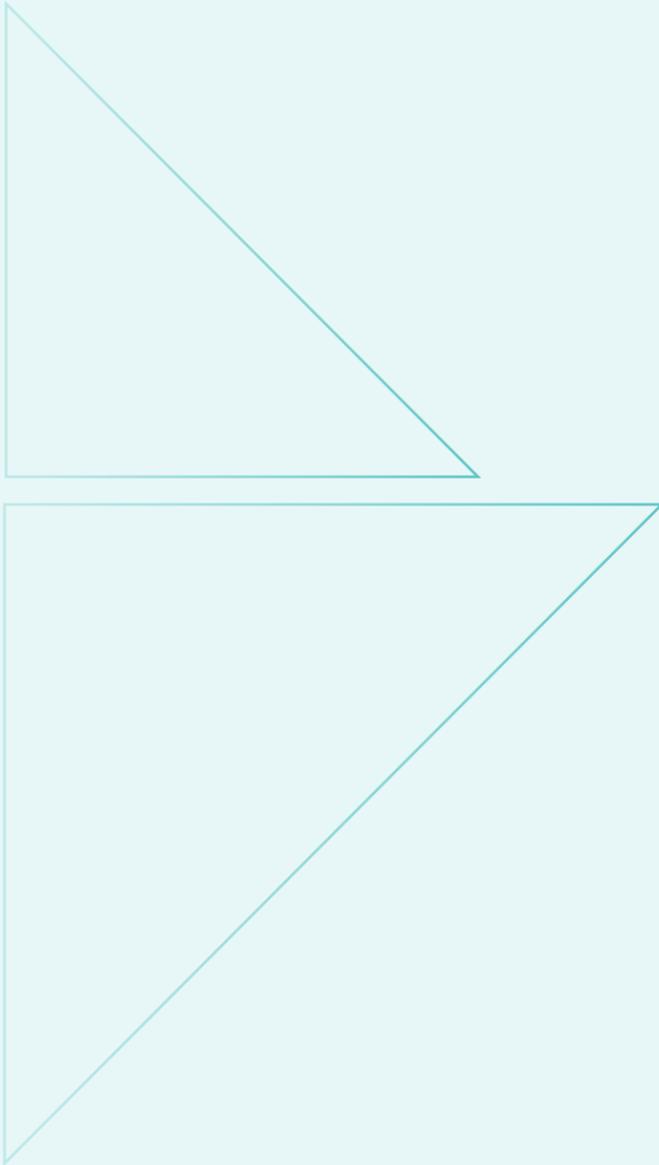


State of the Ecosystem Report

The background features several overlapping, semi-transparent white geometric shapes, including triangles and rectangles, creating a modern, abstract design. The text is centered within a white rectangular area on the right side of the page.

In this report, we're focusing on smart home and connected technology both inside and outside of the home – what it looks like now, current and future trends, opportunities – and how Z-Wave plays a role in all of it.



A Note From The Executive Director

In 2020, technology has reached a point of maturity; adoption and consumer education have begun to see consistent growth, particularly with mainstream and new-to-technology consumers. Smart home technology has become pervasive in the way we all live our lives — we reach to digital assistants to help us complete tasks, smart security cameras and systems are a large part of our culture, and technology that was once considered to be reserved for the wealthy or tech-savvy experts is now found on the shelves in large sections of big-box stores and wide swaths of the internet. If you've been to a Best Buy or Home Depot in the last few years, you'll see this in full effect!

Z-Wave technology was developed almost 20 years ago, and the Z-Wave Alliance was formed just a few years later to create a place where manufacturers integrating this technology could come together to work on new ways to implement Z-Wave, develop certification, and market its strengths and benefits to customers. Since its inception, Z-Wave has stood as a leader in the wireless protocol segment, with a robust certification program, security standards that are among the most rigorous in the industry, and an Alliance made up of a diverse group of manufacturers, integrators, and others all driving forward growth in the residential market, as well as other market verticals. With summer 2020 upon us, Z-Wave Alliance proudly becomes a Standards Development Organization (SDO) and opens the Z-Wave network layer and communication protocol for the Z-Wave Specification. The released specification will become a ratified multi-source wireless standard that is available to all silicon and software stack vendors for development. Under the new SDO, members will have a larger voice in shaping the technology and companies will leverage their diverse backgrounds and experience to work cooperatively in creating the future of Z-Wave and define the future of the smart home and the larger IoT.

We are excited to release our second-annual Z-Wave State of the Ecosystem Report to highlight Z-Wave's growth to over 3300 certified products worldwide across an Alliance of hundreds of global member companies. In this report, we're focusing on smart home and connected technology both inside and outside of the home — what it looks like now, current and future trends, opportunities — and how Z-Wave plays a role in all of it.

As we look to the rest of 2020 and beyond, the Alliance is thrilled that so many companies are committing to driving the interoperability of devices, applications, and systems across the smart home ecosystem. We see a future where all standards can work together to create a seamless product experience for consumers, as well as an easy-to-navigate development process for manufacturers.

Enjoy this 2020 Ecosystem Report and we look forward to seeing you soon.

Mitchell Klein, executive director, Z-Wave Alliance

Since its inception in 2001, Z-Wave technology has seen a lot of changes and developments. What is it that makes Z-Wave technically superior compared to other protocols in the market?

2 Z-Wave was designed solely for the smart home.

Z-Wave's power, range and bandwidth are optimized specifically for smart home applications.

Z-Wave's combination of technological agility, low cost, ease of integration, product-level interoperability, and mature mesh networking makes it ideal for control applications. Z-Wave also uses a sub GHz frequency, eliminating common interference with Wi-Fi or other 2.4 GHz signals; it is much more effective transmitting through building materials, thus making it more reliable for smart home functionality.

3 Z-Wave has led the market for almost 20 years and continues to grow.

Z-Wave has a track record of creating smart home technology that works today and is future proof for the applications of tomorrow with a strong commitment to backwards compatibility. Over the years, Z-Wave has seen investment from and been found in the products of big brands such as: ADT, Alarm.com, Assa Abloy, August Home, GE, Leedarson, LG U+, Nokia, Ring, Samsung SmartThings, Vivint Smart Home, and more.

4 Z-Wave's backwards compatibility ensures future-proof technology.

Z-Wave is backwards compatible – meaning that devices built on previous versions of the Z-Wave chipset platform continue to be compatible with the latest version of Z-Wave – and vice versa. This means that no matter when a Z-Wave device was purchased and installed, it will continue to work with the latest technology for years to come.

1 Z-Wave represents one of the largest smart home ecosystems around the globe.

It's important that products are able to work together with all smart devices in the home, regardless of type, version or brand. There are 3300+ certified products that are backwards-compatible in the Z-Wave ecosystem. Consumers have a wide choice in brands; Z-Wave is found in leading IoT and smart home products around the world.

5 Z-Wave takes security seriously and has made a new framework mandatory.

Z-Wave uses industry-standard AES128 encryption, the same protocol used in online banking. The Z-Wave certification process ensures that Z-Wave smart devices are secure. The Z-Wave SDK includes the Z-Wave Security S2 Framework, designed to eliminate risk of man-in-the-middle attacks and includes an industry-wide accepted secure key exchange using Elliptic Curve Diffie-Hellman. The Z-Wave Security S2 framework is now mandatory for all devices certified after April 2, 2017 and there are 800+ devices on the market with the best in class S2 framework built-in. Z-Wave devices are the safer, smarter choice for users.

6 Z-Wave is an openly licensed standard.

Z-Wave has proven to be the most ubiquitous of the wireless communication standards; it is the only low-power, medium-bandwidth HAN/LAN technology with interoperability. The Z-Wave Specification is now becoming an open standard. The API is openly licensed by the (SOC provider | Silicon Labs); all that is required is certification to ensure interoperability.

7 Z-Wave interoperability complements the cloud but keeps the data in the home.

Z-Wave devices can speak to other Z-Wave devices without an Internet connection. This keeps control local, with no latency issues for simple commands. Many cloud-based services can control Z-Wave products and systems. However, with Z-Wave, no data leaves the home unless the user wants it to.

NEW TECHNICAL CHANGES TO ADD INCREASED INTEROPERABILITY AND SUPPORT NEW CAPABILITIES.

Now, with the newly-opened Z-Wave Specification and the Alliance moving to a structure that is a standards-development organization in charge of regulating, developing and creating deep change in the technology, we look forward to being able to continue shifting the conversation. Z-Wave has always been an openly licensed standard, but now as we roll out our new technical goals, the opened Z-Wave Specification will include the ITU.G9959 PHY/MAC radio specification, the application layer, the network layer and the host-device communication protocol. Instead of being a single-source specification, Z-Wave will become a multi-source, wireless standard developed by collective working group members of the Z-Wave Alliance dedicated to various components of technical development, certification, security, marketing and more.

There are large companies and disruptors in the IoT that need sub-GHz solutions, operators who demand second-source hardware availability, and service providers who want to be able to contribute to the protocol and certification specifications. This move will allow us to address these needs and allow Z-Wave to reach new heights and applications in the market and the Alliance to gain influential new membership.

Ultimately, the goal for Z-Wave and other protocols in the industry should be continued interoperability.

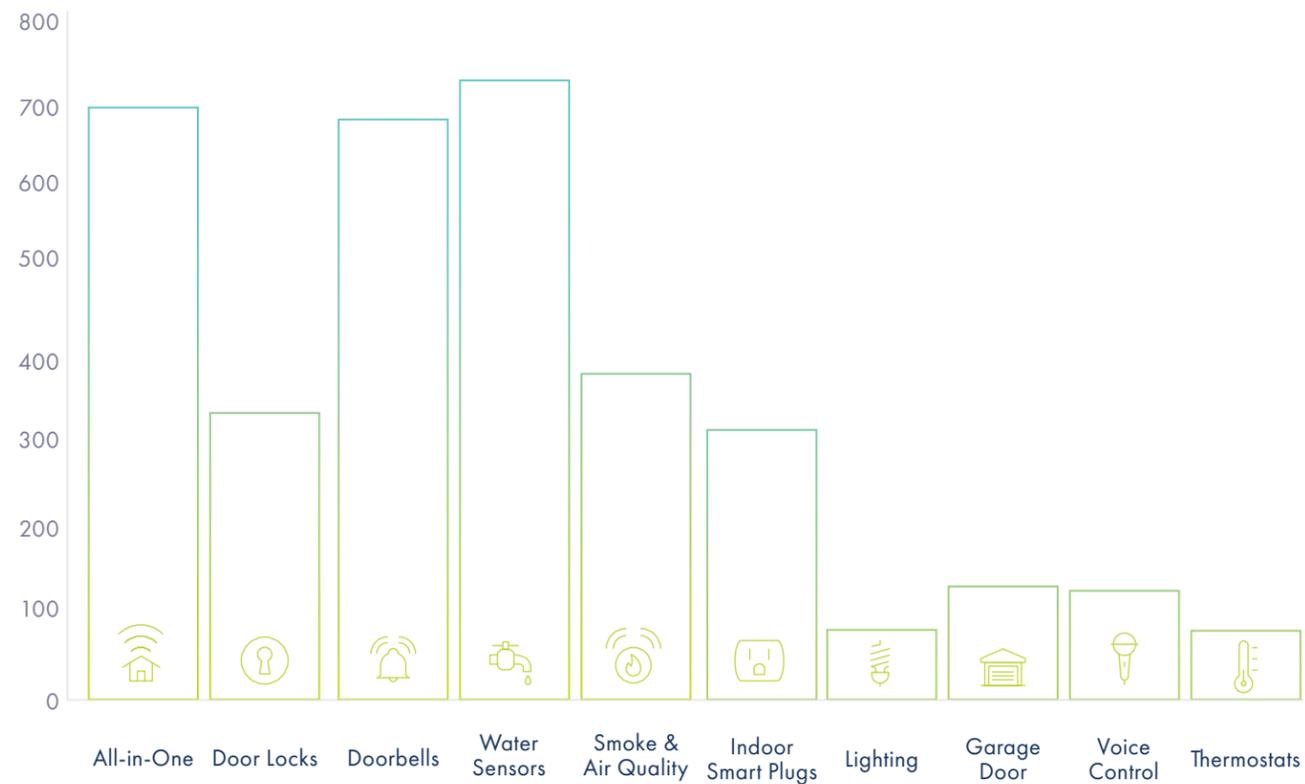
Z-Wave Ecosystem: Current Figures



Z-Wave Alliance Member Location Demographics

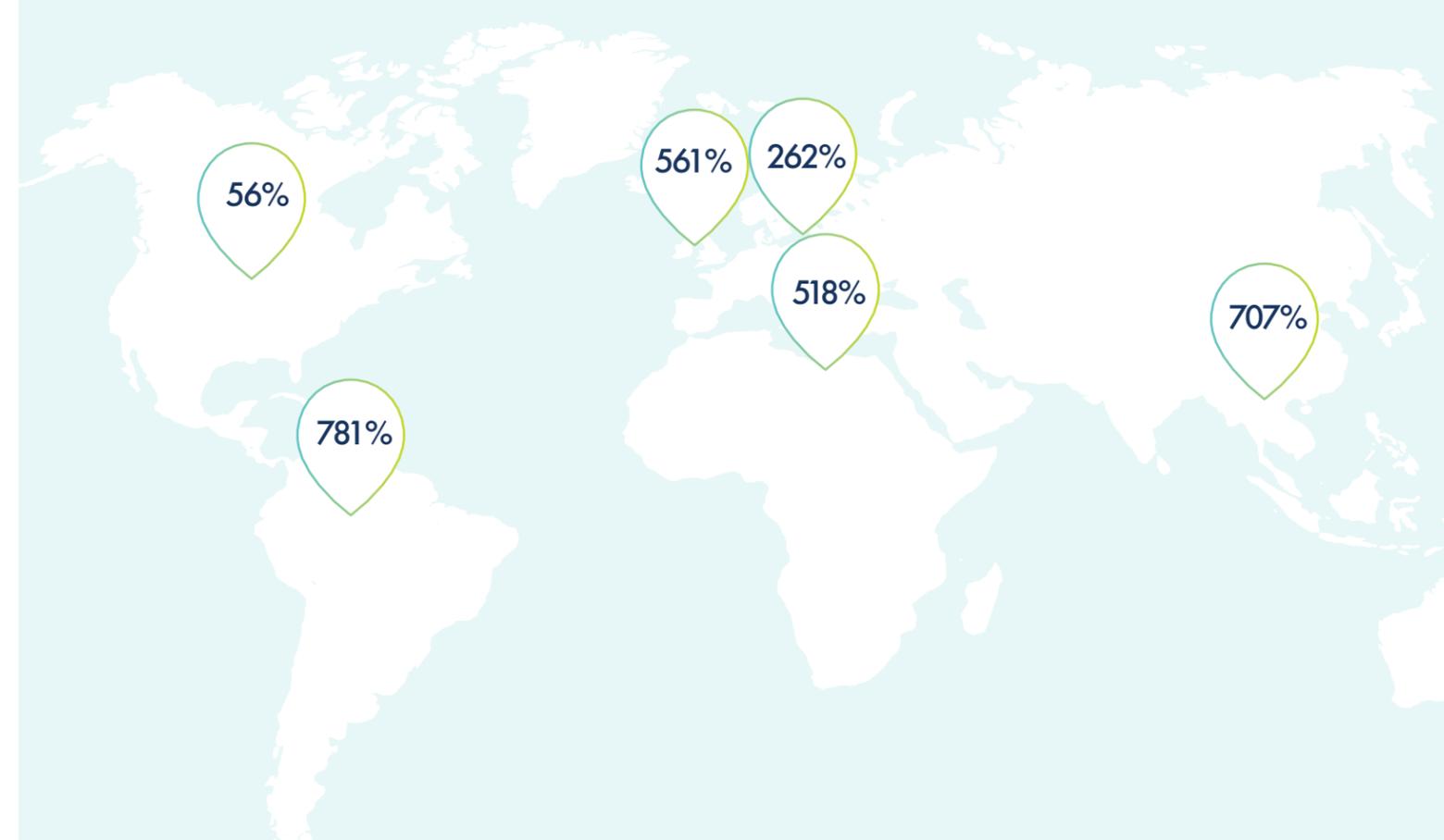


10 Z-Wave Smart Home Categories Primed For Growth (In %)



Regions Primed For Growth (2015 through 2025 projected)

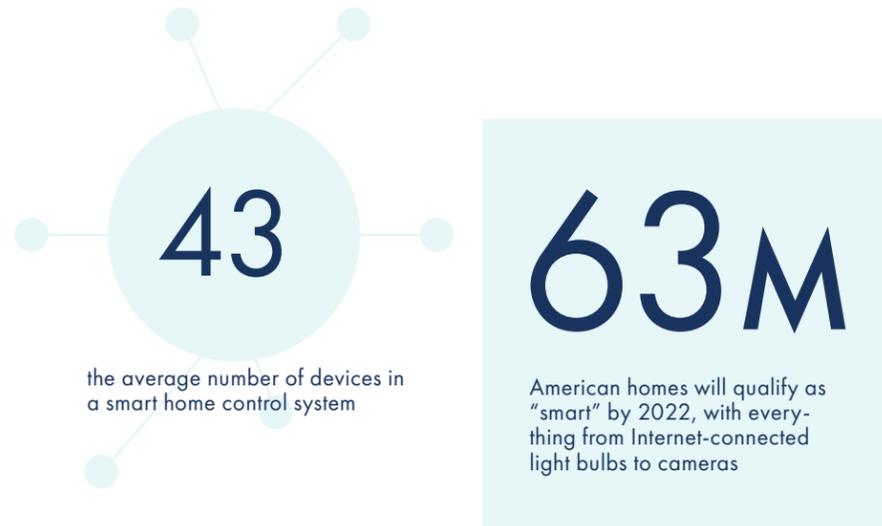
In terms of smart home installed base



Sources and citations for data found in infographic may be found at the end of this document. Z-Wave Alliance specific data comes from internal sources.

Smart Home

The smart home opportunity has never been stronger. This includes a range of residential segments like water, comfort, access, sensors, lighting and security.



Most Common Smart Home Subsystems

	82%	Home Network
	69%	Multiroom Audio
	53%	Surveillance
	52%	Lighting Control
	49%	Climate Control
	45%	Multiroom Video

37%

percent attributed their purchases to a desire for greater security for their family

84%

of respondents cited convenience as essential to smart devices' appeal

MORE THAN 43%

prized comfort and the ability to track data related to their home

Multi-Dwelling Units (MDU)

This includes residential multi-dwelling units such as apartments or condos.

Nearly half of those who say they're at least 'somewhat more likely' to rent for a free smart device are between the ages of 26 – 35.

Insurance

IoT and smart home technology are becoming an increasing part of the conversation as home insurance companies look for new ways to make insurance attractive to new demographics, obtain more data on customers, and mitigate risk.



19%

of MDU residents feel that smart home devices are a very important consideration

35%

of surveyed large scale builders (LSBs) provide the networking infrastructure to provide a "smart home-ready home"

The smart home is moving beyond the home, with connected technology taking shape and feasibility in new applications. Smart home and connected technology no longer refers to just the residential sector — connected tech has permeated apartment buildings/MDUs, hospitality, offices and enterprise, new home construction, as well as industries like healthcare and insurance.

And the technology behind these new applications is also rapidly evolving, with trends such as AI, 5G, more advanced chip-level features, and open-standards all playing a role in bringing these applications into the spotlight.

Making Smart Home Safer and More Easily Accessible

Whether it is a consumer trying to get a new smart security system up-and-running, an integrator installing a whole-home smart system, or a building manager attempting to manage hundreds of smart lighting or comfort devices in an apartment building or hotel — it is critical to the greater success of smart home for there to be tools and educational resources that allow for faster, more streamlined implementation and setup of devices, as well as security requirements that ensure that users and their networks are protected, even as the smart home and networks mature. Safer and smarter technology allows for greater adoption and enjoyment of smart homes for years to come.

HOW Z-WAVE IS PLAYING A ROLE: Z-WAVE CERTIFICATION

Z-Wave certification mandates a number of features and requirements focused on quicker device and system set-up, as well as a continued focus on best-in-the-industry security. SmartStart is a setup feature that removes the complexity of installation for both consumers and professional installers. SmartStart enabled hubs recognize any SmartStart enabled accessory device, like a lock or light, with a quick app scan of its QR code. With SmartStart, the device's information is already set up inside the hub and pairing is complete prior to a consumer or installer adding product — the setup all happens behind the scenes, drastically shortening and simplifying the product setup process. S2 Security is a mandatory security framework that protects devices in a Z-Wave project starting at the hub and across all end devices. If a product passes Z-Wave Plus v.2 certification then users have the assurance their devices are protected from cyber-attack on these connected devices.

The latest requirement cites device identification through an LED light on each product to provide visual confirmation that the device is paired correctly. Z-Wave Plus v2 certification will continue to require each device to implement the updated security framework, drive installation simplicity and confirmation.



A selection of the first Z-Wave Plus v2 certified devices, including the Z-Wave 700 platform — AutoPilot hub by Aeotec, the first hub built and certified on Z-Wave 700; HELTUN HE-HT01 Heating Thermostat and HE-FT01 Fan Coil Thermostat — first Z-Wave Plus v2 and multi-frequency for all regions certified thermostats.

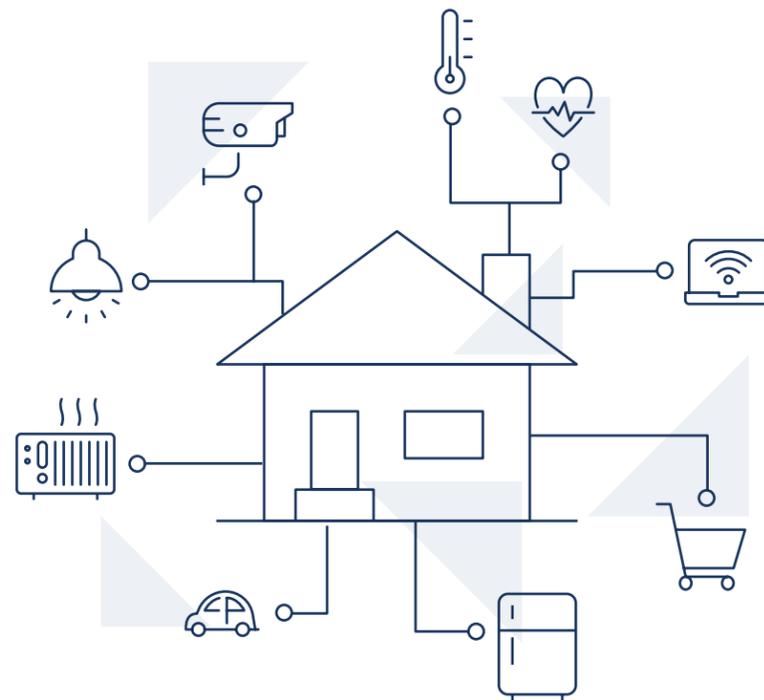
Open Standards and Interoperability

Connectivity is critical to the success of smart home — if devices can't communicate with one another effectively, a roadblock is put in place that hinders the smart home experience. This roadblock surfaces every time a consumer or an installer has to stop, troubleshoot, and conduct extensive research in order to figure out how to get devices to connect — and it can have a big impact on their likelihood to adopt and even recommend smart home tech to others, now and in the future. Interoperability is such a critical part of ensuring success in the smart home and connected technology market — it's important that manufacturers, technology and standards groups, and others with crucial roles in the industry, come together to find ways to ensure that interoperability remains a consistent priority as the smart home continues to grow and mature.

HOW Z-WAVE IS PLAYING A ROLE: Z-WAVE SPECIFICATION CHANGES & NEW SDO

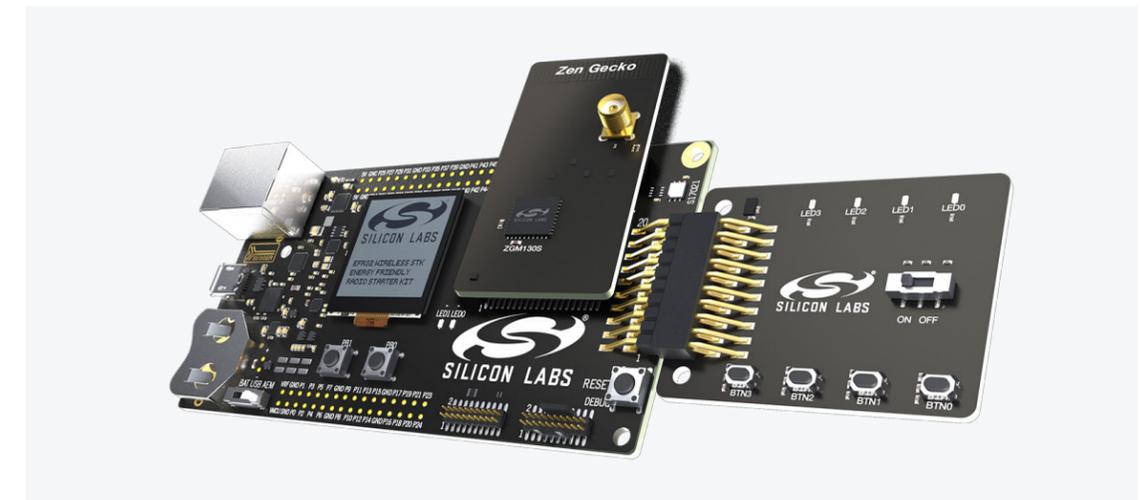
Standards compatibility and product interoperability are critical to ensuring the success of the smart home — we see a future where all the standards, including Z-Wave, and others, can all work together seamlessly to create more freedom of choice for consumers, a better product experience, and an easy-to-navigate development process for manufacturers.

The Alliance is driving forward progress in standards unification by opening the Z-Wave Specification and inviting new companies like silicon vendors and software stack providers to contribute to the ongoing development of the Z-Wave standard. This will inspire deeper interoperability and accelerate a unified smart home ecosystem. The Z-Wave technology provides the range and power consumption benefits needed at the 900 and 868 MHz, subGHz layer. Opening the Z-Wave Specification provides an established sub GHz for development, continues to support backwards compatibility, leaves no consumer behind, and drives a broader ecosystem.



Open standards and connectivity will accelerate the smart home and larger IoT.

Artificial Intelligence and Contextual Awareness



Z-Wave 700 Platform Kit

As the market matures, the possibility for truly intelligent homes that go beyond simple connectivity and control become a reality. Artificial intelligence, voice control, contextual awareness, and machine learning will all play a role in future solutions.

In an IoT application of a neural, AI network, the sensor is at the heart of the system, working to continuously gather data that can then be executed upon directly, without having to call to the gateway or cloud. The sensors baked into smart devices on the neural network are the catalyst for data, power and memory that can then make the context-aware decisions. Essentially, the context-aware smart home is a distributed system, perfectly aligned with the architecture of a mesh network.

We are closer than ever to a context-aware smart home. In the next evolution, applications will respond and adapt automatically to changes in the home and environment through sensing technology that can detect user proximity, identify individuals within their home, or environmental factors.

HOW Z-WAVE IS PLAYING A ROLE: Z-WAVE 700 SERIES PLATFORM

With sensors at the heart of the context-aware IoT network, there is a need for chipsets that offer longer battery life, increased range, improved processing power and security built in.

Mesh wireless networks, like those enabled by Z-Wave, allow for greater product interoperability, stronger and more reliable network communications and powerful device security and range. The latest Z-Wave 700 series platform from Silicon Labs has enhanced technology and performance to enable the artificial intelligence and edge computing trends and is built

to power the context-aware smart home. To be useful in the smart home, technologies like AI and machine learning will require a new generation of sensors reporting data about the environment, behaviors, habits and schedules of people in each dwelling to improve the quality of the user's interaction with the devices. The newest Z-Wave technology developments will allow for significantly longer battery life and propel the growth of sensors and battery-powered wireless devices in the future.

The future of the smart home relies on innovation, creativity, business savvy, and so much more. We asked industry experts and media across a wide range of verticals for their insight into the future of smart home – what they see as challenges, opportunities, and trends to come, through 2020 and beyond.

Q . As the industry shifts from “early adopter” to “mass adoption” what’s the number one (or top few) hurdles facing consumer adoption of the smart home?

“Complexity, interoperability and longevity are the largest hurdles to mass consumer adoption of the smart home. Complexity because consumers don’t want to spend their weekends installing/troubleshooting their homes. Interoperability because consumers don’t want to buy something unless they know it will work with everything they have in their home now (and might want in the future). And longevity because consumers are scared by the all too common reports of the death of smart home devices.”

Jennifer Pattison Tuohy, DWELL

“I think the biggest threat is an ever-expanding range of communication standards – but I also believe that the industry recognizes this and is making strides to make this issue one that the general consumer never needs to worry about. Security and trust are also a massive issue that will need to be overcome.”

Paul Lamkin, The Ambient

Q . What do you think manufacturers of Z-Wave smart home devices could do differently in 2020 and beyond to be more successful?

“For standalone products however, to compete successfully Z-Wave manufacturers need to rethink their approach to design. The modern home is design-focused, form is as important as function for many of these



“Complexity, interoperability and longevity are the largest hurdles to mass consumer adoption of the smart home.”

Jennifer Pattison Tuohy, DWELL

products, and neither should be sacrificed for the other. Customization is also key, give consumers the ability to adapt the product to fit their home design and decor.”

Jennifer Pattison Tuohy, DWELL

“Manufacturers need to increase their security protocols and help dealers understand and commit to these standards. Stop putting default passwords into their devices. Technology exists where you can set random passwords as well as force dealers to change login/password when they commission the devices.”

Tim Albright, AVNation

“Prior to releasing new devices, testing should be done so that drivers are available for all of the major hubs.”

Brandon Doyle, Realtor Magazine/Inman

“I think we’ll move away from seeing things that are internet-connected as futuristic and instead, expect things to simply be ‘smart.’”

Paul Lamkin, The Ambient

Q . What’s the next “voice control” for the smart home? (i.e. what do you think is going to cause the next radical shift in the market/industry?)

“I think it’s going to be self-aware systems, probably related to artificial intelligence. We can program and set routines, but I think a smart home that’s self-aware, able to make logical recommendations (like reminding you to arm your home security system if you forgot to do it), would expand the smart home to a new level.”

John Velasco, Digital Trends

“I think AI is inevitably going to evolve beyond needing voice commands in order to kick start an action. I think we’ll get to a point where our digital assistants know us and our routines so well that everything is just automated for us.”

Paul Lamkin, The Ambient

“While voice control certainly has gained traction through the ubiquity of Amazon Alexa devices in homes, it’s far from a fully realized technology. Many still use it primarily for weather reports and music playback, whereas the potential is there for so much more. That’s why I think AI is the smart home trend with the most future potential. When you can truly enable your home to anticipate your needs, learn your routines and anticipate your needs, then your home is truly ‘smart.’ Voice is a step in that direction, as was the Nest thermostat, but we have a long way to go and a lot more potential than has yet to be realized.”

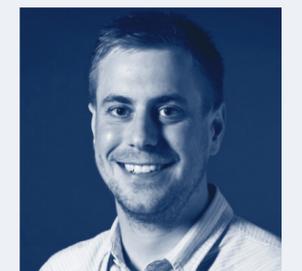
Jeremy Glowacki, Residential Tech Today

“The next big thing is more mobile integration. Customers are already feeling the pain of too many apps, like too many remotes. However, the mobile devices are also Bluetooth and beacons. My smart home will recognize me from my wife because of my device.”

Tim Albright, AVNation

“I think media rooms / home cinemas / home gaming suites are really going to help to grow the market. With huge developments in screen resolutions and high definition audio, people are edging more and more towards bringing great entertainment to their homes.”

Amy Wallington, HiddenWires





“In a post-pandemic world, I think the smart home’s greatest opportunity will be facilitating connections between people.”

Stacey Higginbotham, Stacey on IoT

“In a post-pandemic world, I think the smart home’s greatest opportunity will be facilitating connections between people. Instead of simply focusing on aging in place, we should look for technology that helps people feel connected to their loved ones both inside the home and at a distance. Historically people started buying connected devices for security, followed by a desire to save money on energy costs. The very last reason people bought smart devices was for entertainment.”

Stacey Higginbotham, Stacey on IoT

Q. Which aspect of the Z-Wave protocol do you feel is most important right now? (interoperability, backwards compatibility, security, ecosystem size?)

“I would say security. It’s an area that will always require concentration.”

John Velasco, Digital Trends

“These are all important because they all facilitate improved integration and user friendliness, but I think manufacturers have to ensure the security of these products. Numerous studies indicate that security is a major concern with homeowners/consumers examining the smart home industry... The smart home industry is too small and not mature enough to suffer from these issues without it doing major damage to the growth of the industry.”

Bob Archer, CE Pro

“Security to me is the most important and can always be made better. Beyond that, I would include the interoperability.

This gives inventors the platform to create some unique solutions but also leverage features that others have built into their devices.”

Tim Albright, AVNation

“It is all about interoperability. Getting everything in the house to talk to one another through one control system is key to greater acceptance and users moving to the next level.”

Tony Savona, Residential Systems

Q. What’s the greatest opportunity facing the smart home market in 2020 and beyond?

“I think we’ll move away from seeing things that are internet-connected as futuristic and instead, expect things to simply be ‘smart’. Already there are white-good manufacturers whose flagship kitchen products all come connected as the standard, and I expect that to evolve into other areas of the home including tools, storage, bathrooms, decorations and more. I think people will not only want smart products for automations and the like, but for self-diagnosis, self-cleaning and so on. I think the term ‘smart home’ will die out as people just assume and expect pretty much everything in their houses to be smart; aside from the stuff we’re used to seeing as smart now.”

Paul Lamkin, The Ambient

“One of the biggest opportunities for the growing smart home market is the environmental impact it can have, playing its part in the reduction of global warming.

Smart devices and automated homes can help with energy management and cost savings. Something as simple as a sensor can ensure that lights and temperature control, for example, are only used when needed if someone is in the room.

Another opportunity which not enough people are realizing is the healthcare benefits. Unobtrusive monitoring can help to keep the elderly and disabled in their homes for longer while keeping them safe and reducing the need for caregivers.”

Amy Wallington, Hidden Wires

“I think wellness will be the big opportunity for integrators going forward. Consumers are rapidly learning about smart home and the next phase of that educational process will be the benefits of wellness and services such as circadian lighting, water and air purification and other similar amenities.”

Bob Archer, CE Pro

“A big opportunity in the smart home is providing a robust home network with even Wi-Fi coverage throughout. In uncertain times, most consumers would love to know they can rely on their network infrastructure to operate at its best and if it doesn’t have a trusted professional to text or call to fix it quickly.”

Jeremy Glowacki, Residential Tech Today

“The greatest opportunity that will come out of the COVID-19 crisis is the need for a more robust home network. Millions of workers across the globe are realizing their network is fine for streaming Netflix but never realized how little it could really handle. Dealers will have the opportunity to build even stronger foundations for networked devices.”

Tim Albright, AVNation

“I think the greatest opportunity for the smart home market is the single, whole-home control system. Now that people know what a smart home can do for them, I see them as wanting to maximize its benefits.”

Tony Savona, Residential Systems

“Wider adoption across the mainstream via newbuild and retrofit. Communication to end users that DIY automation is not a viable option, you need an expert.”

Daniel Sait, Essential Install

“Building trust in the providers of smarter homes will not only advance mainstream adoption, it will also ensure that providers of such gear remain compliant with upcoming laws designed to help customers understand where their data is going and to how to control its use.”

Stacey Higginbotham, Stacey on IoT

“If a technology is going to make the leap from early adopters to mass adoption, it needs to be simple to set up/install/use, and it has to work reliably, all the time. To gain traction with the masses, it would also need to truly solve a problem or bring joy or comfort to people in some way.”

Jeremy Glowacki, Residential Tech Today

“The biggest hurdle is the network. Since I think that’s going to be solved, the next will be a crowded field of products. It will take a few years for the truly horrible products to fail and the good ones to remain.”

Tim Albright, AVNation

“There are too many different ecosystems, as companies get acquired, go out of business, or quit supporting older products users will be disappointed when their devices no longer work together.”

Brandon Doyle, Realtor Magazine/Inman

“I think the biggest hurdle facing consumer adoption is the lack of interoperability. So many devices do not work with other devices, making it difficult and confusing for the homeowner and limits them as to what they can buy to work in their home. Also, many consumers do not see the benefit of owning smart devices over traditional appliances. Some are put off by the complexity of these gadgets.”

Amy Wallington, HiddenWires

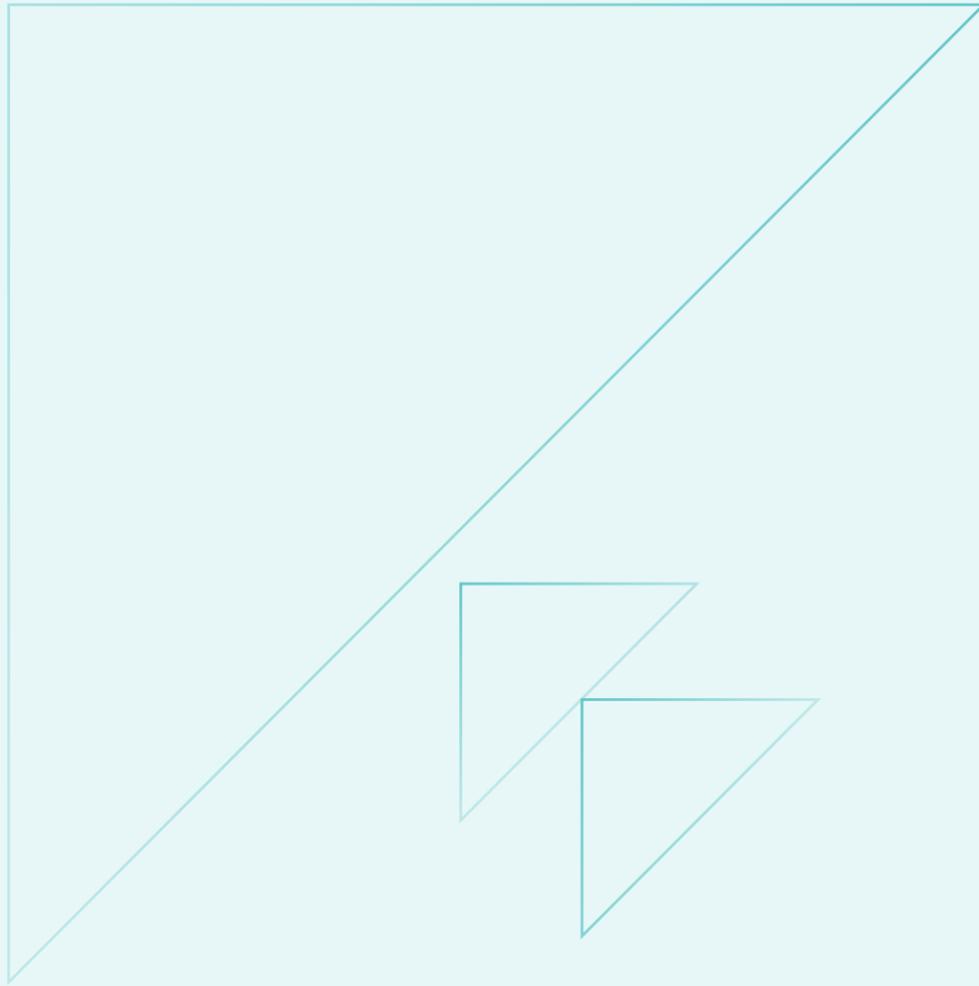
“The post-COVID-19 world will have helped us overcome some of the hurdles to mainstream adoption of smart devices by offering a reason to pick them up and install them. The post-COVID-19 world, however, can’t help with the other big challenge — interoperability. Consumers will not accept frustration when trying to purchase devices that should work together, nor will they accept a lengthy and convoluted installation effort.”

Stacey Higginbotham, Stacey on IoT



“If a technology is going to make the leap from early adopters to mass adoption, it needs to be simple to set up/install/use, and it has to work reliably, all the time.”

Jeremy Glowacki, Residential Tech Today



Looking Ahead

Stay updated on Z-Wave Alliance initiatives and upcoming events by signing up for our quarterly newsletter at www.z-wavealliance.org.

For more information about joining the Z-Wave Alliance, contact Membership & Events Director Janet Collins at janet@z-wavealliance.org.

To connect with the Z-Wave Alliance Board of Directors or leadership team for an interview or quote, reach out to Caster Communications at zwave@castercomm.com.

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