



May 2023

## Smart Home Ready

By Mark Costlow

*The Jetsons* and *Star Trek* told us our homes of the future would be intelligent cocoons that anticipate our needs and react to our actions, moods, and the environment.

But the real history of “home automation” has not made good on these promises. Smart home technology has been largely unavailable and always expensive, finicky, and often requiring an engineer or tech tinkerer to keep it working.

What sparked new interest in home automation is that Big Tech has identified smart homes as their next green pastures. Smart speakers, Siri, Alexa, and other “glue” are intended to tie the disparate pieces of home automation into a cohesive whole. No longer will a computer science degree be needed to install a light that responds to voice commands or an energy-saving thermostat.

Big Tech is trying to usher in an era of super-smart abodes catering to all our needs, but the home automation market is still a bit chaotic at this time. We are at an inflection point, with change happening very quickly.

Advances in the last two decades have made all desirable things possible, and then some. Running new wires in existing homes used to be a big barrier, but now most things are wireless. We have smart thermostats, automatic window-blind open/closers, infinite mood lighting colors, smart speakers, integrated home theater, and more. The problems keeping us from true smart home nirvana are interoperability, security, and control.

### Interoperability

In a functioning smart home, all the sensors and gadgets must be able to talk to each other. If your motion sensors don't speak the same language as your living room lights, then how will they know to turn on when you enter the room?

Many standards have tried and failed at this. The **X10 system**, sold at Radio Shack in the 1980s, talked over radio waves and power lines. It was susceptible to radio interference and other

glitches. To be honest, after putting a lot into X10 three decades ago, we burned out and just ignored home automation for a long time.

Tech advances have made for much more reliable devices. But not all these gadgets speak the same language. More recent standards such as **Z-Wave**, **Zigbee**, and Wi-Fi promise cheap components from any maker that will all work together.

The catch is that once you choose Zigbee or Zwave, all your devices must support that specific standard. Manufacturers commonly have three or four versions of the same device, to work with **Apple HomeKit**, **Amazon Alexa**, **Google Home**, or **Samsung Smartthings**, even though they all use the same Zigbee or Z-Wave standard.

The newest standard, called **Matter**, aims to solve a lot of these problems. It is royalty-free and has buy-in from most device makers. Once your hubs have Matter support, you'll be able to buy any device which supports Matter and know it will work. Hardware manufacturers will only need to make a single version of each device.

The Matter protocol designers built in “bridges” to make it easy for their hubs to support Zigbee, Z-Wave, and Wi-Fi, so people have a logical way to move from pre-Matter systems without tossing their earlier investment – the first time a new smart home protocol has done this, promising to ease and speed widespread adoption.

### Security

The **Internet-of-Things** (IoT) is the idea that you can throw smart devices onto the net anytime and anywhere to provide services with minimum effort on your part. But security professionals are very concerned about how the IoT has developed over the last decade. The mad rush to get everybody's new ideas to market as fast as possible cut important corners. Security, if considered at all, was largely an afterthought.

Many devices let eavesdroppers collect information about the devices themselves and the environment they run in. A person **recently reported** that their neighbor's electric toothbrush showed up, unbidden, on his smart home dashboard, informing him of the exact times and duration of his neighbor's oral health maintenance.

Most devices are deployed with old open-source software toolkits, missing out on years of security improvements and bug fixes. Unable to update, they are stuck with those bugs forever. Does anyone know how to update software in a smart lightbulb? It's probably not even possible.

Old, un-updated software is an invitation to security exploits. That should concern you when

you install a garage door opener that lets you open up your house with a phone app from anywhere in the world. You want to be sure it only opens when YOU tell it, not when a thief with the right cracking software rolls up while you're out.

Matter intends to address many of these problems with built-in security at the start, requiring secure communication for all devices, regardless of what lower-level network they use. Matter devices are able to get security updates "**over-the-air**" (OTA). Device makers will still have to produce the updates, but at least every Matter device will have the infrastructure to apply them.

## Control

Smart buildings need a "controller" for smooth operation – a special computer that can mediate all of the devices as well as implement automations ("when someone enters the kitchen, turn on the light", or "after everyone leaves, turn the heat down to 65"). But for a company that just wants to sell smart light bulbs, it adds a level of complexity and expense most consumers find uncomfortable. The easy solution has been "**The Cloud**". When you connect a Wi-Fi light bulb or thermostat, without having a local controller in your house, it's using a controller in the cloud.

But there are a few security and data privacy downsides to cloud controllers. The operator has a good bit of info about you – maybe only knowing just when you enter the kitchen, or when your thermostat kicks on. But the devices might act like little Trojan Horses while performing that service, harvesting data about your lifestyle that has value on the open market for personal consumer information. For example, an IoT device could show what other devices you have, details about your TV viewing habits, or even allow deducing the times when your house is empty.

Your IoT vendor isn't likely to use that information criminally, but just possessing it makes them a target for data theft by actual criminals.

Finally, there is the risk of a cloud service being shut down, making your device useless. Many services have sadly disappeared because the company which ran them went out of business, or simply lost interest. One of these, Amazon's Halo health trackers, recently announced it will be **shutting down** less than a year after launch.

The economics of IoT cloud services are highly suspect. You pay a one-time price to buy a device, but then a cloud service must run forever without monthly service charges so you can keep using it. They are either making money in a non-obvious way (by selling user data), or will shut it down once new units are no longer sold.

Zigbee and Z-Wave largely solve the control problem by requiring an on-premise controller (or "hub") to operate; easy-to-use devices that are pretty consumer-friendly. Hub users with mostly non-Wi-Fi devices are free of most of the cloud controller risks. Your devices won't become doorstops if Google tires of supporting them, and your motion sensors and lights will work during a net outage. Privacy, however, is still a concern.

## Matter to the rescue?

Matter promises to make all devices that support it work with all controllers. Apple, Google, Amazon, and Samsung are all playing along so far (though different degrees of effort by consumers are needed to make them compatible). This makes it easier to commit to a platform, and cheaper for makers to support everyone.

Matter has just been released and devices that support it are starting to hit the shelves. It will take years to see if it really makes good. The worst case is if one of the big providers decides they are better off locking customers in a "silo" by forcing users to buy all components from them. They might reject Matter to re-balkanize the product space. Hopefully that won't happen.

The last system to consider is **Home Assistant**, an Open Source project that aims to work with any device (using Z-Wave, Zigbee, Bluetooth, Wi-Fi, or more). Running on any low-power PC, it provides a cohesive interface to all those devices. Arguably the most flexible system available with advanced programming, it requires a fair amount of technical know-how: great fun for hobbyists, but not the simplest thing for non-techies.

Our best advice for getting started right now:

- Look for Matter support (existing or planned) in whatever system you choose.
- For dedicated Apple users, there's Apple Home Kit. If you prefer Android phones, go with Google or Samsung or Amazon.
- Get started with a few simple things (light bulbs, cameras, smart speaker). If you don't like them, check to see if the same items from one of the other ecosystems are better to switch to before getting too deeply invested.
- If you are extremely concerned about privacy, go with Home Assistant. It's the only option giving you full control over the availability of your data to third parties.

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