many application providers are also building their own platforms.
- **Component providers** are specialized in manufacturing individual electronic components such as semiconductor chips or sensors or, in the case of original device manufacturers (ODMs) and electronic manufacturing services (EMS) providers, in assembling end products.

Application providers: Who can be the next Supercell?

The future smart home application industry will have enormous potential. In many respects, it may come to resemble the mobile apps industry. Smartphones provide a full set of new business enablers—user acquisition platforms, payment platforms, Internet access—that will

Figure 6

Major roles and select firms in the smart home value chain

Industry layers	Key firms			
Application	Consumer electronics <ul style="list-style-type: none">• Samsung• Haier• LG• BSH• Philips• Panasonic• Xiaomi	Telcos <ul style="list-style-type: none">• AT&T• Verizon• Comcast• Softbank• NTT• Deutsche Telekom• Orange• Telstra	Utilities <ul style="list-style-type: none">• EDF Energy• E.ON• RWE• Vattenfall• Enel• Endesa• PG&E• Tepco	Security services <ul style="list-style-type: none">• ADT• Tyco International• Secom• G4S• iControl Networks
Platform	Smartphone OS providers <ul style="list-style-type: none">• Apple• Google• Microsoft		E-commerce platforms and portals <ul style="list-style-type: none">• Amazon• Alibaba• Baidu• Yahoo!• Tencent	
Component	Sensors <ul style="list-style-type: none">• Bosch• STMicroelectronics• Texas Instruments• Sony	System on chip <ul style="list-style-type: none">• MediaTek• Qualcomm• Intel• ARM	ODMs and EMSs <ul style="list-style-type: none">• Foxconn• Jabil• Wistron• Lite-On	

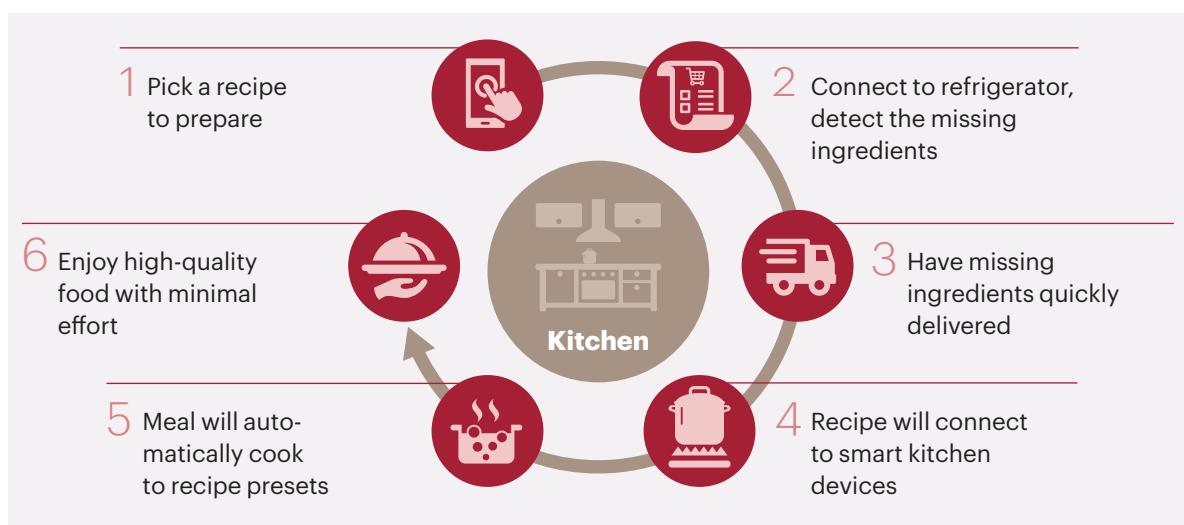
Notes: ODM is original device manufacturer. EMS is electronic manufacturing service. OS is operating system.

Source: A.T. Kearney analysis

allow the creation of new business ecosystems. And as smartphone platforms evolve and become more open, new entrants may easily create new uses for smart home applications through a combination of physical and digital goods and services.

For example, imagine you will be entertaining guests in the evening. Think about how much easier cooking could become if the refrigerator, the oven, and the gas stove were able to seamlessly communicate with one another (see figure 7). You could check possible recipes on your smartphone, based on data from your refrigerator and your preference history. After selecting the menu, your refrigerator would automatically order any missing ingredients from an e-commerce site, which would deliver them to your doorstep in less than two hours. Meanwhile, the menu and recipe information would already have been transmitted to your kitchen appliances, which have been preset to prepare the recipe. A few hours later, and voilà: a meal worthy of a Michelin-star restaurant with minimal fuss.

Figure 7
Smart cooking service



Source: A.T. Kearney analysis

The smart home applications market, however, is still in its early stages, with limited availability of highly sophisticated products, so in the short term, successful companies will apply a **product-based approach** that focuses on one or two consumer pain points. As the market evolves, though, a **service-oriented approach** will become crucial to success. Indeed, the service models themselves may become the differentiator in a market where product features are nearly identical across brands.

One potential service model is the **consumables replacement or rental business**, of which the Amazon Dash Replacement Service is the most prominent example. This model can be expanded into rental businesses for hardware. Through Internet connections, application providers monitor which products require maintenance or need to be replaced or replenished. Ultimately, consumers may pay only a monthly fee to be freed from the hassle of maintaining products, in a model similar to the leasing of copying machines.

Another model companies can pursue is that of **personalized services**, using AI to analyze users' behavioral information and tailor services accordingly. In the Internet world, personalized "services" (for example, product recommendations and targeted advertisements) based on a consumer's digital footprint are already common. This trend will extend to the physical world too as AI monitors usage patterns and offers automated services—for instance, adjusting the lighting and room temperature to prepare you to wake up, while ensuring that freshly brewed coffee is waiting for you when you get to the kitchen.

Multiproduct integrated services is the third model we examine. As we've seen earlier in this report, orchestration of multiple products will create more value for residents than the sum of single products acting on their own. The potential of this model is enormous, but so are the challenges of getting multiple application providers to work collaboratively.

In many respects, the smart home application industry **may come to resemble the mobile apps industry.**

The final service model we consider is that of **integration with physical services**. Until humanoid robots become widely available, we will still have to perform certain activities (such as folding clothes) to complement smart home products' limited functionality. Providing such add-on services may create additional value to households and opportunities for businesses. For example, a smart robotic cleaner could perform basic cleaning at home, while collecting data on spots that require deeper attention. Housecleaning companies could use this data to dispatch staff to focus on the toughest spots, thereby reducing the hours customers need to pay for (while potentially being able to charge a higher rate per hour).

If the analogy of the smartphone industry applies in the smart home applications space, the market will most likely have a short head and a long tail. In other words, a few firms such as Supercell and Niantic could make a huge amount of money, but they will coexist with a large number of smaller firms. A handful of killer apps will go viral and create tremendous value. Smaller companies may not make much money, but they will be able to survive if they keep their operating costs in check.

Platform providers: global smartphone giants versus local alliances

One of the biggest trends in the smart home arena is the rise of smart home hubs, which enable users to administer previously siloed smart home products. Although the smart home hub concept has existed for some time, it has only begun to take off with the entry of technology giants such as Google, Amazon, Apple, BSH, Samsung, and Panasonic. These companies have introduced hubs that use AI—think the Samsung SmartThings Hub, Amazon Echo, Google Home, or even just sophisticated smartphone software such as Apple's HomeKit—leading to rapid household adoption in countries such as the United States.

Not surprisingly, many companies are eager to build smart home platform businesses to integrate smart home products and applications. These companies fall into three major categories:

- **Vertical service providers**—mostly local service-oriented companies such as telcos, utilities, and security service companies that originally focused on a particular application area
- **Digital platformers** such as smartphone platformers, e-commerce companies, and online portals that are trying to expand their inherent platforming capabilities into the smart home business domain
- **Consumer electronics companies** that already provide smart home appliances

As the smart home market evolves from a product focus to a service orientation, successful platformers will need to master four elements:

1. **Control all smart home products.** A smart home platform needs to be compatible with all smart home products in order to control them. A leading platform provider will need to exert **industry influence on a global scale**, occupying a prominent place at the table where evolving communication protocols and application programming interfaces are hammered out.
2. **Provide advanced intelligence.** Although each smart home application can collect partial consumer information, a platform needs to integrate all that information and provide superior intelligence. This means successful platform providers will be equipped with **advanced big data analytics and AI capabilities**.
3. **Connect to consumers.** One of the most important roles for a smart platform—and one of the keys to enhancing its value—is to connect consumers to one another and to enterprises. Platformers that enjoy **large-scale consumer access** have an enormous head start in the race to success: large platforms will tend to grow larger, while small platforms will tend to disappear.
4. **Offer a monetization platform for application providers.** The reason why Google Play and the App Store are able to attract developers is their payment platform. Despite taking a 30 percent cut, Google and Apple allow developers to instantly access large new markets and generate potentially significant revenue. An effective, widely accepted **payment platform** will be similarly essential for smart home platforms.

Globally, a handful of companies are proficient in all four elements (see figure 8 on page 14). Only smartphone giants Google and Apple have a full range of capabilities at global scale. E-commerce titans such as Amazon and Alibaba also have those capabilities, but their geographic scope is more limited. Meanwhile, consumer electronics giants have global influence, but they may not yet be strong enough in big data analytics and AI—not to mention that they have yet to develop a robust payment platform. And vertical service providers have large-scale access to a local customer base and a well-developed local payment platform, but they are seriously lacking in global reach and in all the other major elements.

Component providers: global dominance, with room for niche companies

Component providers encompass multiple horizontal companies: system-on-chip designers, chip manufacturers, sensor producers, ODMs, EMS companies, and others. Given the fundamental technological similarity between smart home products, smartphones, and tablets, upstream technology firms are likely to retain their leadership positions. (Large ODM and EMS players may find that expansion of the smart home market could not come at a better time, as the smartphone market reaches saturation.) The keys to ongoing success will stay constant: cost leadership, technological innovation, and strong partnerships with downstream players.

Figure 8
Smartphone platformers have a structural advantage

Company categories		Global-scale industry influence	Big data and artificial intelligence	Large-scale consumer access	Payment platform
Verticals	Company categories				
Verticals	Security services	• ADT • Icontrol Networks	✓		✓ (in select countries)
	Telecoms and media	• AT&T • Comcast	✓		✓ (in select countries)
	Utilities	• EDF Energy • E.ON			✓ (in select countries)
Digital platformers	Smartphone platformers	• Apple • Google	✓	✓	✓
	E-commerce platforms and portals	• Amazon • Alibaba • Baidu	✓	✓	✓ (in select countries)
	Consumer electronics	• Samsung • Panasonic • BSH	✓	✓	✓

Source: A.T. Kearney analysis

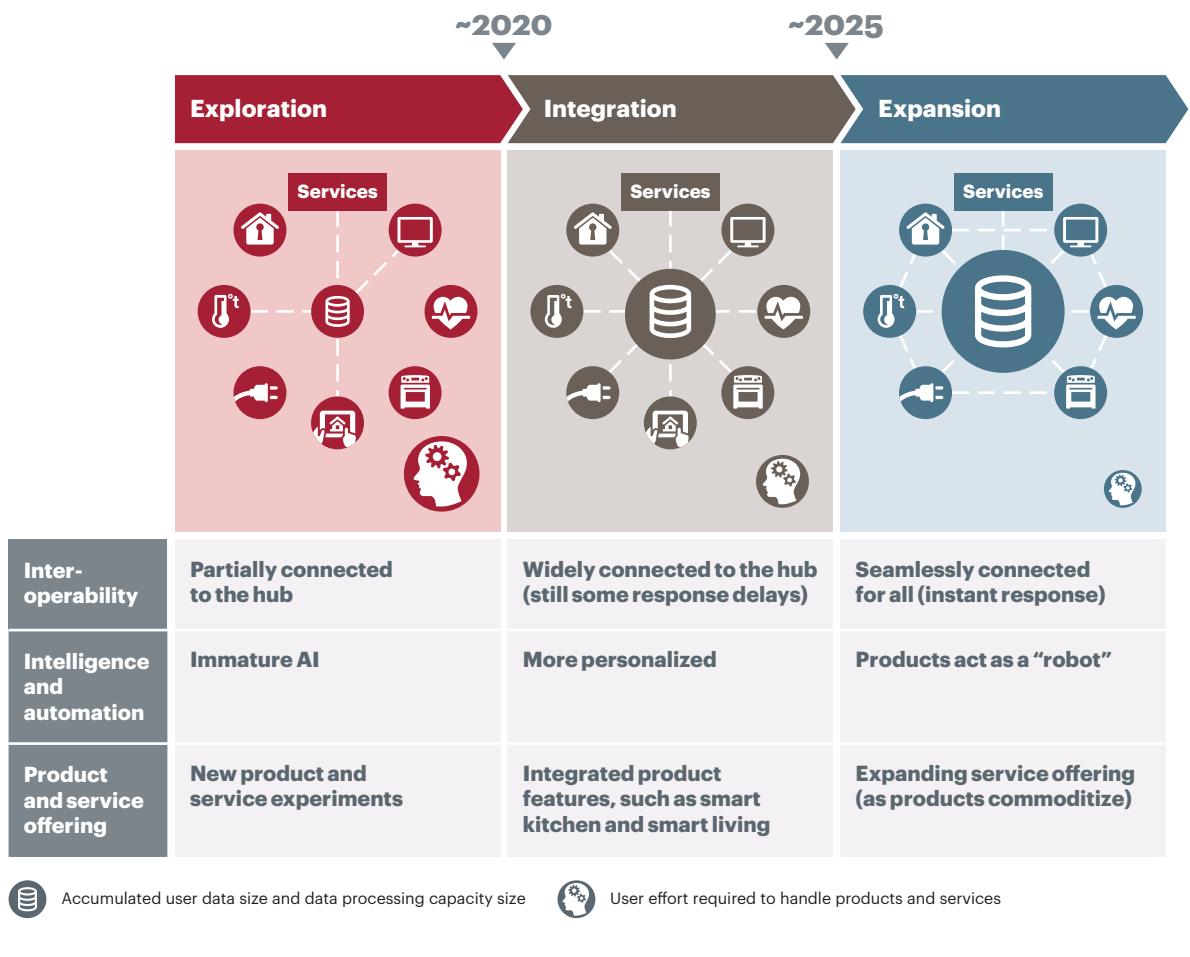
Although we believe the landscape will remain mostly unaltered, certain approaches may offer opportunities to niche companies. For example, producers of customization toolkits will be in demand, as application developers look to make their offerings available to a multiproduct industry without expending significant design effort. Although this industry has been dominated by large global companies, 3-D printers and fabless manufacturing will support the market entry of new companies.

Navigating the Future of Smart Homes

The smart home is often interpreted in various ways, making it difficult to grasp the essence of industry trends. Having a clear view of how the industry may evolve, however, is the key for success. The smart home industry is in the **exploration** phase—many companies are experimenting with new products or services while improving interoperability and advancing AI—so industry ambiguity will continue to linger. The turn of the decade in 2020 will usher in an **integration** phase: newly purchased home products will be smart by default, incorporating connectivity and certain intelligent functions as standard features. After this point, most electronics products will be widely connected to the hub, and products and services will be more integrated and personalized. The **expansion** phase will begin around 2025.

Interoperability will no longer be an issue, and AI will be very advanced—making smart home products similar to a robot. The products themselves are likely to become commodities, so value will largely shift toward services (see figure 9).

Figure 9
Evolving smart home concept



Source: A.T. Kearney analysis

Given that the industry is still taking shape, opportunities lie ahead for many types of companies. Here are four success factors to keep in mind:

- 1. Balance a local and global strategy.** Smart home is not smartphone—a one-size-fits-all multi-country strategy is a recipe for failure. Market strategies for smart homes, much more than for smartphones, will have to be adapted to each geography. While a common platform may work across multiple geographies, the services will need to be tailored to meet local needs. For example, health and wellness management applications will require collaboration with local hospitals or pharmacies, local e-commerce or logistics support will be critical for the evolution of convenience and comfort applications, and security management applications will have to connect to local security services or the police. Furthermore, smart home adoption hinges on a complex set of locally variable factors such as regulations, privacy and security concerns,

industry value chains, home application standards, and industry infrastructures (utilities, telecommunications, securities, and health services, among others) (see sidebar: Privacy and Cybersecurity Concerns). This means that market readiness and market characteristics can be very different even at the city level, so it is important to choose markets carefully and tailor strategies to each market.

2. Begin with product, but quickly evolve to service. Given the limited availability of sophisticated products, the first imperative will be to resolve product issues. As the market evolves, though, a service-oriented approach will become crucial to success especially for application developers—and it will also be important for platform and component providers to support application developers and prepare for the future commoditization of products. Initially, a simple service model that captures the true consumer pain points may be the key—for example, a rental or consumable replacement service model with some degree of personalization. As AI advances and product functions grow more sophisticated, either developing more personalized and integrated services to orchestrate multiple products or connecting to physical services will be the battleground for innovation. Choosing the monetization model (whether based on subscriptions, pay-per-use, or transaction fees, among other options) will also be a crucial decision point, just as it is with current online businesses.

3. Partner to win. Although smartphone platformers such as Google and Apple start off the race with structural advantages, opportunities also exist for other firms such as telcos, security companies, utilities, consumer electronics companies, and online companies. For example, global consumer electronics players (with global industry influence) could team up with local service companies such as telcos or utilities, which could provide customer access and payment platform capabilities. Alternatively, local Internet giants (with a payment platform, customer access, and big data capabilities) could partner with globally influential ODMs. Or global consumer electronics companies could work with local home builders and real estate developers to gain access to local customers. The smart home industry comprises multiple sectors and value chains that differ by geography; hence, partnering with other industry players is inevitable. Who to partner with is the strategic question for all market participants—and will largely determine how much value they capture.

4. Make the decisive first move. The market is taking off, and the potential is enormous. If our market forecast of more than \$400 billion by 2030—equivalent to Thailand’s current GDP—is correct, the smart home market could be the most promising area of growth in the entire technology sector. The industry’s most significant pain point is the lack of a truly integrated platform. The smart home market has been fragmented and siloed: security

Privacy and Cybersecurity Concerns

One potential barrier to smart-home adoption is consumers’ concerns about privacy and safety. In the wake of revelations about widespread snooping by the US government, news articles claiming state-sponsored hacking, and high-profile data

breaches, people might avoid connecting new aspects of their lives to the Internet, especially for smart-home applications where a cybersecurity breach could not only violate their privacy but, more importantly, put their physical safety at risk.

Application developers will need to make security a top priority when developing products. One case gone wrong can cause enormous harm to a company’s reputation and finances while also delaying the entire category.

management was covered by security services companies, media service was provided by telcos, and energy management was the domain of electric utilities. Despite improved interoperability and the recent launch of several smart home hubs, no one has yet managed to offer a suite of compelling, integrated services that consumers can control via a unified customer interface. The first companies to successfully launch an integrated platform will achieve a decisive advantage by locking in significant market share that competitors will struggle to shake loose.

Companies that pay attention to these points have a chance to play in what promises to be an exciting and lucrative market for decades to come.

Authors



Naveen Menon, partner, Singapore
naveen.menon@atkearney.com



Nikolai Dobberstein, partner, Mumbai
nikolai.dobberstein@atkearney.com



Sridhar Narasimhan, partner, Singapore
sridhar.narasimhan@atkearney.com



Tomoo Sato, principal, Singapore
tomoo.sato@atkearney.com

Appendix

Definition of smart home

Smart home products are defined in this report as products that contain one or more of the following features on top of their original functions:

- **Data detection**, such as via a sensor or camera, to determine behaviors of the device
- **Internet connectivity** so the device can enhance its functions by collaborating with other smart devices
- **Data analytics or artificial intelligence**, whether centralized (that is, stored in the cloud or operated through other smart devices) or decentralized in the individual device
- **Remote control and monitoring**, whether via a smart home hub, a smartphone, a smart TV, a tablet, or its own controller

Market model methodologies

Inputs

Using forecast data from the Economist Intelligence Unit for 2015–2030, we extracted the **income distribution by household for each country** and used this to identify the addressable size for each country.

Next, we used a variety of data to segment the countries into tiers for each of the five application categories. For security management, we used a combination of the **Global Peace Index** to identify security levels in a country and the **percentage of population above 65 years old** as a proxy for aging population. **Energy consumption per capita** was used for energy management, while **GDP per capita** was used to segment the countries for the convenience and comfort application category. For the health and wellness management category, **health expenditure per capita** was used. Finally, we classified countries based on **audio and video equipment demand per household** for the media and entertainment group.

The price of items is based on a compilation of about 50 smart home appliances and equipment and their current market price.

Coverage of each application category

The following list is not exhaustive:

- **Security management:** security cameras or monitors, fire alarms, door locks, and security boxes
- **Energy and resource management:** thermostats, air conditioners, fans, room heaters, lighting, electricity plugs, water heaters, meters (electricity, gas, water), sprinklers, and windows
- **Convenience and comfort:** vacuum cleaners, washing machines, dryers, curtains, blinds, wardrobes, mailboxes, refrigerators, gas stoves, microwave and conventional ovens, dishwashers, tea kettles, coffeemakers, and juicers
- **Health and wellness management:** toilets, toothbrushes, bathroom scales, medical thermometers, shavers, hair dryers, humidifiers, water taps, beds, and pillows
- **Media entertainment:** audio systems, speakers, mirrors, smart tables, and smart home hubs

Countries

Algeria, Argentina, Australia, Austria, Azerbaijan, Belgium, Brazil, Bulgaria, Canada, Chile, China, Colombia, Czech Republic, Denmark, Ecuador, Egypt, Finland, France, Germany, Greece, Hong Kong, Hungary, India, Indonesia, Iran, Ireland, Israel, Italy, Japan, Kazakhstan, Malaysia, Mexico, Netherlands, New Zealand, Nigeria, Norway, Pakistan, Peru, Philippines, Poland, Portugal, Romania, Russia, Saudi Arabia, Singapore, Slovakia, South Africa, South Korea, Spain, Sri Lanka, Sweden, Switzerland, Taiwan, Thailand, Turkey, Ukraine, United Kingdom, United States, Venezuela, Vietnam

Products versus services

Our projection considers two main business models in the smart home market. The first is the traditional product purchase method, where users make a one-off payment to own the product. The alternative is a subscription-based model, where users pay a monthly fee for services rendered by a firm. In the latter case, users receive the equipment on loan instead of owning it.

New installation versus replacement

For consumers who choose to pay a lump sum to own the equipment, our model also factors in the cost of replacement, where households will need to buy brand-new equipment to replace older equipment whose useful life has expired.

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