Home Automation Protocols and Languages 101: An Introduction

JASCO®

With the right devices, you can control all of your favorite small appliances and lighting with the touch of your finger from anywhere or by the sound of your voice instantly, adding simplicity and efficiency to your everyday life.

Introduction

Home automation continues to be a common buzzword with new home technology. Smart home technology, however, has transformed significantly in the last decade so that even your ordinary home electronics can be automated through a specific smart home hub, your Wi-Fi network, and virtual assistants like Amazon Echo and Google Home. One-third of U.S. households are now familiar with smart home devices, but what does home automation mean for you and your home?[1]

There is more than one way to build a smart home and getting started can be somewhat confusing for the average homeowner. In this whitepaper, we will explain the differences between the home automation protocols and discuss other important factors to consider to help you choose the right fit for your home and family.

What Really is Home Automation?

In the simplest form, home automation is having the ability to control all systems, appliances and other electronics from a remote device like your phone or with your voice using a virtual assistant. Another popular term used for home automation is smart home, which allows homeowners to interact with technology, lights and appliances around their home and determine actions, scenes, and times for specific situations as well as wirelessly control lights and devices with their phone or their voice.

For example, driveway and entryway lighting can be automatically triggered to come on after dark, so that you never have to return from work to a dark house. This offers even more value because it doesn't require the user to actually do anything manual, which is the biggest benefit of home automation. Additionally, if you're already in bed, but want to adjust the thermostat, lock up the house and turn off all the lights, all of these actions can be as simple as a few clicks on your mobile phone or even easier by telling your virtual assistant smart speaker to do it all for you.

You don't have to be a tech wiz to use or understand it. Instead, you're connected to an easy-to-manage system that provides safety, security, convenience and simplicity to your home-life.

How Does Voice Control Work with Home Automation?

At this point, you have seen or at least heard of voice assistants somewhere online or from a friend. You might even have one in your home already. These devices have been around since 2014 and have continued to rise in popularity, quickly becoming a device that you will find in most homes and the main driving force behind smart home adoption due to the ease-of-use. The major players in the voice assistant space are Google Assistant and Amazon Alexa. These virtual assistants use cloud computing via Wi-Fi network to process tasks and requests that are initiated with your voice including the ability to control your home through compatible smart home devices.[2]

The voice control feature of the virtual assistants maximizes convenience by allowing you to automate your home and control your smart devices hands-free instead of only using smart home apps through your phone or computer. Integrating virtual assistants with your smart products makes for the ultimate smart home setup by giving you "everywhere" control without the need for manual interaction. It's important to consider what virtual assistants work with what protocols when choosing your smart home devices, so your entire smart home

network can work seamlessly together without fail.[3]

The newer generations of Amazon smart speakers, all models of the Echo Plus and the second generation of the Echo Show, have built-in Zigbee hubs that seamlessly connect and control Zigbee smart devices right out of the box. According to Parks Associates, the number of virtual assistants that double as a gateway for other smart devices is growing with 53% of U.S. broadband households owning a smart speaker with a personal assistant while also owning a smart home device.[1] Over time more and more applications and tools are being developed (like Samsung's Bixby or Microsoft Cortana.) Amazon Alexa and Google Assistant offer a useful solution and major benefit for all protocols, including Z-Wave, Zigbee, Wi-Fi and even Bluetooth products. Voice assistants can help take your smart home to the next level, but finding the right protocol for your home requires more thought, so we have laid out important factors to consider about each below.

Choose Your Smart Home Adventure: Finding the Right Protocol

There is more than one way to build a smart home, but for most homeowners, a good place to start is by choosing the protocol to use based on your needs and level of advanced automation you are wanting to achieve. Ask yourself, "Do I simply need a few seasonal lights to wirelessly control and schedule?" or "Do I want to have custom scenes and advanced automation

triggered by specific actions like walking through the front door or opening the garage door?"

This could be the difference between choosing Z-Wave or Zigbee protocols for a fully automated home through a hub or choosing a Wi-Fi or Bluetooth solution to automate specific devices or areas of the home. Like most electronic systems, smart devices in your home can run on many unique protocols. The best way to think about protocols is to compare them to different languages.

These protocols can either be hardwired or sent through radio frequency (RF). Just as it sounds, hardwired systems likely need to be connected to your home's wiring in some way, while RF would connect through air waves, much like how you use Wi-Fi technology. When choosing how you want to build your smart home, consider the installation and setup complexity of the different devices and protocols. For example, controlling all the lighting in your home will require hard wire connections while automating a single lamp or a small appliance can be as simple as connecting

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it to a smart plug. However, don't let intimidation of installing products alter you from your needs as video resources are available and often easily assessible by scanning QR codes on product packaging or searching through YouTube.

By simply understanding the basics of each type of communication, you'll be able to purchase the right products the first time. Determining what protocol to use depends greatly on your needs. Think about the activities that take place in different rooms on a daily basis.[4] Have you ever wondered if you left the doors unlocked or the garage door open? These scenarios and many others can be managed with smart home products.

Z-Wave

- **Requires Hub to Operate**: Compatible with Z-Wave certified hubs
- **Voice Control Capabilities**: Devices work with Google Assistant and Amazon Alexa for hands-free control
- **Extended Range**: Operates on a mesh network that strengthens as more devices are added and communication range is extended
- **Low Interference**: Operates on a 908

MHz radio frequency band that will not interfere with your Wi-Fi network
- **Interoperability**: Works with over 2,600 certified Z-Wave devices of any generation
- **Easy Installation**: Simple to install with a variety of different programming

One of the most widely used protocols in home automation is Z-Wave. This wireless protocol uses a mesh network on 900-megahertz RF band (radio frequency.) This means all Z-Wave devices, with the exception of battery-operated devices, act as repeaters. Since each device can relay signals to other devices until it reaches the right one, the process extends the overall range, making Z-Wave one of the best options for automating large-scale areas.

In order to function and support this strong line of communication, Z-Wave devices require a hub (also known as a gateway) to serve as the "middle man" linking all of your smart devices together for simple and advanced automations. It's important to know that some hubs are multilingual, which means you can mix and match your products with different protocols. However, some systems only

Z-Wave Compatible Hubs

speak one language. You will want to make sure your hub is compatible with Z-Wave if this is the protocol you choose to adopt (SmartThings, Wink and Ring Alarm are a few of the common Z-Wave hubs options).

Z-Wave is also known for exceptionally low power consumption, which makes this ideal for devices that operate on battery power and it only continues to improve. The newest generation of Z-Wave devices, Z-Wave Plus, has 50% more wireless range along with 250% faster processor, 400% more memory and 50% more energy efficiency than the first generation of Z-Wave, and the technology is only expected to improve with the next release of Z-Wave 700 series.[5]

Z-Wave products will work with any other certified Z-Wave device of any generation, whether it was manufactured five years ago, five minutes ago or five years from now.4 Since Z-Wave operates on the 900 megahertz RF band, it will not affect your Wi-Fi or another Bluetooth connection in your home, so you won't have to worry about slow internet or streaming speeds.

One of the biggest advantages to choosing the Z-Wave protocol is that it has the largest assortment of interoperable products on the market. There are over 2,600 certified Z-Wave devices that can control the majority of things in your home from locks to lights to shades to security systems.6 Integrating your existing electronics to the Z-Wave wireless network can be as easy as plugging them into a Z-Wave smart outlet.[6]

All Z-Wave products are marked by a Z-Wave logo to clearly state whether or not they are compatible with the Z-Wave protocol. This helps your interoperability with the various Z-Wave products made by several different manufacturers. As an added benefit, GE and Honeywell Z-Wave products by Jasco also include a hub compatibility guide on the side of all product packaging.

Zigbee

- **Requires Hub to Operate**: Compatible with Z-Wave certified hubs
- **Voice Assistant Integration**: Pairs directly with Amazon Echo Plus or Amazon Echo Show (2nd generation or newer) that include *built-in* compatible hubs to operate Zigbee devices
- **Voice Control Capabilities**: Devices work with Google Assistant and Amazon Alexa for hands-free control
- **Extended Range**: Operates on a mesh network that strengthens as more devices are added and communication range is extended
- **Easy Installation**: Simple to install with a variety of different programming options

Zigbee also provides an RF solution (2.4 GHz) for homeowners to control and automate lighting, security systems and other electronic appliances. Zigbee has expanded in the smart home world over time and is used within a vast number of devices. In fact, cable providers such as Comcast and Cox Cable use Zigbee to connect devices through their home gateway. Zigbee offers a lot of customizations, making this popular amongst developers but Zigbee doesn't offer quite the same selection of smart

Zigbee Compatible Hubs
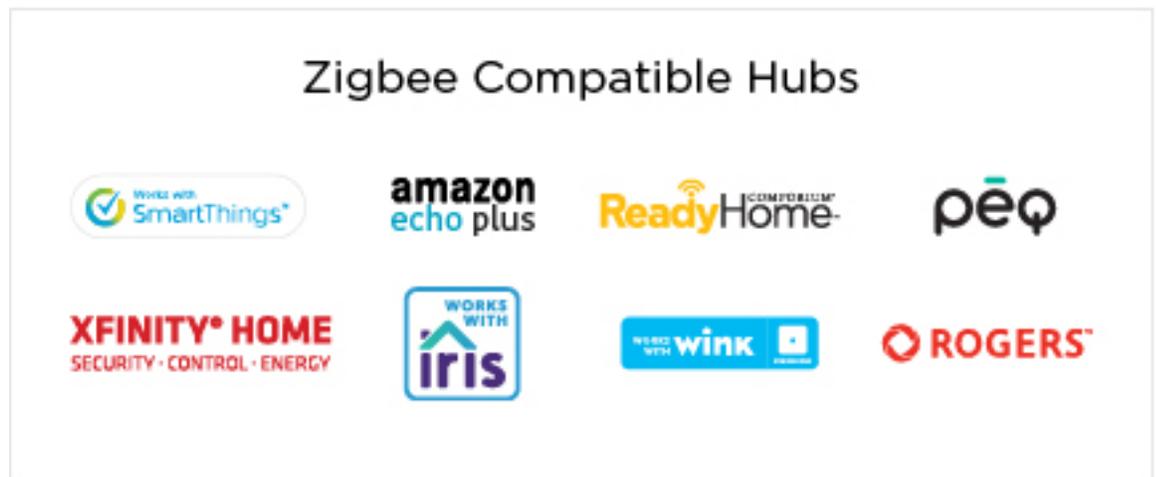
home devices like Z-Wave does due to lack of interoperability.

It's important to remember that even though both Zigbee and Z-Wave work similarly, they are not compatible with one another. If you choose to have devices of each protocol, you must make sure your hub or gateway supports both protocols (ex. SmartThings and Wink.) Ensuring your smart home is compatible with other devices will make it more useful now and help make future upgrades easier. If you already have a specific hub that doesn't support both or want to keep it simple by using only one protocol for all your smart devices, this won't limit you in any way since various products are provided in both Zigbee and Z-Wave protocols.

A large convenience in choosing Zigbee is its integration with the Amazon Echo Plus and Echo Show (2nd generation) which has a built-in Zigbee smart home hub, making it easier and more cost efficient to get into home automation. Having a Zigbee hub built into these voice assistants saves you money and gives you the convenience of having one device instead of two, whereas otherwise you would have to have a virtual assistant and a smart home hub

to automate your home and control with your voice.[7]

Some of the advantages to Zigbee include low-power consumption and that the protocol also uses a mesh network similar to Z-Wave. This allows Zigbee to have a wider range of communication between devices at a faster rate, allowing it to support full automation across a residential or commercial property. To preserve battery life, battery-powered devices do not repeat signals to other devices.

Although Zigbee can transmit more data working at a higher frequency, the products can sometimes have trouble communicating between different manufacturers that use different software profiles on the Zigbee protocol, which can make your interoperability suffer.[8] However, the next generation of Zigbee (Zigbee 3.0) will merge the varying software versions to improve the interoperability for the protocol.[9]

Like Z-Wave, Zigbee products will be clearly marked with the protocol logo, which will help you purchase the correct product and make your buying experience simplistic.

Wi-Fi

- **No Hub Required**: Works with standard Wi-Fi routers
- **Voice Control Capabilities**: Devices work with Google Assistant and Amazon Alexa for hands-free control
- **Direct Communication**: Perfect for devices within 100 ft. of router
- **Easy Installation**: Simple to install with a variety of different programming options
- **Low-Cost**: Can be a less expensive way to install home automation one piece at a time

This protocol provides a different approach to home automation and is rapidly growing in popularity, largely due to the convenience that comes with it. This line of communication uses a star network to deliver automation to indoor and outdoor lighting and small appliances without a hub or bridge required. This means if you have a smart phone or tablet you can download the app that corresponds with the brand of Wi-Fi products you choose, then begin controlling devices over your home's Wi-Fi

Mesh Network

Star Network

network without the added "middle man" hub to carry the communication to each device.[10]

You will need a Wi-Fi network connection in your home (typically at least a 2.4 GHz network) which most homes already have. Because Wi-Fi doesn't use a true mesh network like Z-Wave or Zigbee, the devices resort back to your Wi-Fi router for communication and not each other. assistants like Google Assistant or Amazon Alexa. If you want to outfit your entire home with automation, you will need to have a higher end wireless router with a strong signal to support multiple devices and transmit throughout the house.

In some cases, the connection to your devices can be faulty if your smart controls are placed in a far distance from your Wi-Fi router or if obstructions are between the two and cause interference or possible dead spots with the connection. Adding a mass number of smart devices to a standard router can lead to issues with streaming video and internet speeds. However, you can expand your network range by purchasing additional extenders to support your growing smart home.

Choosing Wi-Fi is a great way to get started in home automation as you can easily add one piece at a time and expand your smart home as you go. The installation process for Wi-Fi is another factor that makes it such a contender for consumers. To establish an open line of communication, the devices only need to connect through a one-time process known as pairing. Once devices are paired to your Wi-Fi network through the corresponding build
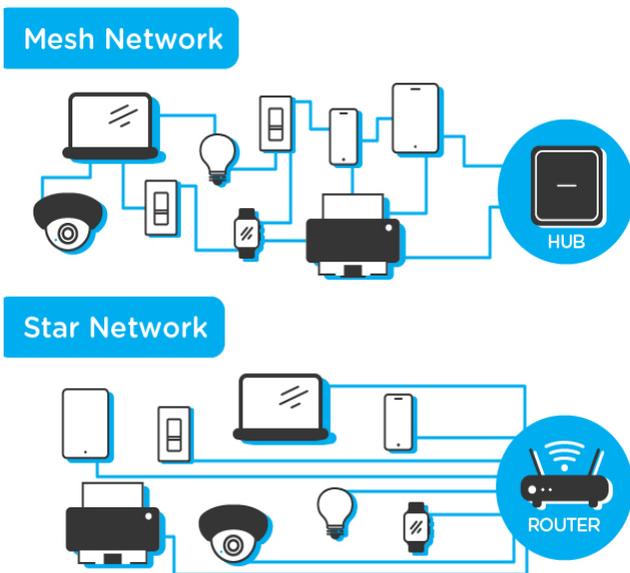
app for your products, there is no need to claim or un-claim devices every time. After you connect and pair, you can immediately start automating your home and remotely controlling your devices from anywhere as long as you are connected to a Wi-Fi network. Wi-Fi devices even allow you to program preset or customized schedules for your devices, so they automatically come on and turn off at predetermined times or can be controlled with your voice at any time by pairing them to voice assistants like Google Assistant or Amazon Alexa.

Although a great option for quick automation, one downfall to the Wi-Fi protocol is a limited selection of products by manufacturer which can lead to having scattered control for your various devices through multiple apps versus one hub with Z-Wave and Zigbee protocols to control everything.

Bluetooth

- **No Hub Required**: Works with Bluetooth on your mobile device
- **Voice Control Capabilities**: Some devices can be connected to Google Assistant or Amazon Alexa voice assistants
- **Direct Communication**: Perfect for devices within 100 ft. of a mobile device
- **Easy Installation**: Simple to install with a variety of different programming options

Bluetooth Smart mesh technology allows multiple-devices to not only receive messages, but also repeat those messages to other devices, thereby defying traditional

Bluetooth range limitations of typically less than 33 feet. This means consumers can control lighting across a large home, estate or office complex without requiring a complicated setup or use of a router, Wi-Fi connection or gateway.

This works more as an in-home only system, which basically means no remote access to control your devices while away from home. However, all programming, schedules, timer settings and preferences can be securely stored in the corresponding app and function properly even when your phone is off or out of range. Lacking remote access is one limitation of Bluetooth, but on the other hand, if your lights or other devices are already programmed for set schedules, ask yourself if you still need that capability or not.

Bluetooth technology is still coming along and doesn't currently have a wide range of products outside of smart bulbs by some manufacturers. Companies like Google and others are starting to look at Bluetooth as an option, but it still has a long way to go before becoming a dominant home automation protocol.

How to Make Your Selection

With several communication protocols, manufacturers and smart products in the market, it can be intimidating to get started in home automation. Hopefully this guide has alleviated some of that confusion. It's important to remember there is no wrong way to a smart home. How you choose to transform your house into a smart home should depend greatly on your specific routine and individual needs.

When you choose a home automation supplier such as Jasco, you get reliable products that both match your protocol and your home décor. With the wide range of smart home products to choose from, you can still have the same light switches that match the rest of your home. Jasco's in-wall units blend perfectly with your home instead of a flashy device standing out like a sore thumb. If you are a renter or just want to avoid hard-wire installations, Jasco offers a full line of plug-in options as well, making it easier than ever to get started in home automation or expand your existing smart home.

In addition to convenience benefits of home automation, there are also energy savings and security benefits such as not coming home to a dark house anymore and creating a "lived-in" look at home when you're not there. With the right devices, you can control all of your favorite small appliances and lighting with the touch of your finger from anywhere or by the sound of your voice instantly, adding simplicity and efficiency to your everyday life.

Shop Smart Home

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