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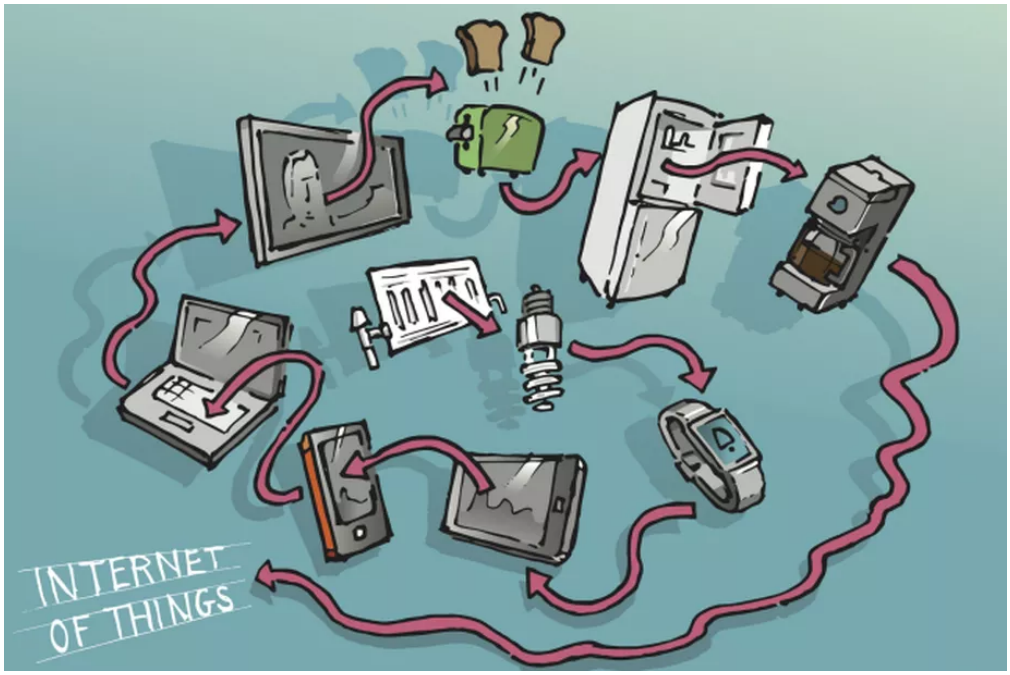
A Beginner's Guide to Understanding the Internet of Things

Confused by the Internet of Things? This guide can help.

BY BONNIE CHA | JAN 15, 2015, 6:00AM EST



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Smart locks, smart thermostats, smart cars — you've probably heard some of these terms lately, and you're going to hear them even more as the year goes on. But what are these things exactly — and what makes them so *smart*?

These devices are all part of an emerging category called the Internet of Things, or IoT for short. At its very basic level, IoT refers to the connection of everyday objects to the Internet and to one another, with the goal being to provide users with smarter, more efficient experiences. Some recent examples of IoT products include the Nest Protect smoke detector and August door locks.

But as with any new technology, IoT can be confusing and intimidating for the average consumer, especially as debates swirl around standardization, security and privacy, and company after company piles on to this fast-growing trend. I've compiled an FAQ on IoT to better explain how it works, how these products are being used in the real world, and some of the issues and challenges facing the category.

I spoke with a number of companies and groups working on IoT products and standards, including Apple, SmartThings, the Internet of Things Consortium, AllSeen Alliance, the Open Interconnect Consortium and the Thread Group.

The smart home was a big topic at this year's CES. | Bonnie Cha

What exactly is the Internet of Things?

My colleague Walt Mossberg gave a great, succinct overview of IoT when he described it this way: "The broad idea behind these buzzwords is that a whole constellation of inanimate objects is being designed with built-in wireless

connectivity, so that they can be monitored, controlled and linked over the Internet via a mobile app."

The types of objects span a wide range of categories, from wearables to light bulbs to home appliances (like the coffee maker, washing machine, and even your car) — really, anything. IoT is also being applied to vertical markets like the medical and health-care industry and to transportation systems.

Okay, I think I get it, but can you give me an example of how it's being used today, and how does this actually make things easier for me?

One of the better-known examples is the Nest thermostat. This Wi-Fi-connected thermostat allows you to remotely adjust the temperature via your mobile device and also learns your behavioral patterns to create a temperature-setting schedule.

The potential value is that you can save money on your utility bill by being able to remotely turn off your air conditioner, which you forgot to do before leaving the house. There's also a convenience factor. Nest can remember that you like to turn down the temperature before going to bed, and can automatically do that for you at a set time.

Another company, SmartThings, which Samsung acquired in August, offers various sensors and smart-home kits that can monitor things like who is coming in and out of your house and can alert you to potential water leaks, to give homeowners peace of mind.

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As the IoT category expands and the products become more sophisticated, one can envision a scenario where your fitness tracker detects that you've fallen asleep and then automatically turns off your TV and lights. Or, before hitting the road, your car could pull up your work calendar and automatically provide the best route to your meeting, or send a note to relevant parties if you're running late.

On a broader scale, it is being used by cities to monitor things like the number of available parking spaces, air and water quality, and traffic.

How does IoT work?

I'll try not to get too technical here. First, there's the underlying technology, the various wireless radios that allow these devices to connect to the Internet and to each other. These include more familiar standards like Wi-Fi, low-energy Bluetooth,

NFC and RFID, and some that you've probably haven't heard of, like ZigBee, Z-Wave and 6LoWPAN (have your eyes glazed over yet?).

Smart locks, just a glimpse at the world of IoT | Bonnie Cha

Then there are the things themselves, whether they're motion sensors, door locks or light bulbs. In some cases, there may also be a central hub that allows different devices to connect to one another.

Finally, there are cloud services, which enable the collection and analysis of data so people can see what's going on and take action via their mobile apps.

What companies are working on IoT?

At this point, the easier question might be who *isn't* working on an IoT product. Big names like Samsung, LG, Apple, Google, Lowe's and Philips are all working on connected devices, as are many smaller companies and startups. Research group

Gartner predicts that 4.9 billion connected devices will be in use this year, and the number will reach 25 billion by 2020.

So, can all IoT devices talk to each other?

This is where things get a little more complicated. With so many companies working on different products, technologies and platforms, making all these devices communicate with each other is no small feat — seamless overall compatibility likely won't happen.

Several groups are working to create an open standard that would allow interoperability among the various products. Among them are the AllSeen Alliance, whose members include Qualcomm, LG, Microsoft, Panasonic and Sony; and the Open Interconnect Consortium, which has the support of Intel, Cisco, GE, Samsung and HP.

While their end goal is the same, there are some differences to overcome. For example, the OIC says the AllSeen Alliance doesn't do enough in the areas of security and intellectual property protection. The AllSeen Alliance says that these issues have not been a problem for its more than 110 members.

A connected sprinkler system | Bonnie Cha

It's not clear how the standards battle will play out, though many believe we'll end up with three to four different standards rather than a single winner (think iOS and Android).

In the meantime, one way consumers can get around the problem is by getting a hub that supports multiple wireless technologies, such as the one offered by SmartThings.

These products seem to be collecting a lot of data. Should I be worried about security and privacy?

The various amounts of data collected by smart home devices, connected cars and wearables have many people worried about the potential risk of personal data getting into the wrong hands. The increased number of access points also poses a security risk.

The Federal Trade Commission has expressed concerns, and has recommended that companies take several precautions in order to protect their customers. The FTC, however, doesn't have the authority to enforce regulations on IoT devices, so it's unclear how many companies will heed its advice.

Of the companies I've talked to, all said that security and privacy were of the utmost importance. For example, Apple requires that companies developing products for its HomeKit platform include end-to-end encryption and authentication and a privacy policy. The company also said it doesn't collect any customer data related to HomeKit accessories.

I'm digging the sound of this IoT thing. Is now a good time to buy?

While the idea of IoT has been around for years, it's just beginning to enter the consumer space, and the category has yet to mature. But there are good products out there. If you're looking to buy now, as with anything, do your research, buy from a company you trust, and make sure you're getting a solution that is actually going to solve a problem. After all, making sure your kids get home safe from school is one thing, but cooking a pot roast in a Wi-Fi connected crockpot is another.