Impact of Voice on Connected Consumer Markets

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Voice control and voice-based technologies have experienced massive growth in the past five years within the consumer market. Due to their accelerated growth and consumer interest, the voice-first landscape is rapidly changing and influencing the adoption of voice-enabled products.

Market leaders such as Amazon, Google, Apple, and Microsoft continue to announce new product enhancements and expanded roadmaps, all competing to stay strategically ahead in the race for dominance in the voice-first market. Collectively, companies regularly announce new integrations and partnerships to create new voice-based use cases, as stakeholders vie to leverage the current market's momentum to enable a robust user experience.

Defining the Voice Control Market

Given the many active players in this space and the cross-category applications that include connected entertainment, media consumption, home security, and control, defining the different layers of the voice control market is a challenge.

Parks Associates categorizes and defines three key terms in the market:

Intelligent Personal Assistants

Through interactions with voice and natural language processing, an intelligent personal assistant (IPA) or a virtual personal assistant is a software agent that performs tasks or services for an individual. These tasks or services are based on user input, location awareness, and the ability to access information from online resources.

Examples of voice-controlled personal assistant applications include Apple's Siri, Google Assistant, Microsoft Cortana, and Amazon Alexa.

Smart Speakers with Personal Assistants

Devices like Amazon Echo and Google Home are always-on, Internet-connected speakers with microphones that are powered by intelligent personal assistants. These devices, also referred to as voice-first devices, have an interface where the primary input and output are voice, and the intelligent personal assistant is embedded within the device or in the cloud.

Parks Associates classifies these devices in their own category given the functionalities are a crossover of capabilities from the smart home, connected CE, and audio categories. Through the convergence of functions across device categories, these devices have revolutionized the hardware industry.

Smart Home Device

A smart home device connects to the Internet and allows users to access, monitor, and control the devices as well as receive alerts. These actions occur through an app on a smartphone or through a tablet or computer.

Smart home devices are Internet-connected versions of a traditional home product – like a thermostat, garage door opener, major appliance, or lighting. Parks Associates categorizes entertainment, gaming, and music streaming devices as connected CE devices rather than "smart home" devices.

A smart home device is a single-point device with the intelligence embedded in the device or combined with intelligence provided by software in the cloud. It typically supports cloud-based data and analytics. Some communicate with other smart home devices, and some reside as a client of a smart home central controller or smart home subsystem. Smart home devices can be purchased one at a time or as a bundle and may or may not be part of an integrated system.

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Consumer Adoption and Use

Consumers have been relatively quick to embrace voice-based applications, especially considering early experiences with voice technology, such as automated toll-free phone systems, were not particularly user friendly. These infamous systems often re-routed frustrated consumers several times before reaching the correct service option or individual.

The novelty of the consumer experience with IPAs, led by Apple's Siri, launched a new phase in voice.

Parks Associates research in 2012 found more than 50% of U.S. users of Apple iPhone 4S were "very satisfied" with the Siri voice-command feature. Even at that early stage, nearly 40% of Apple iPhone 4S users expressed an interest in Siri-style voice command for their TV.
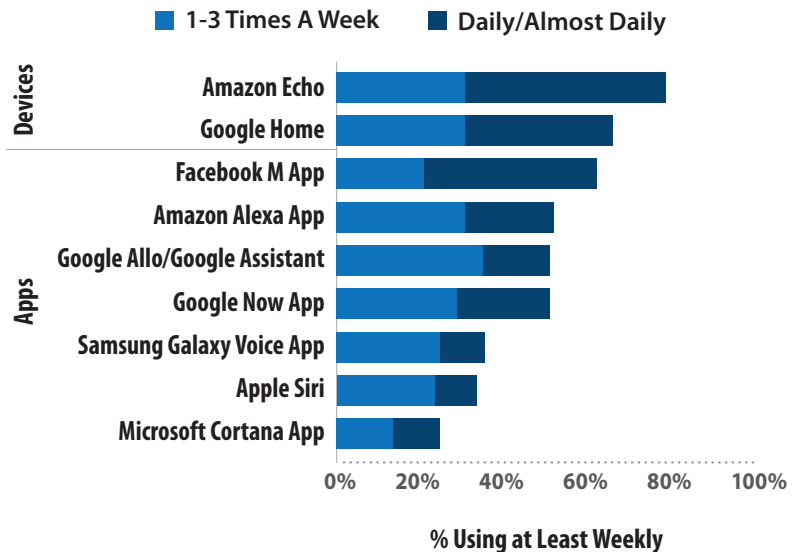
These experiences set the foundation for the next phase in the voice race and the expansion of intelligent personal assistant offerings. In 2014, Amazon accelerated the market and intensified consumer appeal with its Amazon Echo device and Alexa solution. In particular, the firm garnered significant attention at CES® both in 2016 and 2017 with numerous companies unveiling products embedded with or integrating Alexa. It succeeded early in catering to and targeting customers with its marketing initiatives, channel strategies, and solutions that provided the convenience in voice assistance and the multifunctional ability to perform various tasks.

Trends in the voice-first space have far-reaching implications for a variety of areas. While voice-based assistants are generally tied to a particular smartphone OS, voice interfaces have the potential to help simplify the consumer experience across a number of different product and service categories.

Weekly Usage of Personal Assistant Devices/Apps
U.S. Broadband Households

■ 1-3 Times A Week   ■ Daily/Almost Daily

Devices
- Amazon Echo
- Google Home

Apps
- Facebook M App
- Amazon Alexa App
- Google Allo/Google Assistant
- Google Now App
- Samsung Galaxy Voice App
- Apple Siri
- Microsoft Cortana App

0% 20% 40% 60% 80% 100%

% Using at Least Weekly

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The average U.S. broadband household has 8.1 connected computing, entertainment, or mobile devices, plus another 2.1 smart home devices. Voice serves as a potential key interface across these devices and also promises to alleviate the complexity in fragmentation. Smart home adoption in particular has been stymied by competing protocols and fragmentation.

An easy-to-use interface such as voice creates a compelling experience for consumers. Once in the home, the voice interface creates a natural gateway to smart home products with consumers desiring to build their ecosystem around voice, thus leading to greater smart home adoption. Parks Associates' research supports this strong correlation between smart home ownership and adoption of smart speakers with personal assistants.

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Overall Smart Home Device Ownership by Ownership of Smart Speaker with Personal Assistant

Among U.S. Broadband Households with/without a Smart Speaker with Personal Assistant

% Of Respondents Owning a Smart Home Devivce

70%
60%
50%
40%
30%
20%
10%
0%

Non-Owners   Owners

Smart Speakers with Personal Assistant
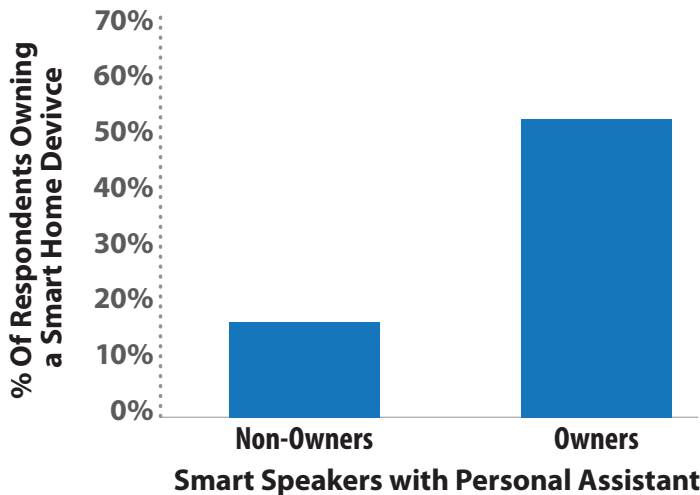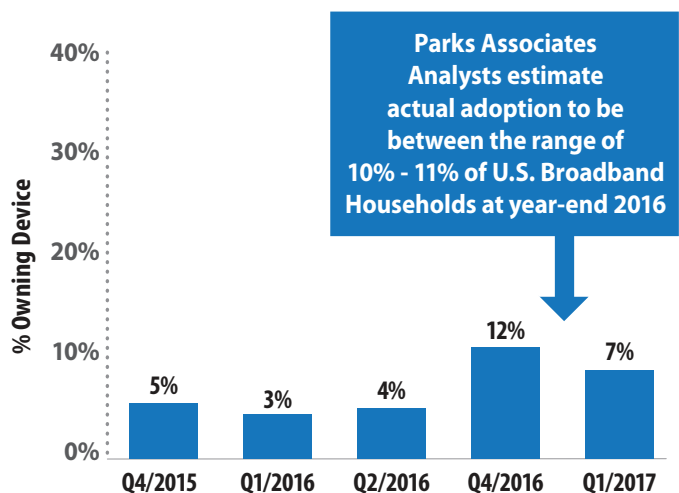
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53% of owners of smart speakers with personal assistants, like Amazon Echo and Google Home, report having a smart home device.

Understanding Consumer Adoption

- At the end of 2016, 45% of U.S. broadband households used a voice-enabled personal assistant through an application or dedicated device.

- At the end of 2015, adoption of smart speakers with personal assistants was 5%. Parks Associates estimates that by the end of 2016, 10-11% of U.S. broadband households owned such a device.

- Parks Associates estimates 2016 sales for smart speakers with personal assistant totaled 14 million units.

- Consumer-reported adoption of these devices has varied significantly since their introduction, especially during the end of the year, which is likely a holiday-related bump due to heightened awareness and the influx of marketing. Parks Associates combines industry insight and consumer data to determine best estimates for 2016 adoption and total sales.

Overall Ownership of Smart Speakers with Personal Assistant

Among All U.S. Broadband Households

% Owning Device

40%
30%
20%
10%
0%

Q4/2015	Q1/2016	Q2/2016	Q4/2016	Q1/2017
5%	3%	4%	12%	7%

Parks Associates Analysts estimate actual adoption to be between the range of 10% - 11% of U.S. Broadband Households at year-end 2016

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The Consumer Experience

As devices continue to add listening capabilities, voice control will extend throughout the home as an intrinsic, easy, and natural way to facilitate management of the connected home and other devices in the IoT space.

Consumer interest and familiarity will drive the demand for voice-controlled products. As noted, the market started with voice-enabled personal assistants, and at the end of 2016, 45% of U.S. smartphone owners reported using a voice-enabled personal assistant through an app or dedicated device. That figure rises to 63% of millennial smartphone owners. IoT firms, keen to capture these younger consumers, are investing in improvements and new use cases with their voice technologies.

The early market iterations of voice-based assistants introduced a new form of technology, and with any new form of technology, there are identifiable improvements to be made. Due to the nature of the enabling technology of artificial intelligence, machine learning, and natural language processing, these types of devices will continue to learn and improve.

Early versions of voice-based assistants did not have the same intelligence as they do today. Apple, for instance, improved Siri with its latest iOS 10.3 update. Improvements included adding features that supported third-party apps such as checking the status of accounts and being able to check if a car was locked though a Siri-supported car app. Retention of consumers in using these technologies is key – consumers will not tolerate inaccurate or incorrect responses.
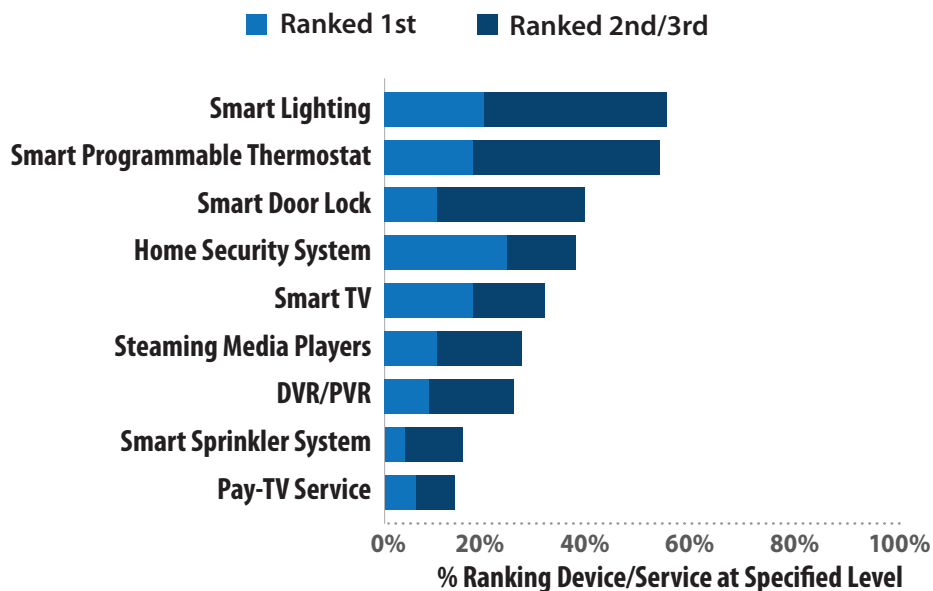
The narrowing window for error tolerance is emphasized with a voice interface as it has no graphical or keyboard input where users can correct misstatements. Industry players have responded to this need by continuing their efforts on improving the accuracy of voice technology. As the consumer experience with voice interfaces stays positive, users will want this option on a variety of different devices.

> Over one-third of U.S. broadband households find it very appealing to use voice to control smart home devices (37%) or entertainment devices (34%).

> As this market matures, consumers will expect their voice-based assistant to be more intelligent, proactive, and understanding than a search results page.

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Preferred Smart Home Products for Personal Assistant Control

Among Specified Device Owners or Services Subscribers

■ Ranked 1st   **■ Ranked 2nd/3rd**

Smart Lighting
Smart Programmable Thermostat
Smart Door Lock
Home Security System
Smart TV
Steaming Media Players
DVR/PVR
Smart Sprinkler System
Pay-TV Service

0%   20%   40%   60%   80%   100%

% Ranking Device/Service at Specified Level

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Many smart home devices promote the value proposition of remote control and management, e.g., homeowners can check and adjust their watering schedule through an app that connects to their smart sprinkler system. The majority of consumers see voice as an intuitive way to control these new connected form factors.

Preferences for Voice Control

- 55% of U.S. broadband households find it "appealing" to use voice control to understand the status of connected devices or to control these devices.

- 24% of home security owners selected their system as the top smart home product they want to control through a personal assistant.

- 42% of smart door lock owners prefer to use a personal assistant to control their device.

- 33% of smart TV owners prefer to use a personal assistant to control their device.

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Market Shift Factors

A number of factors will drive the voice-first market in a variety of industry areas, and company responses will determine accelerations in adoption and sales as well as successes and failures among both established players and new entrants.

Consumer Experience with First-generation Devices

There is still a sizeable portion of U.S. consumers who have not used voice-based interfaces or don't use them regularly. Their initial interactions could come from any number of industries – a voice-based remote control from their pay-TV provider, a voice-based health app recommended by their doctor – and their experiences with these devices will largely determine their perceptions and future use of voice-based solutions. Also, as these are the middle and late adopters, on the other side of the chasm, they will have much less tolerance for errors, and will be quicker to abandon voice options, than the early adopters.

UX is particularly important in the CE market, where repeat brand purchases are the norm. First-generation devices often have to tackle product issues from the introduction of new technology.

> Only 31% of product owners who experience two or more problems will buy another product of the same brand.

> 54% of consumers will buy another product of the same brand if no problems occur with the current device or service.

Companies must balance the race to establish early market share with the danger of prematurely releasing a voice-enabled device or application that is riddled with software issues. Samsung's delay of Bixby on Galaxy S8 smartphones reiterates the challenge in launching a sophisticated voice-first application. This delay will be crucial for Bixby—not only will Samsung be rolling out the Galaxy S8 without Bixby but the rival Google Assistant will be taking its place. The smartphone will offer features of Bixby but no voice command capabilities.

However, a delayed, competitive, and market-ready launch of Bixby is better than one that falls short of its competitors, even if it means losing valuable time with consumers.

Amazon Echo devices and Google Home have proven the appeal in voice assistant devices with their rapid success. Due to market reception, Amazon has already introduced its second-generation devices with the Echo Tap and Echo Dot. Recognizing the limitations that a voice-only interface brings and learning from consumers' experiences with their first form factors, it launched the Echo Show – an Echo with a screen. This changes the game and may end the current market iterations of Echo-like devices from other competitors if they are unable to compete.

Market Factors

- Consumer Experience with First-generation Devices
- Extending the Experience in the Home
- New Entrants and Increased Sales
- Expanding Partnerships and New Use Cases

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Google is reportedly in development on its next-generation Home device. Incorporating learnings from its initial product launch, Google has added the ability to recognize up to six different voices. Considering these significant moves and upgrades to these voice-first devices, new entrants will undoubtedly be playing catch-up but can also learn valuable lessons from first-movers' rollouts, design flaws, and user feedback.

> Parks Associates finds over one-fourth of owners of smart speakers with a voice-enabled personal assistant use two or more devices in their household.

Extending the Experience in the Home

Devices like the Amazon Dot have allowed for portability and the extension of voice assistants to multiroom experiences. Smaller form factors and lower price points entice consumers to add additional devices throughout the home.

Amazon's Echo Spatial Perception (ESP) update illustrates the company's expectation that its customers will build their home ecosystem beyond just one smart speaker. With ESP, Amazon has programmed its Echo devices to respond to a user's command only from the speaker that is closest to the user.

The impact of additional purchases on the growth and potential of this market is dramatic. If consumers embrace a multiroom voice-first approach, the projections of unit sales for this category would increase multifold, creating new opportunities for CE makers to establish an ecosystem of products that drives consumers, through an exponential increase in value propositions, to purchase multiple devices of the same brand.

New Entrants and Increased Sales

Whether integrating products with current market voice assistants or creating their own proprietary solutions, companies are entering the competitive fold seeking to capitalize on this momentum.

Those that have integrated their products or services with third-party voice assistants have seen their efforts rewarded. For example, Linkplay, a comprehensive audio solution provider, has integrated its speakers with Alexa and has found a 50-60% increase in sales from doing so.

> **New entrants** expand the product offerings available to consumers, can fill potential gaps in current market offerings, and can push the adoption curve further by approaching consumers' needs in a different way.

Furthermore, industry giants who enter the market, such as Samsung, will be able to leverage their existing customer base. Consumers are inclined to use the voice assistant that is provided with the device they are using.

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Expanding Partnerships and New Use Cases

Partnerships will lead to greater adoption by expanding the reach and utility of voice assistant devices.

> Consumers routinely perform activities in the car that they believe are dangerous—77% send or receive texts while driving.

As partnerships grow and the list of compatible products expands, voice assistant devices will increase in the potential value propositions they are able to offer. Allowing third-party manufacturers to integrate voice assistants into their product designs pushes adoption beyond the form factor of a smart speaker. From categories such as the connected car to those in the home such as connected appliances, consumers will be able to use voice commands to interact with their devices.

Use in the connected car in particular will be a strong growth area, as this use case has public and safety benefits beyond individual convenience.

> Following announcements at I/O 2017, Google Home now has more than 70 different smart home partners. Amazon Alexa currently has more than 400 smart home-related skills.

In Summary

The arrival and growth of voice control have catalyzed a major market transformation in both the UX and UI for a variety of devices.

Advances in artificial intelligence and machine learning have improved the accuracy of voice technologies. These technologies, paired with the ubiquity of portable devices, have helped push the massive growth of voice-based technologies as the consumer experience with these interfaces has continued to improve.

As devices continue to add listening capabilities, voice control will extend throughout the home and in other connected devices as an intrinsic, easy, and natural way to facilitate smart home management. It is in the smart home where voice interfaces will be able to demonstrate their full potential. Voice serves as a key interface to alleviate the complexity in fragmentation typical of the smart home market (and which will likely persist for the foreseeable future).

Voice control is a smart home enabler – and future adoption of smart home products will hinge of their ability to integrate into a connected ecosystem driven by voice as the standard point of interaction.

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As Director, Research Quality & Product Development, Jennifer manages Parks Associates' process for producing high-quality, relevant, and meaningful research. She acts as an internal advocate for Parks Associates clients and leads the company's efforts at conceptualizing and implementing digestible, relevant research presented in an optimal manner. Jennifer is always looking at the most effective ways to provide research to Parks Associates clients.

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Industry Expertise: Digital Health Products and Services, Portable and Mobile Access Platforms and Applications

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Parks Associates is an internationally recognized market research and consulting company specializing in emerging consumer technology products and services.

Founded in 1986, Parks Associates creates research capital for companies ranging from Fortune 500 to small start-ups through market reports, primary studies, consumer research, custom research, workshops, executive conferences, and annual service subscriptions.

The company's expertise includes the Internet of Things (IoT), digital media and platforms, entertainment and gaming, home networks, Internet and television services, digital health, mobile applications and services, support services, consumer apps, advanced advertising, consumer electronics, energy management, and home control systems and security.

For more information, visit **parksassociates.com** or contact us at **972.490.1113** / **info@parksassociates.com.**

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Smart Home Tracker: Market Sizing & Trends provides the market intelligence for companies to navigate and succeed in this competitive landscape by sizing and forecasting the overlapping markets in the smart home space and providing an analysis of key industry trends, market shifts, and player announcements on an ongoing basis.

This annual service includes multiple deliverables from the Parks Associates smart home analyst team, with market sizing, analysis, and insight about key smart home and IoT products and services:

- **Smart Home Market Tracker (Quarterly)**
- **Smart Home Market Sizing (Biannual)**
- **Analyst Consultation (Four Hours Per Annual Contract)**

These deliverables present and analyze:

- Size of key smart home markets and submarkets
- Five-year forecasted growth of key smart home markets and submarkets
- Important trends shaping the market
- Impactful product announcements
- Partnerships and acquisitions from major players

This service provides:

- Strategic assessment of market changes, current announcements, and new products
- Up-to-date analysis of the impact of events on the competitive landscape
- Insights into strategies for key players
- Evaluation of events in the context and broader market trends
- Identification of market, partnership, and revenue opportunities
- Access to Parks Associates analyst team

Use Voice Control to Access Internet-connected Platform
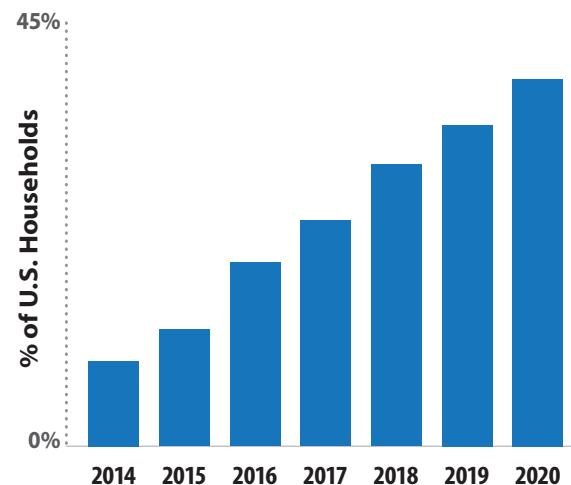
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