THE US SMART HOME MARKET

FORECASTING FUTURE ADOPTION AND
ANALYZING HOW VOICE IS DISRUPTING THE
SMART HOME EXPERIENCE

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BI INTELLIGENCE

KEY POINTS

- **Following moderate growth from 2010 to late 2012, the overall US smart home market has expanded sluggishly.** The market in the US currently remains the healthiest and most promising, but it's only just beginning to enter the mass market phase of adoption.

- **There are a number of factors that could bolster consumer adoption of smart home devices in the coming years.** As the population increasingly sees smart home devices as less of a luxury and more of a necessity or cost-saving tool, consumers will be more apt to purchase these devices. BI Intelligence forecasts that 73 million smart home devices will be installed in the US in 2022.

- **But there are various barriers to mass market adoption that still need to be overcome before adoption substantially picks up.** These include high device prices, technological fragmentation, long replacement cycles of existing legacy devices, and overall low consumer demand.

- **Amazon's Echo established voice as the center of the smart home ecosystem for the first time.** Now, voice has become a key remote interface within the smart home — a trend that will continue to upend the connected home market as devices gain more and more skills.

Download the charts and associated data in Excel »

INTRODUCTION

When Amazon released the Echo in 2014, it was viewed as gimmicky by consumers. The AI-powered speaker was equipped with only a handful of skills — apps that enable the device to perform various functions and services, like streaming music or reading the news, via voice command — offering insufficient value and, therefore, little purchase incentive. Further, the price point of the Echo was considered high, retailing at $99 for Prime members and $199 for non-Prime members. At that point, it wasn't obvious that the device would take off.

But despite initial perceptions, the Echo ended up revolutionizing the smart home market for one important reason: **It established voice as the center of the smart home ecosystem for the first time.** This is opening up new business opportunities — with a smart speaker at its center, the smart home can serve its inhabitants ads, a strategy Google is expected to pursue with its Home, or make e-commerce purchases easier, a route that Amazon is currently taking. Such devices have the potential to be much more powerful for consumers and smart home companies alike.

Nonetheless, the smart home market is only just entering the mass market phase of consumer adoption. While companies in this emerging market have done a good job of developing, marketing, and selling smart home devices, several barriers have prevented them from making significant strides in terms of consumer adoption. That means that much of the transformative potential of voice as the new smart home interface has yet to be realized.

In this report, BI Intelligence outlines the overall state of the smart home market in the US. It projects where device ownership will head in the coming years, and analyzes the factors driving adoption and the barriers that are holding back adoption. Finally, it examines the most prevalent technological trends within the smart home market — in particular, how voice is transforming the smart home interface and how it will continue to expand moving forward.

THE SMART HOME MARKET, TODAY AND TOMORROW

BI Intelligence defines a smart home device as any stand-alone object found in the home that's connected to the internet, can be either monitored or controlled remotely, and has a noncomputing primary function. These devices collect and analyze data on usage, which can then be used by device makers to perfect their products and help determine users' preferences in the home. This definition includes all smart appliances, smart energy equipment such as thermostats and lighting, and security devices like smart locks and security cameras. It excludes smart televisions and smart home speakers like the Amazon Echo or Google Home.

BI Intelligence splits the smart home market into two categories:

- **The Professionally Installed Smart Home.** These systems are purchased from, and installed by, a provider. Major market players include the Xfinity Home, ADT Pulse, Vivint, and Alarm.com. Customers typically pay a one-time installation fee as well as a monthly subscription to cover the cost of the service as long as it's active.

- **The Self-Installed Smart Home.** Also referred to as the DIY market, the self-installed smart home consists of devices, like a Nest thermostat or Philips Hue smart lights, that are purchased and installed by consumers themselves. This market is composed of device makers, such as GE and Honeywell, and ecosystem providers, which are typically large tech companies like Google or Amazon that provide a hub for the smart home ecosystem like a voice-controlled speaker.

As a note, some smart home devices won't fall into either of these categories. For instance, some new homes are being built with integrated smart home management systems and solutions — these aren't installed by the consumer, nor do they require professional maintenance.

Following moderate growth from 2010 to late 2012 — largely as a result of tech-savvy consumers adopting smart home devices early — the overall US smart home market has grown sluggishly. The market in the US currently remains the healthiest and most promising for mass market adoption, primarily due to its large size, high income levels, high consumer interest in an automated lifestyle, and advanced tech adoption levels compared with the rest of the globe. In 2015, BI Intelligence identified that the market was in a "chasm," stuck between the early adopter and mass market adoption phases in the tech adoption cycle. Two years later, the market is only beginning to emerge.

BI Intelligence estimates that 39 million smart home devices are currently installed in the US. Our forecast incorporates exclusive data from a BI Intelligence survey conducted in February.

FORECAST: Smart Home Device Installed Base
US, Millions

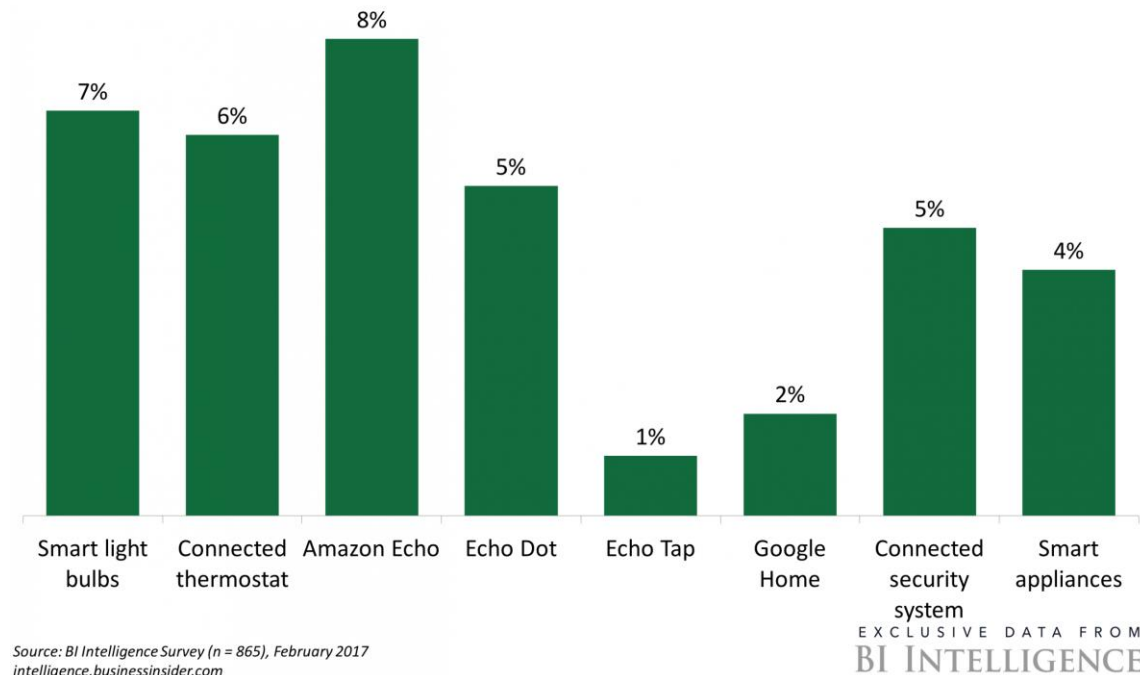Source: BI Intelligence estimates based on February 2017 survey
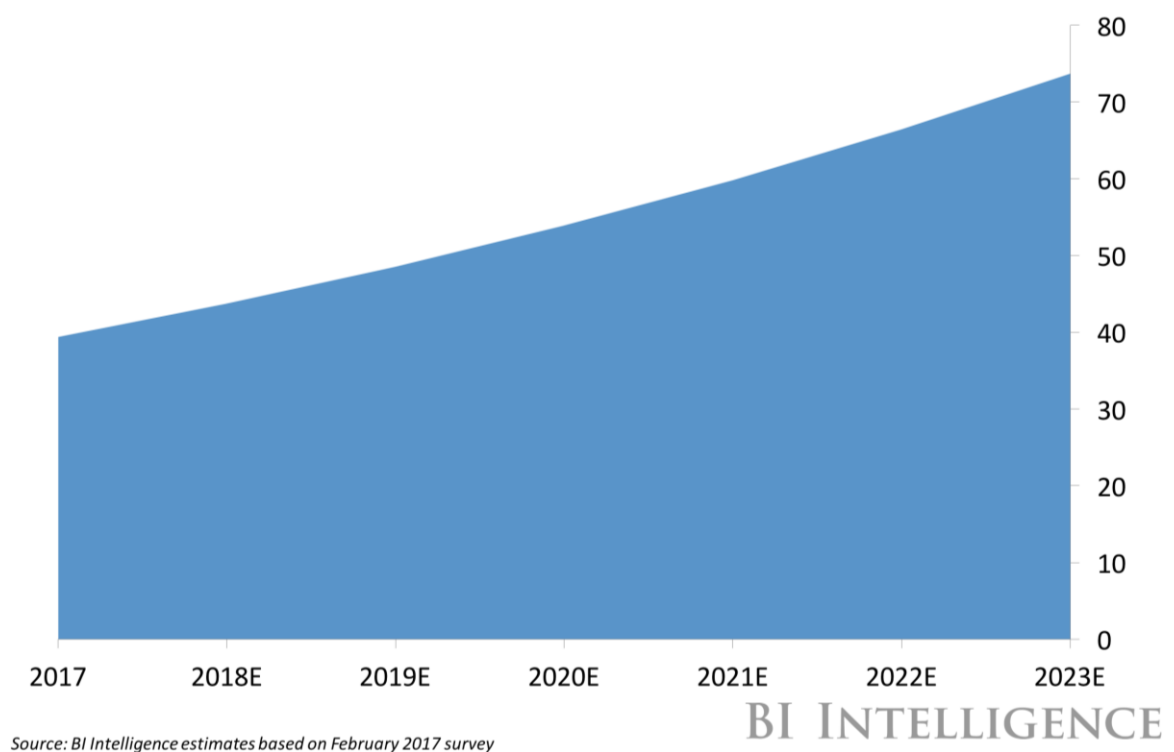
Smart home device ownership will likely rise at a very slow pace due to a number of factors. Consumers won't replace existing devices in their homes until those devices reach the end of their lifespan, or until they have greater incentive — as measured by cost savings or added convenience, in particular — to do so. Further, smart home devices are expensive relative to their traditional counterparts — a gap unlikely to narrow in the near future. Technological fragmentation also remains a major barrier to adoption, as applications and networks support different devices. This prevents a user-friendly experience in many ecosystems, an element crucial to attracting less tech-savvy consumers to equip their homes with smart home devices. Read more on adoption barriers later in this report.

BI Intelligence forecasts that 73 million smart home devices will be installed in US homes in 2022. Our forecast incorporates exclusive data from a BI Intelligence survey, an assessment of larger trends in the space, and an assumption that the current barriers to adoption will gradually subside over the forecast period. BI Intelligence forecasts that the number of devices that could be connected in US homes — or the addressable market — will reach 13 billion over the period. This equates to about 100 devices — mostly smart lights and security sensors — per home.

US Smart Home Device Ownership
Q: Which of the following devices do you own?

Device	Ownership
Smart light bulbs	7%
Connected thermostat	6%
Amazon Echo	8%
Echo Dot	5%
Echo Tap	1%
Google Home	2%
Connected security system	5%
Smart appliances	4%

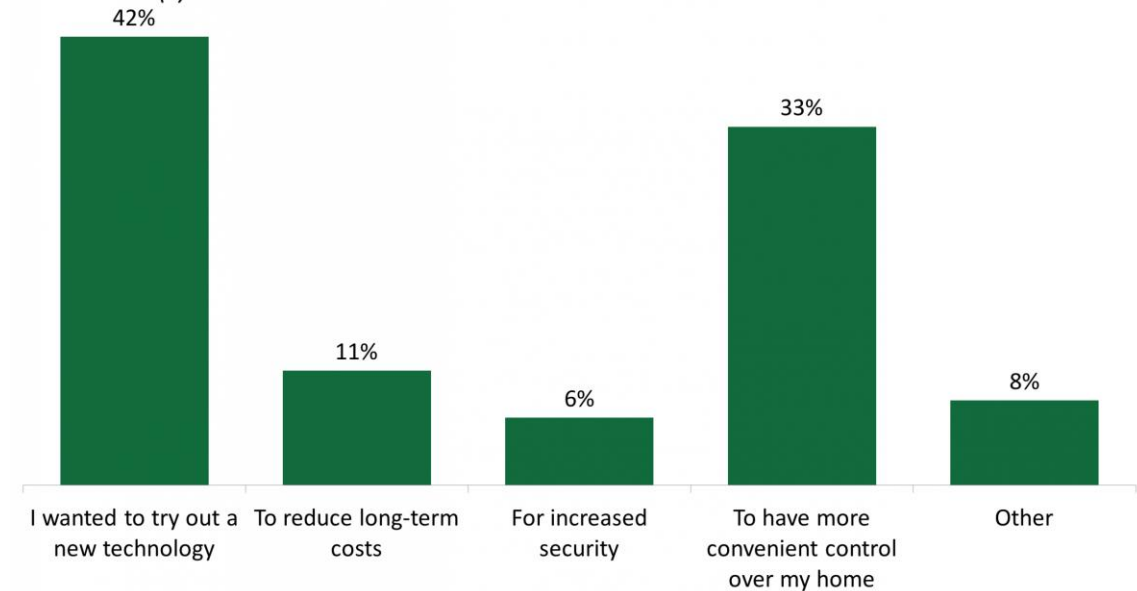*Source: BI Intelligence Survey (n = 865), February 2017*
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Partly fueling US growth is the professionally installed market, which will reach 13.5 million customers in North America by 2022. Though the market remains healthy, it may face challenges as the competing DIY smart home market gains traction. Further, self-installed smart home solutions are less expensive for consumers than professionally installed systems, which typically require a monthly fee to keep them active.

Reasons US Consumers Purchased Smart Home Devices

Q: Which of the following was the top reason you purchased your smart home device(s)?

Reason	Percentage
I wanted to try out a new technology	42%
To reduce long-term costs	11%
For increased security	6%
To have more convenient control over my home	33%
Other	8%

Source: BI Intelligence Survey (n = 438), February 2017
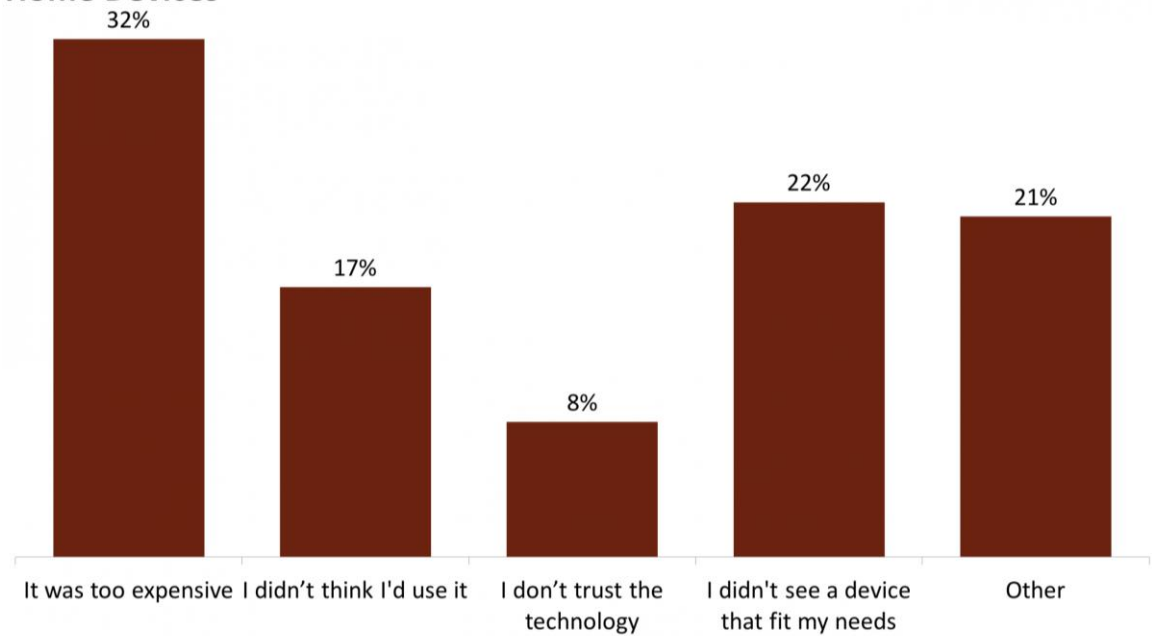*intelligence.businessinsider.com*

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FACTORS DRIVING ADOPTION

There are a number of factors that could bolster consumer adoption of smart home solutions in the coming years. As the global population increasingly sees smart home devices as less of a luxury and more of a necessity or cost-saving tool, they will continue to gain traction.

- **Cost-saving incentives:** Home service providers, from energy companies to insurance firms, have slowly been encouraging their customers to purchase smart home devices, saving both money. For example, Southern California Edison last year teamed up with Alphabet's Nest to encourage its customers to conserve energy by purchasing a Nest thermostat in return for a bill credit of up to $125. BI Intelligence expects more of these partnerships to emerge.

- **Less expensive ecosystem entry points:** Remotes are the entry point into a provider's smart home ecosystem. In Amazon's ecosystem, this entry point is an Echo device. As the prices of these devices come down over time — the original Echo was priced at $199 for non-Prime members, but is now $179.99 regardless of Prime membership status — more consumers will be inclined to purchase these devices.

- **New home construction:** New home construction has been rising steadily since the US housing crisis and ensuing global recession of 2007-2009. In 2014, many of these new homes began to come with automation solutions that enable an easy and inexpensive way to connect smart devices throughout the home. Over time, as a larger percentage of new homes are built with such features, BI Intelligence expects smart home device ownership to rise.

Top Reasons US Consumers Have Not Purchased Smart Home Devices

32%	17%	8%	22%	21%
It was too expensive	I didn't think I'd use it	I don't trust the technology	I didn't see a device that fit my needs	Other

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BARRIERS TO ADOPTION

BI Intelligence previously identified four key barriers to mass market smart home adoption. They are revisited here with an eye to the extent to which they've been overcome since first identified in 2015 and how we think they'll affect long-term mass market adoption.

- **High device prices.** Compared with traditional legacy home devices, smart home devices remain expensive, though prices have started to decline slightly with time. A Nest smart thermostat retails for $249.99, for example, while a traditional Honeywell thermostat retails for only $15.99. These high device prices are holding back adoption; 32% of global consumers cited high prices a top reason for not owning a smart home device, according to BI Intelligence February 2017 survey data. When device prices fall more substantially, consumers will be more inclined to purchase these devices, especially as their existing legacy home devices reach the end of their lifespans.

- **Technological fragmentation.** There are currently a number of standards, networks, and frameworks used to connect devices. This makes it difficult for users to control different devices that run on different networks, posing issues with interoperability. To deal with technological fragmentation, Apple, Amazon, and Google have unified their smart home ecosystems. Apple's HomeKit revamp and the introduction of the Google Home last year enabled a single mobile application to control all of the components of the Home ecosystem. Similarly, Samsung in March announced Samsung Connect, a single app that controls all compatible smart home devices. Still, there's not yet a single dominant standard for connecting smart home devices — ZigBee, Z-Wave, and Wi-Fi all remain popular options.

- **Low consumer demand.** Mass market consumers still view smart home devices as unnecessary luxuries. According to BI Intelligence's February 2017 survey, 17% of consumers don't think they'd use a smart home device, and 22% don't think such a device would fit their needs. As device makers and ecosystem providers embark on marketing and advertising campaigns for these offerings, more consumers will begin to recognize the value of these products and demand will likely subsequently tick up.

- **Long device replacement cycles.** Many home security devices and appliances have lifespans that last for years and, in some cases, decades. According to H&R Block estimates, for example, a refrigerator can last between 13 and 19 years. Additionally, some legacy analog thermostats have a lifespan of 35 years, though they're often replaced in a shorter time as a result of upgrades to heating and cooling systems in the home. The majority of the mass market — middle-income consumers — won't opt to replace their legacy home devices with smart solutions until the end of their lifespan. As that happens, and as consumers awaken to the value proposition smart home solutions provide, this barrier will begin to dwindle.

# THE BATTLE OF VOICE CONTROL IN THE SMART HOME

Amazon

The most prominent trend in the smart home space in the last 18 months has been the proliferation of voice assistants. Since the introduction of Amazon's Echo and its voice assistant Alexa in 2014, both professionally installed providers and DIY providers have integrated voice assistants into their offerings, giving their customers a hands-free way to control their smart home devices. For example, Vivint recently enabled Echo compatibility with its professionally installed smart home security system, meaning that Vivint customers can now control any of their smart home devices by speaking commands to Alexa.

In an increasing number of households, a smart home speaker, like the Echo, serves as the hub of the smart home ecosystem. These hubs make it easier for consumers to build out their smart home ecosystems and integrate other smart devices into their home environments. Currently, 9.14 million US households own at least one Echo product. We reached this estimate by taking the results from BI Intelligence's February survey, adjusting our estimate based on conversations with executives in the space, and incorporating previous analyses of Echo ownership.

FORECAST: US Household Echo Penetration
Millions

Source: BI Intelligence estimates based on February 2017 survey
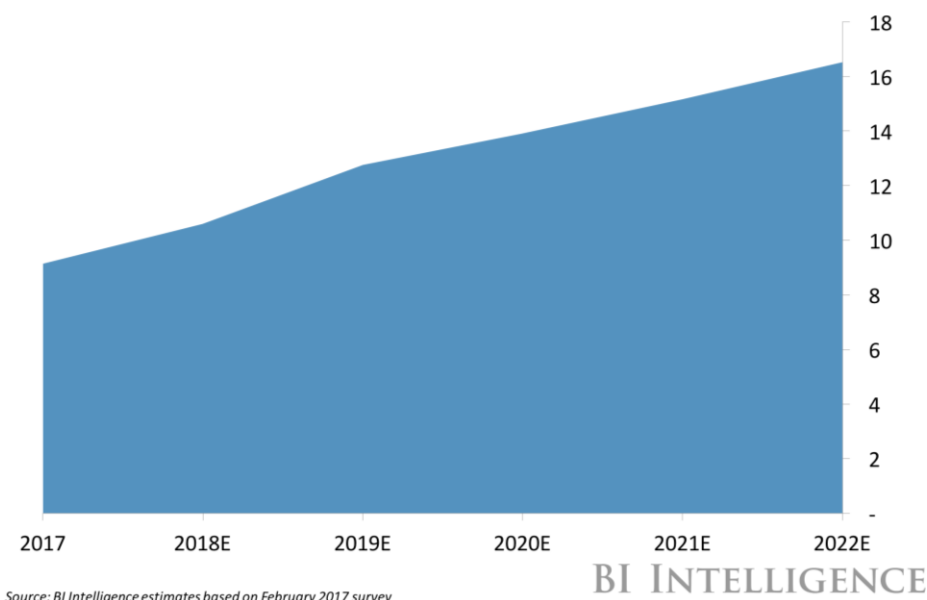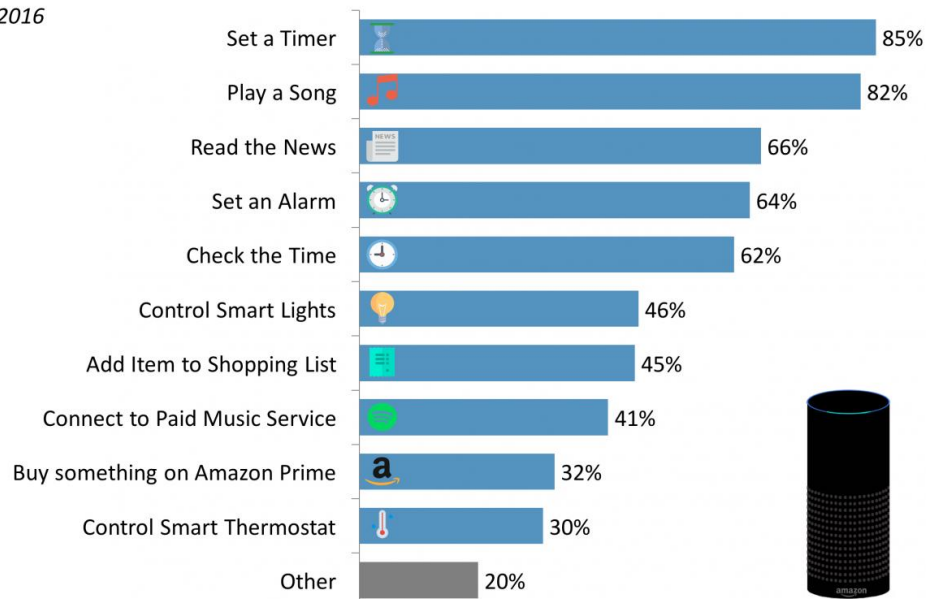
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Looking forward, BI Intelligence estimates that at least one Echo product will be in 16.5 million US homes in 2022. This represents a compound annual growth rate (CAGR) of 16% through 2019, which will then slow to a 9% CAGR through 2022. We expect growth in ownership of Echo devices to slow as competing products enter the market — particularly smart home devices with embedded voice assistants — which will eliminate the need to purchase an added piece of hardware to integrate voice control into the home.

Here's what makes the Echo the market leader:

- **Low price point.** Last year, Amazon lowered the price of the Echo Dot from $89.99 to $49.99 as part of a larger revamp that also updated the device's hardware and software, and expanded the device into Germany and the UK. Currently, the device remains the least expensive of its kind on the market. The Google Home, the closest Echo competitor at the time of publication, retails for $129.99.

- **Capabilities and skills.** In June 2015, Amazon opened up Alexa skills to third-party developers, allowing any developer to create their own skill for the voice assistant — like playing the local radio broadcast of a user's favorite baseball team, or reminding a user about their next appointment. The assistant passed the 10,000-skill mark in February 2017.

Skills Echo Owners Have Used At Least Once
2016

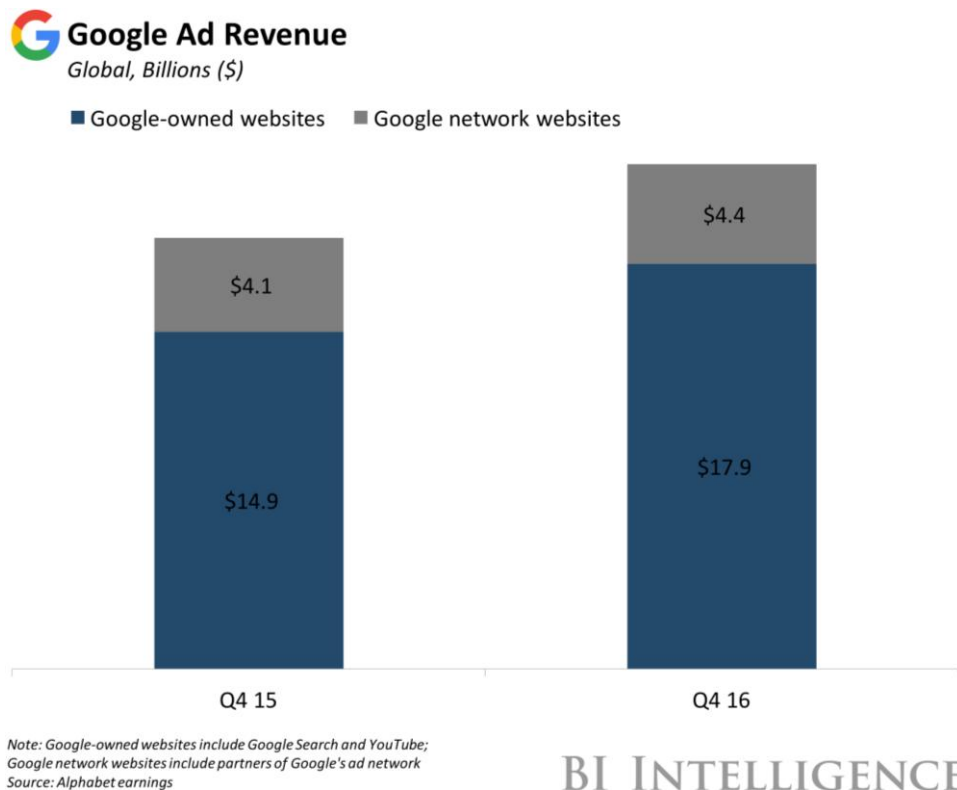| Skill	Percentage
Set a Timer	85%
Play a Song	82%
Read the News	66%
Set an Alarm	64%
Check the Time	62%
Control Smart Lights	46%
Add Item to Shopping List	45%
Connect to Paid Music Service	41%
Buy something on Amazon Prime	32%
Control Smart Thermostat	30%
Other	20%

Source: Experian Information Solutions

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Google

The Google Home was introduced in October 2016 alongside the Pixel smartphone, both of which can now control smart home devices. Here are the device's primary advantages in the space:

- **The AdSense network.** Google's ad division accounts for the vast majority of revenue for parent company Alphabet. In 2016 alone, the division generated $79.4 billion in net revenue. We expect Google to eventually leverage this network to employ sponsored ads over the Google Home. If a user asked Google Assistant on the Home, for example, to suggest a Mexican restaurant close to their location, it could recommend five restaurants that have paid the company to advertise on the massive Google network.

Google Ad Revenue
Global, Billions ($)

■ Google-owned websites   ■ Google network websites

	Q4 15	Q4 16
Google network websites	$4.1	$4.4
Google-owned websites	$14.9	$17.9

Note: Google-owned websites include Google Search and YouTube;
Google network websites include partners of Google's ad network
Source: Alphabet earnings

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- **Google's AI R&D resources.** As one of the world's largest tech companies, and arguably the most innovative, Alphabet has the financial resources from its AdSense revenue to fuel moonshot venture projects and R&D investments, as Bloomberg identified. As voice becomes a more important aspect of the smart home experience, Google's AI resources will help the company make improvements to Google Assistant, which powers Google Home, on a regular basis.

- **Massive search database.** Unlike Echo products, which Amazon positions as focused on e-commerce, the Google Home is more of a personal assistant thanks to its access to the company's massive search database. This means the device is adept at quickly looking up esoteric facts and data points for the user. For example, a user could prompt the Home to do a search for a recipe while he is cooking in the kitchen.

Apple

Though not yet a competitor in the smart home speaker market, Apple enables smart home control through its Siri voice assistant. In 2016, the tech giant revamped its HomeKit app to add Siri compatibility, and it incorporated a "Scenes" feature that enables consumers to set temperature, lighting, and door-lock preferences by prompting the voice assistant. Apple is expected to release a smart home speaker in the near future. There are a couple of factors that could make Apple a strong competitor in the space:

- **Large existing addressable market.** The iPhone — which serves as an entry point into Apple's smart home ecosystem — has a large install base. In 2016, Apple shipped more than 215 million iPhones, each of which has the new native Home application. Further, there's still a large portion of iPhone users who have an iPhone 4 or earlier models, which aren't compatible with HomeKit. As these users upgrade their devices, they'll too gain access to Apple's smart home ecosystem.

iPhone Sales
Global

iPhone Sales — Year-Over-Year Growth

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Source: Apple
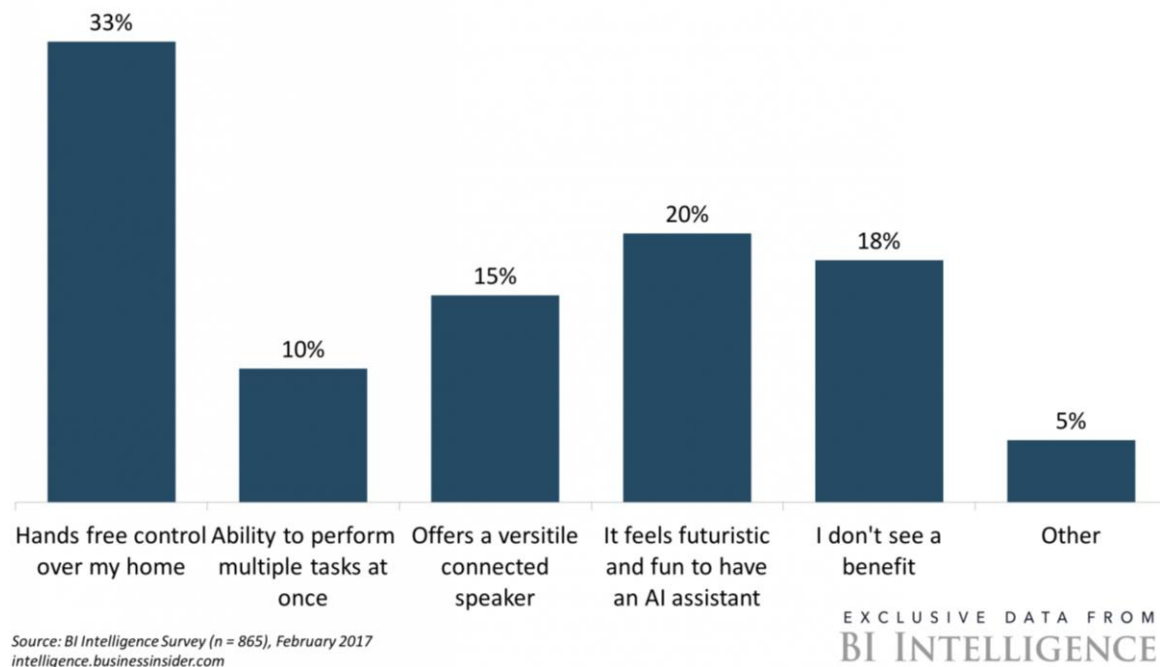
- **Unification around a single mobile application.** In its HomeKit revamp last year, Apple revealed that a user could control the ecosystem from a single native mobile application on any iPad or iPhone running iOS 10 or later. This marked a big step toward solving the technological fragmentation problem that plagues the smart home speaker space.

However, Apple's late entry to the space could work against it. It makes sense for the company to bake Siri into its Apple TV because it already serves as a hub to its ecosystem, but Apple seems to have abandoned this approach. If the company opts instead to release a smart home speaker, its device could struggle to gain traction in a market that's already dominated by Amazon and Google.Further, HomeKit isn't compatible with as many devices as the Echo or the Google Home. On the other hand, Apple loyalists could drive adoption in much the same way they did for the iPhone and iPad.

Top Perceived Benefits of Smart Home Voice Assistants
US Consumers

Hands free control over my home	Ability to perform multiple tasks at once	Offers a versitile connected speaker	It feels futuristic and fun to have an AI assistant	I don't see a benefit	Other
33%	10%	15%	20%	18%	5%

Source: BI Intelligence Survey (n = 865), February 2017
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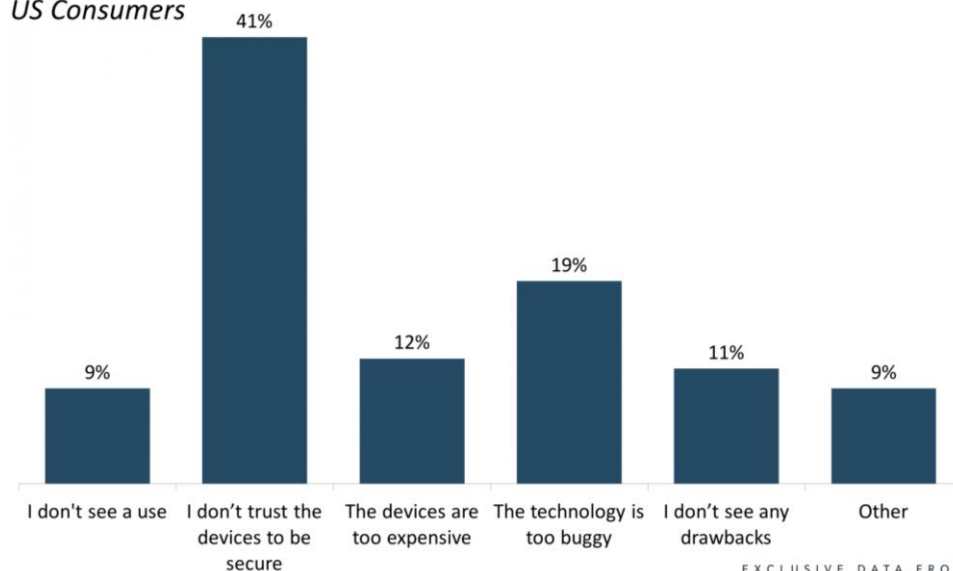
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Factors Driving Voice-Activated Speaker Adoption

According to BI Intelligence's survey, consumers are drawn to smart home speakers for a number of reasons. Here are some of the most notable:

- **Hands-free control.** Voice-activated speakers are particularly useful in situations where a user might not be able to control their smart home device through a mobile phone. For example, if someone comes to the front door of a user's home while he's cooking, he could ask Alexa or the Google Assistant to unlock the door and let the person in. Thirty-three percent of survey respondents cited the ability to control home devices hands-free as the top advantage of owning a smart home speaker.

- **Futurist nature of an AI-powered personal assistant.** The Echo and Google Home can serve as both a personal assistant and a smart home hub, providing answers to quick questions, controlling a calendar, and sending messages. Many consumers enjoy both the utility of the device performing such tasks and the futuristic nature of being able to get answers to questions instantly. Twenty percent of survey respondents cited this as a top benefit.

- **Ability to perform multiple tasks at once.** Smart home speakers enable users to utter a command to their home voice assistant while performing another task simultaneously. For example, a user might ask Alexa to play music while he's cleaning her home. Ten percent of users cited this as a benefit to device ownership.

Perceived Drawbacks of Smart Home Voice Assistants
US Consumers

Category	Percentage
I don't see a use	9%
I don't trust the devices to be secure	41%
The devices are too expensive	12%
The technology is too buggy	19%
I don't see any drawbacks	11%
Other	9%

Source: BI Intelligence Survey (n = 865), February 2017
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Barriers To Voice-Activated Speaker Adoption

The success of voice assistants and smart home speakers will depend largely on how consumers perceive them, and how effectively the companies building these technologies address users' concerns. Here are some notable concerns cited by respondents to BI Intelligence's survey:

- **Device security.** As with any internet-connected device, smart home speakers are vulnerable to hacking. The potential of a larger attack, like the one on Dyn in 2016, could affect consumers' willingness to purchase a smart home speaker. Further, the Echo is "always on," meaning it's listening to conversations even when the "Alexa" wake word isn't used. Forty-one percent of respondents cited security as a top concern of owning a smart home speaker.

- **Technological bugs.** When the outage of Amazon Web Services (AWS) caused Alexa to shut down temporarily in early 2017, the issue was less about the assistant's capabilities and more about its perceived reliability. Nineteen percent of survey respondents said they believe voice-activated speakers are technologically buggy.

- **Price points.** The Echo ($179.99) and Google Home ($129.99) are viewed by many consumers as pricey. Twelve percent of survey respondents cited price as a primary concern. Until device prices come down, mainstream adoption will remain sluggish.

THE FUTURE OF VOICE IN THE HOME

Smart home voice assistants are poised to see steady growth in the coming years. Some current unfavorable perceptions held by consumers will increasingly subside as devices improve, leading to greater mass market adoption.

In the longer term, voice assistants will likely be embedded in smart home devices beyond speakers. Amazon, for example, struck a partnership with Sensory, a voice recognition firm, to help developers bring the Alexa voice assistant into any piece of hardware. Earlier this year, LG integrated webOS and Alexa with its refrigerator, enabling users to adjust power settings and order groceries by voicing a command. Such devices will likely remain significantly more expensive that standard smart home devices, namely because of the added software and engineering required. Down the line, demand for these devices will grow as prices decline.

Smart home voice control will move beyond the home and into the car. Ford earlier this year announced that Alexa voice control would be integrated into its Sync connected car platform. As more connected — and soon, autonomous — vehicles hit the road, other such partnerships will emerge.

THE BOTTOM LINE

- The market in the US currently remains the healthiest and most promising, but it's only just beginning to enter the mass market phase of adoption.

- As the global population increasingly sees smart home devices as less of a luxury and more of a necessity or cost-saving tool, consumers will be more apt to purchase these devices. BI Intelligence forecasts that 73 million smart home devices will be installed in the US in 2022.

- But there are various barriers to mass market adoption that still need to be overcome before adoption substantially picks up. These include high device prices, technological fragmentation, long replacement cycles of existing legacy devices, and overall low consumer demand.

- Voice has become a key remote interface within the smart home — a trend that will continue to upend the connected home market as devices gain more and more skills.

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