Market Trends: Connected Home Platforms
Unify Use Cases and the User Experience

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Connected home solutions are maturing. By 2020, fragmented point solutions will be integrated into ecosystems such as Apple HomeKit, Amazon Alexa and Samsung SmartThings. Product leaders must design to standards and differentiate around core competencies.

Key Findings

- Current point solutions in the future will be integrated around vendor-certified ecosystems, creating use value by combining multiple applications around a single user interface.
- Use models and the user experience benefit from platforms that securely integrate devices, facilitate installation, and create new, monetizable value.
- In 2015, less than 200 million home automation products were sold. This burgeoning market, however, will grow aggressively to about 2 billion products by 2020, with significant regional differences.

Recommendations

Product leaders:

- Participate in the Apple HomeKit ecosystem if your hardware architecture meets the semiconductor requirements and you are willing to submit to a thorough certification process.
- Participate in Samsung SmartThings, Amazon Alexa, Open Interconnect Consortium or other certified platforms to leverage synergies and incremental revenue streams with ecosystem partners, creating real value, brand equity and customer retention.
- Build unique, differentiating solutions around your company’s core competencies without reinventing proven standards.

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Introduction

Home automation products have been marketed for decades, but these legacy products and platforms are now in the process of being disrupted and redefined by the Internet of Things (IoT) and especially the myriad of sensor-enabled devices embedded throughout the home. Gartner defines connected home devices as networked devices, with services and apps that are delivered over multiple interlinked and integrated systems. Services and apps are delivered over devices,
sensors, tools and platforms. We view connected home devices as a part of the burgeoning market of the Internet of Things (see "Hype Cycle for the Connected Home, 2015").

The connected home automates appliances and use cases in the home, and contextualizes them with cloud-based apps and services. Today’s fragmented point solutions are in the process of being integrated, and this convergence creates new business opportunities for technology and service providers (TSPs) that understand the enabling technology platforms and build differentiated solutions.

In this document, we describe the value creation of platform-based solutions over stand-alone products. We identify some of the early leaders in connected home platforms, comparing the way these platforms leverage existing physical layer technologies, how they authenticate and integrate connected elements. Finally, we contrast the way in which platform providers and industry consortia certify and manage participation in their respective ecosystems.

The market is expected to bear only a handful of competing ecosystems with a critical mass of interoperable devices. Product leaders for connected home devices should study this document to gain an understanding of where ecosystems provide value, how markets and buying trends are evolving, and what some of the most promising vendor ecosystems are today. Note that your product may be associated with multiple ecosystems and that participation in one does not necessarily preclude you from joining others.

**Market Trend**

**Personal Technologies Are Disrupting Legacy Home Automation and Home Security Markets**

Personal technologies and digital business models are challenging markets and vendors of home automation and particularly home security through the introduction of commoditized low-cost, easy-to-install sensor devices and cameras. Cloud infrastructure and mobile device apps create a new use paradigm that is based on affordable and ubiquitous connectivity. Home networking connectivity based on new wireless standards allows the installation of devices without wiring or costly service provider "truck rolls." This has opened up market opportunities for new entrants, creating new market structures and market dynamics.

**Market Structure Trend**

**Today's Connected Home Solutions Are Fragmented and Noninteroperable**

In its currently nascent state, the global market for connected home products still shows the typical signs of fragmentation. Recognizing the market opportunity, startup companies as well as established, branded vendors have rushed to market with early products that attempt to set barriers to competitive entry and establish first-mover advantages. Funding for startups in the connected home and brand extensions of existing brands have contributed to this early stage of fragmentation.
Most of these early product examples have attempted to solve a single problem within the connected home, and these point solutions typically have a monolithic, stand-alone existence.

These early point solutions leverage the Internet and mobile apps to allow the home owner to monitor and manage these solutions remotely. Usually, each of these point solutions comes with its own app. Examples for these early solutions include smart lighting systems such as Philips Hue, connected thermostats like Nest, cameras such as Nest Cam, or smart door locks like products from Schlage. Although connected through the home’s Wi-Fi access point to a cloud-based service (thereby satisfying Gartner’s definition of a connected home product), these early product releases did not communicate with each other. Conditional rules (“If-This-Then-That” — IFTTT) were typically programmed with a single device responding to a trigger event. As a consequence, users with multiple connected home devices have to install multiple mobile apps, create separate sets of rules, and thus manage each use case individually.

This portfolio of stand-alone point solutions is now in the process of being disrupted by vendor- and industry consortia-driven platforms that aim to converge products into a single network, a single management and user interface, and an aggregated rule base (“If-This-Then-That-And-That-And-That …”), as illustrated in Figure 1.
Figure 1. Integrated Ecosystems Create Value in the Connected Home

Today’s disconnected, fragmented home solutions create little value: sprinkler systems, home surveillance, appliances, garage doors, lighting systems, pet feeders, thermostats, baby monitoring cameras and so on.

Source: Gartner (March 2016)

Tomorrow’s connected home ecosystems integrate solutions, creating synergy and user value.
The current state of the market is depicted in the left side of Figure 1 — interesting connected home solutions exist today, but these are isolated, serving point solutions such as lawn irrigation, home surveillance, home appliances, garage door openers, lighting, baby monitoring cameras and thermostats. Each vendor and application has its own app and its separate set of IFTTT rules or similar, and the user is required to manage them separately and individually. There is some use value that can be monetized, but competition and commoditization are already setting in.

The future state is depicted on the right side of Figure 1. The boundaries that divide the different use cases go away and make way for synergistic collaboration. All solutions are now integrated into fewer apps or even one single app, making the user experience much easier and intuitive. IFTTT rules can be set up across functions and achieve a much higher degree of automation. Given this superior user experience, higher functionality and synergistic integration, customers will show a higher propensity to spend, and monetization across the entire connected home will be easier.

**Combined Unit Shipments Approach 2 Billion Units Annually by 2020**

The opportunity and addressable market for connected home devices and associated services has yet to ramp, as forecast by Gartner’s Internet of Things projection. From 2015 through 2020, unit shipments for home automation, security and energy management systems will ramp up by an order of magnitude, reaching close to 2 billion units shipped annually in 2020. For further information, see "Forecast Analysis: IoT Endpoints — Sensing, Processing and Communications Semiconductors, Worldwide, 2015 Update."

The industry has recognized the promising and sustained growth opportunity in the connected home and therefore is aggressively rolling out early products and covering white spaces. Figure 2 shows Gartner’s growth forecast for home automation, security and energy management systems.
Buyer Trend

Buyers Move From Point Solutions to Integrated Platforms by 2020

Household buying behavior will prompt and accelerate the proliferation of connected home products that are integrated into interoperable vendor ecosystems. The driver for integration lies in the use value thus generated, and this will cause buyers to largely abandon products that offer only stand-alone point solutions and cannot be integrated in wider solutions. To broadly illustrate this buyer trend, we will highlight different buyer behaviors in mature markets.

Given the accelerated growth of IoT and the commoditization of products and price points, Gartner anticipates disruptive changes in the mature market dynamics by 2020. For example, buyers will be selecting connected home systems that integrate into large, established ecosystems controlled by certification of large ecosystem providers, such as Apple and Google.

In mature markets, 5% of the current installed base is installed and managed by service providers and only a tiny percentage can be considered as belonging to a vendor ecosystem. The overwhelming rest of the installations are installed by the end customer without any “truck roll” from a service provider, and they serve stand-alone point solutions. We expect this percentage of service provider installed products to change dramatically in mature markets by 2020, when the vast majority will be used as platform-adhering products.
By 2020, the minority of connected home sales will be managed by service providers, and the percentage of stand-alone, do-it-yourself point solutions will diminish.

Technology Trend

As a first step to shed light on the competing ecosystems in the connected home, we turn to the definition of connected home devices, their different hardware designs and why different ecosystems apply to different hardware architectures.

Connected Home Devices Interact With Cloud-Based Services

Devices in the connected home are a part of the burgeoning market of IoT (see "Hype Cycle for the Connected Home, 2015"). The Gartner terminology distinguishes between "connected devices" and "smart devices." Connected devices:

- Have the capability to be connected to the Internet.
- Actively interact with a cloud-based service via an application programming interface (API).
- Leverage services that may be monetized by a service provider or offered free in consideration of other value created.

Examples for such connected devices include home thermostats connected directly to a Wi-Fi access point and interacting bidirectionally with a service that gives the user the ability to manage settings via a smartphone or a user-defined set of rules.

Devices in the Connected Home Form a Hierarchy of Networked Elements

The different use cases for connected home devices mandate different hardware architectures, which in turn define the ecosystems through which they are connected. The device classes and their corresponding hardware architectures are discussed and contrasted in "Market Insight: Connected Home Stack."

Simple door sensors, for example, lack the compute capabilities to run TCP/IP for precise IP addressing, whereas more sophisticated hubs and cloud gateways are equipped with apps processor-class CPUs that drive the user interface, process communications, and have the capability to provide connectivity and security at a different level.

It is therefore necessary to recognize that some of the different standards and ecosystems reflect and are based on the different layers of networking connectivity. We identify standards that operate at:

- The physical layer
- The authentication layer
- The application layer

Product vendors should identify and adopt standards of interoperability and leverage ecosystems to enhance use value.
Leverage Existing Networking Standards at the Physical Layer

Connected home product architects should not consider the reinvention of physical layer and transport layer technologies to enable their solutions because of the existing, interoperable industry standards available today. The various physical layer (PHY) technologies provide reasonable trade-offs between the different bandwidth requirements and network latency constraints imposed by the application. Moreover, existing silicon solutions are available from multiple sources (with the exception of Z-Wave) and are sufficiently commoditized for mass market adoption.

- Use 802.11n or 802.11ac and leverage its ubiquitous adoption for bandwidth-intensive and latency-sensitive traffic; use Wi-Fi Protected Access II (WPA2) as secure authentication/encryption/security standard to prevent unauthorized network intrusion.
- Use 802.15.4 PHY silicon to network simple sensor devices (such as temperature monitors, door locks and motion sensors), and leverage this wireless band to service ZigBee, Z-Wave or Internet Protocol version 6 over low-power wireless personal area networks (6LoWPAN), using their respective encryption standards and encryption key methodologies for network security.
- Use existing power line and radio frequency (RF) network standards in niche applications (for example, brick-walled buildings where Wi-Fi has difficulty in penetration) or very low bandwidth requirements.
- Leverage the HTTP protocol and Secure Sockets Layer (SSL) security as your data link layer standards and Internet Protocol version 6 (IPv6) for network layer packetization.

Emerging Vendor Ecosystems Will Standardize Interoperability and Enhance Use Value

Having noted the importance of leveraging existing network standards at the lower layers, we now highlight the emerging vendor ecosystems. These are mainly platforms that allow devices to:

- Introduce themselves to the network.
- Describe the nature of their features by means of tags and schemas.
- Request authentication, encryption and data transfer between themselves and the network.

Product leaders must understand which of these ecosystem schemas to adopt, comply with and leverage for co-marketing. Participation in these ecosystems will boost their products’ use value and facilitate user interaction through a shared app or user interface. These ecosystems vary according to their provenance (device OEMs or cross-company consortia) and their governance (tightly controlled certification process versus loosely defined specifications). The following section highlights some of the emerging ecosystems that product leaders for connected home vendors should consider. Each platform is described along the following lines:

- Which layers of the communication stack are affected by a vendor’s specifications
- An ecosystem’s organizational and governance principles
- Membership highlights (per January 2016)
Recommendations for product leaders of device makers

Apple HomeKit

Communications stack layers covered by HomeKit's specifications

Apple HomeKit is unique among the ecosystems in that it specifies the processing chipset of devices. Supported chipset makers include Texas Instruments (ARM Cortex-M4-based CC3200 SimpleLink), Marvell (88MC200) and Broadcom (BCM20706). HomeKit leverages existing physical layer standards: Wi-Fi and Bluetooth Low Energy (BLE) are the primary physical protocols, and only under special circumstances will bridging into ZigBee and Z-Wave networks be enabled. Device portfolios are managed and certified through the Made for iPhone (MFi) program. HomeKit reaches all the way into the application layer by utilizing Siri, Apple’s virtual personal assistant (VPA) technology, as a speech-enabled user interface for HomeKit-attached device management.

Governance principles

Apple tightly regulates the portfolio of devices connected to and interacting with its ecosystem. It does so by allowing only devices using HomeKit-certified chipsets and firmware to communicate with the network members. Bridge products into products and protocols outside of the HomeKit ecosystem also require MFi authorization. Apple specifies that each attached bridge can support up to 100 endpoints or "things." An Apple TV device running Siri as a VPA is used to manage the HomeKit system as well as devices attached to bridges.

Membership highlights (per January 2016)

HomeKit-certified connected home systems currently include ecobee3 thermal automation (hub-connected, remote sensors are placed around the home, requiring no installation service; Siri is used for system management) and Lutron light switches and dimmers, as well as Philips Hue light bulbs.

Recommendations for product leaders of device makers

Product leaders should consider participating in the HomeKit program if their hardware architecture uses one of the certified semiconductor solutions and they are willing to submit to a thorough certification process. Benefits of participation include co-branding and co-marketing opportunities within the HomeKit ecosystem and a seamless customer experience when connected to products within this ecosystem.

Samsung SmartThings

Communications stack layers covered by Samsung SmartThings' specifications

The Samsung SmartThings hub connects to an existing router via Ethernet (using IPv6) and bridges into ZigBee and Z-Wave networks. Authentication and encryption/security are therefore handled.
Governance principles

Connected home products can be certified by SmartThings and are listed on Samsung's website. The SmartThings value proposition to the end user states that there are no contracts or service fees, and that device setup is user-friendly. The user manages connected home devices through a free smartphone app (Windows and Android) and through the SmartThings hub device.

Current membership number (per January 2016)

After Samsung's acquisition of SmartThings toward the end of 2014, coverage of Samsung's connected home strategy remained low key. However, at CES 2016 in Las Vegas, Samsung showcased a wide variety of third-party products that are now integrated into the platform and are interoperable. Examples include connected door locks from Schlage, Yale and Kwikset, ADT security devices, Samsung-branded sensors (for motion, door and water leaks), Samsung’s robotic vacuum cleaner, lightbulbs by Philips and Osram, Amazon Echo and thermostats by Lyric, or ecobee. These portfolio of integrated devices makes Samsung's SmartThings platforms one of the most prolific ecosystems in the connected home today.

Recommendations for product leaders of device makers

Product leaders should consider SmartThings as an ecosystem with depth and breadth of product range. They should also bear in mind that Samsung’s top vendor position in global smartphone shipments provides an installed base for the management of the connected home.

Open Interconnect Consortium (OIC)

Communications stack layers covered by the OIC's specification

Open Interconnect Consortium-compliant devices typically run over Wi-Fi networks with an IPv6 stack. The authentication of devices on an OIC network is defined by an implementation of Internet Engineering Task Force (IETF) RFC 7252, also known as Constrained Application Protocol. Yet another IETF standard, RFC 7049, also known as Concise Binary Object Representation, describes the resource to the network. Encrypted security schemes are openly documented for device vendors to implement.

Governance principles

The OIC was formed as a consortium of multiple key supply chain players for connected home products such as Intel, Atmel, Cisco, Samsung, Dell, GE and Honeywell. The OIC caters to both connected business models: the self-installed consumer products as well as the service provider installed and serviced model. Product leaders whose devices are aimed at serviced implementations should therefore consider the tight integration the OIC provides to several service providers, such as SK Telecom.
Current membership (per January 2016)

OIC’s current membership count is approximately 130.

Recommendations for product leaders of device makers

Product leaders will find the open, less stringent certification (compared to Apple’s HomeKit) and membership model of the OIC beneficial. It offers room to apply features above and beyond the specifications and schemas proposed by the consortium, thus allowing the member company to differentiate. Successful compliance testing is required to obtain the logo license that indicates interoperability with the full OIC ecosystem.

Google — Works With Nest, Weave/Brillo

Google today is establishing several platforms and oftentimes competing ecosystems, partially because its acquisition on Nest and the corresponding "Works With Nest" ecosystem continues to be supported internally in somewhat of a direct competitive relationship with Google’s own ecosystem. The Works With Nest interoperability platform across a low-power mesh network provides different standards, which, ironically, was authorized by Apple HomeKit before Nest’s acquisition by Google in February 2014.

Communications stack layers covered by Google

Google’s connected home platform utilizes Weave at the authentication layer, and Brillo is used as the upcoming, small-footprint operating system for connected home and IoT devices.

Governance principles

Unlike Apple’s tightly managed and controlled ecosystem, this platform is a more open management infrastructure and therefore has been able to proliferate more easily and quickly compared to the iOS platform. Similarly, in the connected home security space, Google Weave provides a communications layer that allows cross-platform architectures to identify and connect the characteristics of its device constituencies, so that, for example, a home refrigerator can be controlled with Google Now voice commands. The Brillo OS, though touted as being a small-footprint Linux/Android implementation, has (at the time of the writing of this document) been noted by some OEMs as too bulky, causing some device vendors to implement proprietary versions of Linux on top of the Weave platform.

Current membership (per January 2016)

Participation is by invitation from Google, which can be requested at https://developers.google.com/weave. The number of current members is not known.
Recommendations for product leaders of device makers

Closely follow the release versions of Brillo to determine whether your product can readily leverage Brillo as an OS standard, or whether the hardware resources required by Brillo are too costly.

Thread

Communications stack layers covered by Thread

Thread sits on top of 802.14.2 physical layer and is therefore using the same PHY as ZigBee and Z-Wave. However, it implements IP via the 6LoWPAN standard.

Governance principles

The founding members of Thread include ARM, Freescale Semiconductor (acquired by NXP Semiconductors), Big Ass Fan Co., Silicon Labs and Yale. Members' products undergo a certification process. Upon successful completion, participants may use the Thread logo to announce their compliance to the public.

Current membership

Thread has more than 200 members.

Recommendations for product leaders of device makers

Participation in Thread could be valuable for connected home vendors that would like to differentiate their product on the basis of low power consumption and whose product runs on 802.14.2 PHY and is IPv6-based. Thread is especially interesting as an alternative to ZigBee-based and Z-Wave-based products.

Amazon Alexa

Communications stack layers covered by the Alexa platform

With very few exceptions, ecosystems will interact over the cloud. As a consequence, Alexa products from Amazon will be agnostic of physical layer transport protocols. SSL connections via HTTPS will carry and encapsulate payloads and provide security.

Governance principles

Amazon intends to manage its ecosystem liberally, certifying basic compliance and functionality, but not prescribing hardware, OS or methods of authentication. Participation in the ecosystem will not carry a fee. Alexa's voice UI features can be implemented by third-party vendors in the connected home as a voice front end of their products. "Skills" are the basic vocabulary of Alexa's capabilities, and third parties are at liberty to specify skills specific to their solution. Outside of voice, the Alexa
app (running on iOS, Android, FireOS) can manage third-party products such as ecobee thermostats, Philips Hue lighting systems and other connected home applications.

**Current membership (per January 2016)**

At present, only Amazon products (such as Echo, Fire TV, Tap and Dot) implement Alexa, but in 2Q16, several third-party vendors are expected to announce voice UI implementation.

**Recommendations for product leaders of device makers**

If you are looking for a cost-effective and liberally governed ecosystem to leverage your marketing strategy, and especially you want to voice-enable your designs with a powerful VPA such as Alexa, then Amazon’s ecosystem will be an attractive choice. Be aware that today, Alexa's voice UI is not available through the Alexa app yet, and your mobile users will only be able to use in-app touch commands. However, it is likely that Amazon will voice-enable mobile apps in the future.

**Contrarian View**

The Connected Home Will Remain Fragmented, With Many Competing Platforms Delivering Islands of Solutions

Contrarian viewpoints to the value of vendor ecosystems may argue that already today, there are more vendors and more competing platforms than the market will bear, and this may cause further fragmentation before consolidation sets in. It may even be argued that such consolidation will never occur, and that the marketplace will stay in its current “messy” state of fragmentation.

If this is the case, the consequence for device vendors in the connected home is that their products will either continue to serve point solutions requiring their own user interfaces. This would also imply that users will have to continue to use these devices as point solutions and the setting of "If-This-Then-That" rules would not be possible for integrated systems. This would significantly diminish the use value of connected home systems and impede the further proliferation of this market.

**Vendors to Watch**

Top Platform Providers for the Connected Home

**Amazon**

Although we are not seeing a comprehensive connected home platform from Amazon yet, it is reasonable to expect a strategic push from Amazon will be able to leverage assets such as its Fire TV set-top box as a hub and Alexa as a VPA interface. Having a play in the connected home would certainly benefit Amazon in its effort to own the online shopping experience.
Apple

Apple has identified the connected home as one of several product and services areas for growth beyond the iPhone. Apple's philosophy of tightly controlling its ecosystem is manifest in the way it is growing the HomeKit platform: focus on quality and functional integration rather than rapid membership growth.

Google

Google's philosophy of experimentation with new device classes is apparent in its connected home strategies: two overlapping and partially competitive platforms coexist under the Google umbrella. Google has the breadth to support both and monitor how connected home markets evolve.

Samsung

Samsung is trying to mitigate the recent weakness in its mobile phone business. Creating a connected home platform through acquisition is logical, and its rapid proliferation is promising. Among the major platform providers, Samsung is the one with a comprehensive home appliances offering that will further enhance the SmartThings portfolio, and keep rival LG Electronics at bay, whose SmartThinQ platform is lagging.

Gartner Recommended Reading

Some documents may not be available as part of your current Gartner subscription.

"Market Trends: Security Platforms for Connected Home Devices"
"Forecast: Internet of Things — Endpoints and Associated Services, Worldwide, 2015"
"Hype Cycle for the Connected Home, 2015"
"Market Insight: Connected Home Stack"
"Competitive Landscape: Connected Home Ecosystems"
"Market Trends: Connected Home — Opportunities and Uptake"
"Market Insight: Connected Home Behaviors"
"Market Trends: Four Business Models for the Entering Connected Home Market"

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