



**IoT NOW
ANALYST REPORT**

SMART HOMES

**Will whole-home systems
dominate point solutions as
the market matures?**

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From smart lights and home security systems to connected toasters



Martin Bäckman,
Berg Insight

Smart homes and home automation are ambiguous terms used in reference to a wide range of solutions for controlling, monitoring and automating functions in the home, writes Martin Bäckman, an IoT analyst at Berg Insight. Smart home systems can be divided into point solutions and whole-home systems. Smart home point solutions are designed for a specific functionality such as climate control, video monitoring or access control. Examples of this type of product include smart thermostats, smart door locks and smart lighting systems

Whole-home solutions consist of two or more point solutions that can be controlled from a unified user interface. In its simplest form, a whole-home system can, for instance, consist of a smart thermostat and a smart plug that can be controlled from the same smartphone app. However, in its more advanced forms whole-home systems can be comprehensive solutions that are used to control and automate everything in the home from access control and entertainment systems to window blinds.

Connected devices now cover all areas of the home

There are various application areas in the home for smart and connected solutions. Seven primary categories can be found: security and access control systems; energy management and climate control systems; audio-visual and entertainment systems; lighting and window control systems; healthcare and assisted living systems; home appliances; and service robotics. The most ▶

North America is leading the smart home market

North America is the most advanced region in the world for smart home solutions. At the end of 2018, an estimated 28.8 million homes in the region were equipped with at least one smart home device. This represents market penetration of 20.3%. Europe is still behind the North American market, in terms of market penetration. A total of 29.7 million European homes had one or more smart home devices installed at the end of 2018, which gives market penetration of 12.9%. The installed base of smart home solutions are expected to grow substantially in both regions in the coming years. North America will continue to be the most mature market and reach market penetration of close to 44% in 2022. The European market will be larger in terms of number of smart homes but will stay behind in terms of market penetration, at around 36% at the end of 2022.

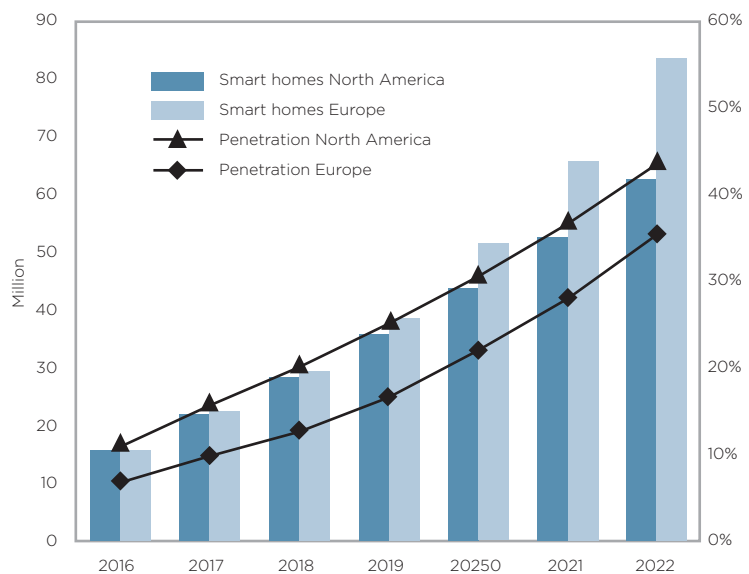


Figure 1: Smart home penetration and installed base (Europe and North America 2016-2022)

Source: Berg Insight

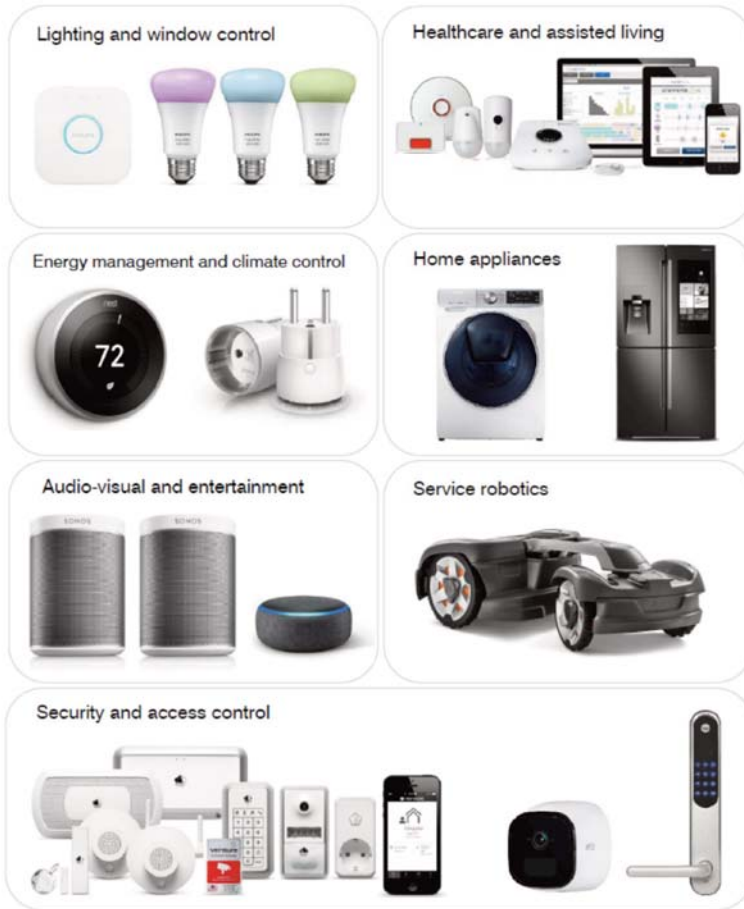


Figure 2: Smart home product categories

Source: Berg Insight

popular smart home product category today is audio-visual and entertainment systems, largely due to the success of voice-controlled smart speakers. These are followed by energy management and climate control systems. The total installed base of smart home products in Europe and North America at the end of 2018 reached an estimated 362 million devices.

Security and access control

The security and access control category comprises smart home devices such as alarm systems, door locks, garage door opening systems and video surveillance cameras. Alarm systems has been one of the first smart home market segments to gain traction. Interactive features such as arming and disarming the alarm systems from a PC over the internet emerged in the early 2000s. However, the popularity of these features really started to take off around 2010 when smartphones and smartphone apps became commonplace. The latest generation of monitored alarm systems often have a range of optional add-on accessories such as video surveillance, smart door locks, smoke alarms and carbon monoxide detectors. Self-monitoring using connected video cameras is also gaining traction as a stand-alone solution for the smart home. Major vendors of interactive home alarm systems include **ADT, Verisure and Vivint.**

Energy management and climate control

The energy management and climate control category comprises smart home systems that are used to manage energy usage and control temperature, humidity and ventilation in homes. The most popular products in this category today are smart thermostats, smart air conditioners and smart plugs. In addition to this a broad range of new connected devices such as heat pumps and water heaters are emerging on the market. The benefits of connected climate control systems go beyond convenience and the ability to remotely control the home climate. They also help users save energy and in turn reduce their energy bills. For example, smart thermostats can adapt to weather conditions and be programmed to turn off heating during the day when the home is empty and turn it on again in the evening when family members return to their home. The market for smart thermostats is led by **Nest, Honeywell and Ecobee.**

Audio-visual and entertainment

The audio-visual and entertainment systems category includes control of multi-room audio, TV and video systems. Audio-visual and entertainment systems are popular in mid-range and high-end home automation installations but uncommon in low-end systems. Multi-room audio is a very popular smart home point solution in this category, which was pioneered by **Sonos** but is now also offered by companies such as **Bose, Denon and Harman Kardon.** In recent years, voice-controlled smart speakers from companies such as **Amazon, Google and Apple** have been introduced to the market and these have made a significant impact on the smart home market.

Lighting and window control

The lighting and window control category consists of smart home systems that are used to control lights, window blinds, window shades and the opening and closing of windows. Lighting control can be used to adjust the mood in the room and schemes can often be designed for different situations such as morning, movie night and party. Window and shade control has mainly to do with opening windows for ventilation as well as reducing solar glare and heat gain so that the home remains comfortable at all times of the day. There is also an energy management component in both segments. For instance, a smart lighting system can be configured so all lights are automatically turned off when the user leaves the home. Similarly, the operation of window blinds can be automated in an intelligent way so that the use of energy-consuming heating, ventilation and air conditioning (HVAC) equipment can be reduced. Smart light bulbs are one of the most popular smart home device ▶



categories and are often the first smart home product consumers purchase. **Signify** sells smart lighting products under the **Philips HUE** brand and is the market leader. Other major vendors in the category are **IKEA, Osram, Hive, Lutron** and **LIFX**.

Healthcare and assisted living

The healthcare and assisted living category comprises smart home devices that enable continuous monitoring of the user's activities and well-being. The most common devices in this category are sensors in the home, such as motion sensors, front door open/close detectors, fridge open/close detectors, pressure mats and bed and chair occupancy sensors. Smart healthcare and assisted living solutions are evolved versions of traditional assistance systems that usually are called telecare systems or social alarms in Europe and personal emergency response systems (PERS) or medical alert systems in North America. This type of system is offered by telecare market leaders such as **Tunstall** and **Legrand**, as well as by new entrants such as **Doro, Greatcall, H2AD, Essence Group** and **Gorvo**.

Home appliances

The home appliances category comprises a wide range of products such as washing machines, dryers, dishwashers, refrigerators, freezers and ovens. For consumers, the main benefit of appliances being connected to the Internet includes notifications of events such as when the refrigerator door has been left open or when the clothes have been washed. Also, features such as remote start and pause allow users to control their appliances when away from home. Global market leaders in the category such as **Whirlpool, Haier, Electrolux, Bosch** and **LG Electronics** offer a growing product portfolio of connected appliances.

Service robotics

The service robotics market comprises various types of robots which can be used in the home environment. For the average consumer, robots are commonly used for tedious and repetitive tasks such as domestic chores or for leisure and entertainment purposes. The most common service robots developed for the home include robot lawn mowers, floor cleaning robots, assistant robots and telepresence robots. **Husqvarna, Robomow** and **Zucchetti Centro Sistemi** offer robot lawn mowers while **iRobot, Neato Robotics** and **Dyson** sell robots for floor cleaning. These types of robots have previously functioned as point solutions and been controlled through the companies' own apps, but are now increasingly part of wider smart home systems.

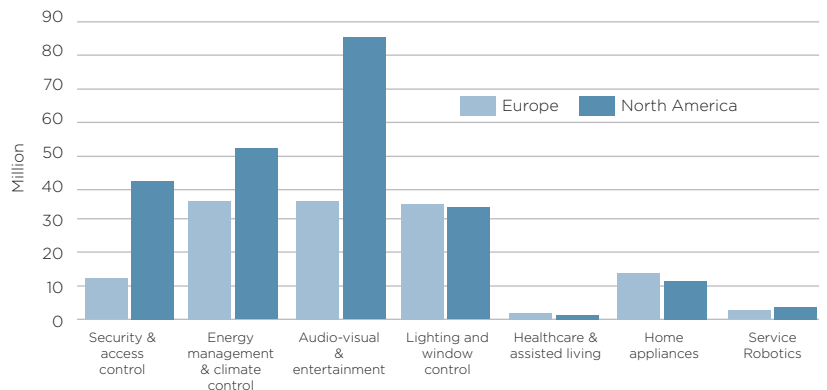


Figure 3: Installed base of various smart home categories (Europe and North America 2018)

Whole-home systems

There are several actors offering complete smart home systems where the user can control everything from window blinds and lights to audio systems and alarm systems, all from a single unified interface. The market is served by a diverse set of vendors with different industry backgrounds. The home automation specialists **eQ-3, Control4** and **Crestron Electronics** were some of the first companies offering complete smart home systems. Today, they are seeing increasing competition from ICT industry giants such as **Google, Samsung** and **Amazon**, telecoms operators such as **AT&T** and **Deutsche Telekom**, monitored security providers such as **ADT** and **Vivint** as well as consumer electronics companies such as **D-Link** and **TP-Link**.

Multiple connectivity standards are used in smart homes

There are many different connectivity standards used in the smart and connected home space. This allows vendors and end-customers to have options for any scenario, but has also caused fragmentation in the industry. Incompatibility among home connectivity technologies increases the level of complexity and uncertainty that consumers and vendors face, which in turn slows down the development of the industry as a whole.

The most common protocols for wireless communications between smart home devices and the hub are Z-Wave, Zigbee, Bluetooth and Wi-Fi. KNX is one of the most common wired

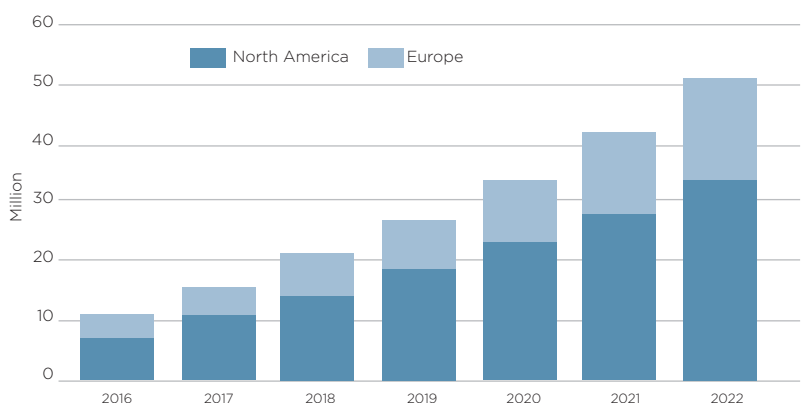


Figure 4: Cellular connections in the smart home market (Europe and North America 2016-2022)



communication protocols. Several company-proprietary communication protocols also exist. Fixed broadband is the primary communication channel between smart home devices and back-end servers. However, cellular technology is used as primary or secondary communication channel to a large extent in the security and access control segment as well as in the healthcare and assisted living segment. Cellular connectivity can also be suitable for smart plugs, thermostats and other HVAC products that can work independently in, for example, vacation house settings that lack fixed broadband connectivity. Furthermore, the mobile operators in North America and Europe are in the midst of rolling out LTE-M and NB-IoT networks which can be a suitable alternative for smart home products such as smoke detectors and door locks.

services in addition to security solutions. These include, for instance, smart plugs, door locks, lights, appliances, climate systems and more that can be controlled from the same app as the home alarm. The rationale behind investing in a home security system is straightforward. Residences are of high value and people are willing to pay to protect their properties. When a home security system is in place, it is easy for users to add various smart home products. Adding smart home products and services to the existing home security offering has been a successful go-to-market strategy for security companies, especially in North America. The region has around 9.5 million interactive security subscribers, meaning they can control the alarm through an app or web interface. An estimated 37% of these, or 3.5 million subscribers, also has one or more smart home products connected to the system.

Home automation offered by leading security system vendors

Many of the leading providers of traditional home security systems including ADT, Verisure, **Prosegur** and **Securitas** have in recent years started to offer smart home products and

The popularity of smart speakers boosts smart home product sales

In recent years smart speakers with built-in voice assistants from companies such as Amazon, Google, Apple, **Alibaba** and **Microsoft** have become a success. A total of more than 100 million devices have been sold in 2016-2018. North America is by far the largest market globally, but Europe is now catching up. Voice controlled speakers have made consumers aware of the benefits of the smart home and in many ways paved the way for other smart home device vendors. The value of having a smart speaker also increases when more devices such as thermostats, lights and cameras are connected and possible to control using voice commands. Due to this reciprocal relationship between voice-controlled speakers and smart home devices many vendors have made their products and systems compatible with Amazon Alexa, Google Assistant and others. Consumers now also expect smart home devices to be functional with smart speakers from the leading brands.

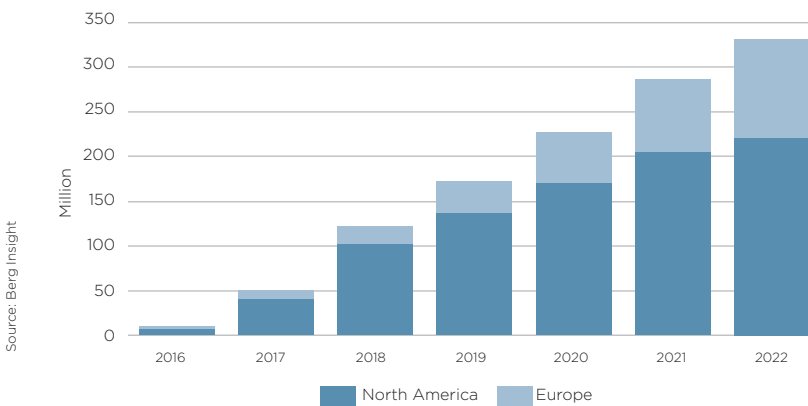


Figure 5: Installed base of voice-controlled speakers (Europe and North America 2016-2022)

BERG INSIGHT



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