

# The Internet of Things (IoT)

And The Smart Home

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# What is the Internet of Things? (IoT)

# It's Many Things

- It's different things to different people
  - It's a new paradigm to the internet
  - It's the Smart Home
  - It's a security tsunami waiting to happen

# Let's take a look

- [David Rose - Enchanted Objects](#)
- Author of 'Enchanted Objects,' sees a future where we can all live like wizards.
- [The Latest in Smart Home Innovation at CES 2016](#)
- The Smart Home Marketplace at CES 2016 spanned more than 56,000 net square feet. With technology designed to enhance home security, save energy and more, the tech on the show floor showed how you can transform your house into a smart home.

# Key Points

- It is about Interconnecting everything
- It is about controlling / managing this interconnectivity
- Beyond the devices that will do things for you, there are the devices that will manage this
  - Hubs
  - Smart Phone / Tablets / PC

# So what's real in the world of Trilogy

- Many things
- Home Security
  - Cameras
  - Locks
  - Alarms
  - Doorbells
- Home Automation
  - Thermostats
  - Lightbulbs
- ...

# What are the challenges

- Awareness
- Perceived need
- VHS vs Beta
- Installation
- Not so much price

# Awareness

- Many people are at best vaguely aware that this even exists
- Most (understandably) think of this as the Smart Home if they think about it at all - Not as the Internet of Things
- Most of those who know of the Smart Home probably think of X10
  - Hard wired systems requiring special electric adapters that go back to the 70's
  - Allowed one to remotely control lights and other devices



# Perceived need

- How many people really think they need a new thermostat?
  - Many programmable thermostats exist today
  - You probably have one
- How many people really think they need a light bulb connected to a hub connected to your smart phone?
  - Won't a light bulb on a motion sensor or timer take care of that?

# VHS vs Beta

- We all remember the good ole days - Get a VHS or Beta video recorder?
  - Both had their strong points and adherents
  - Both were incompatible with each other
  - No one knew who would be the winner
  - So just wait for the dust to settle
- Today: Zigbee vs Z-Wave vs Insteon vs Wifi
  - Let's look at each

# Insteon

- Insteon is a home automation protocol designed to bridge the gap between powerline-based and wireless protocols, so it uses both. It's also compatible with x10 devices, so it's not a bad choice at all, especially if you've got a house filled with X10 stuff already and are looking to transition to wireless. A wide range of Insteon devices are available right now, and you can browse through the company's entire catalog on its [official Smarthome Blog](#).

# Z-Wave

- Z-Wave is a wireless home automation protocol that runs on the 908.42MHz frequency band. It's relatively new in terms of home automation protocols, but has grown quite rapidly in the past few years. The group behind it, the Z-Wave Alliance, now boasts over 1,000 different compatible devices, giving you a wide range of options when it comes to automating your home. One of the key features of Z-Wave is that it utilizes a type of network called a "mesh network," which essentially means that one Z-Wave product will pass the signal along to another until it reaches its intended destination. This relay system greatly extends its range. It's also extremely low power, which is ideal for devices that rely on battery power.
- More proprietary than Zigbee - in particular it's radio. All the chips are made by Sigma Design. This has resulted in fewer interoperability issues.

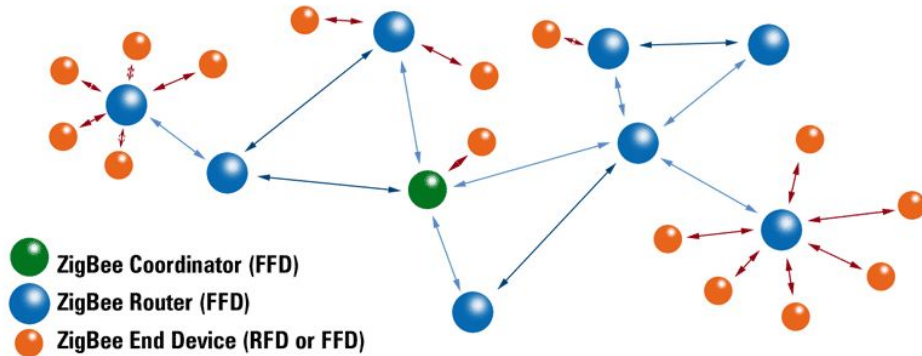
# Zigbee

- ZigBee is an 802 wireless communication standard built by the IEEE. Much like Z-Wave, it's seen significant growth in the past few years, and can be found in a relatively large number of devices. It also consumes a very small amount of power, and uses a mesh network structure to offer excellent range and speedy communication between devices. That being said, however, some users have noted that Zigbee devices frequently have difficulty communicating with those made by different manufacturers, so it might not be the best option if you're looking for seamless interoperability.

# Mesh Protocol

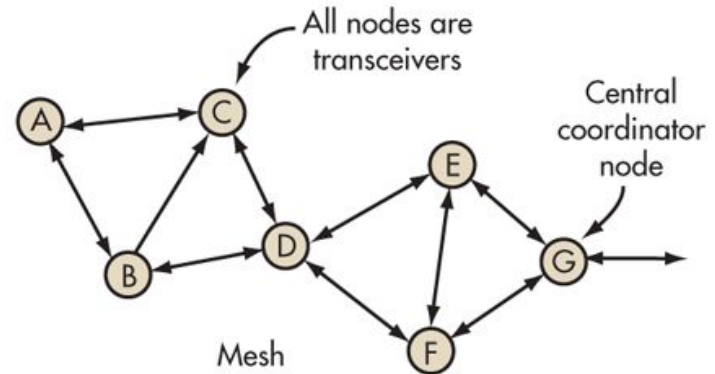
- Z-Wave and Zigbee are both mesh protocols.
- What does that mean?
  - Unlike IP devices that all communicate with a central router. Mesh devices communicate to their partner until they reach the hub
- Advantage
  - Low power
  - Greater overall range
- Dis-Advantage
  - Distance - especially if devices are few are far between

# Mesh Protocol



**Zigbee Mesh** - Hierarchy of nodes

**Z-Wave Mesh** - Nodes are self configuring



# Wi-Fi

- Of course, Wi-Fi is already fairly ubiquitous, so it's not surprising that a broad range of manufacturers have begun making smart home devices that work with it. If you already have a wireless router, you won't need to pick up a hub/access point in order for your compatible devices to connect to it. This does, however, come with one key drawback: interference and bandwidth issues. If your house is already full of Wi-Fi-connected gadgets (TVs, game consoles, speaker docks, laptops, phones, tablets, etc.) then your smart devices will have to compete for bandwidth and will potentially be slower to respond. Wi-Fi also consumes a lot of power, so it's not ideal for battery-based smart devices like doorbells and locks.



# So Many Choices - What Should I Do?

- If you have an investment in X10 that you want to preserve, Insteon may be your best choice. Costco has a \$99 Insteon hub. While choices are more limited than Z-Wave or Zigbee, there are still plenty to choose from.
- If you primarily want a smart thermostat, garage door controller or security camera, Wi-Fi will work fine. Nest Thermostat and Nest Camera from Google is quite popular and easy to install - connects to your existing Wi-Fi. Many other choices for security cameras and doorbells with cameras .
- If you are looking for a more extensive set of choices - invest in Zigbee or Z-Wave and try to stick to that respective ecosystem
- Some devices (like Nest) and hubs are multi-protocol. Check before you buy.

# However: Be Careful - Be Aware

- The technology and some of the companies behind it are still young
- Nest bought Revolv and Google bought Nest
- Revolv had a \$299 multi-protocol hub that had a measure of popularity
- Google has announced that it is discontinuing Revolv and the hub will cease to work in May 2016

# Installation

- Do It yourself
  - Probably what many of us will do
  - Most of these devices are wireless
  - Relatively “simple” to install
- Call in a professional
  - May be most appropriate for a “complete” installation
- Built in to the house
  - Maybe your next home

# Not so much price

- If you really want (need) it, price is not a major barrier to entry
- Hub is center piece - but today many devices don't require one
- [Samsung Smart Home Monitoring Kit](#)
- [Nest Home Thermostat](#)
- [Ring Wi-Fi Doorbell](#)
- [Smart Light Bulb](#)
- [Smart Door Lock](#)
- [Smart Refrigerator](#)
- [Amazon Echo](#)

# Control It From Your Smart Phone

- Most of these devices can be controlled from your smartphone or computer
- And from apps such as If This Then That ([IFTTT](#))
  - IFTTT is a free web-based service that allows users to create chains of simple conditional statements, called "recipes", which are triggered based on changes to other web services such as Gmail, Facebook, Instagram, and Pinterest. IFTTT is an abbreviation of "If This Then That". An example "recipe" might consist of adding a photo to a user's cloud-base photo archive if the user is tagged by someone on Facebook.

# Security

- Hackers
  - Great new opportunities for those so inclined
  - Demonstrations already of a car being hacked and remotely controlled
- But chill
  - Difference between theoretical and possible
  - The money is elsewhere

[Can your car be hacked?](#)

# Privacy

- Many devices are always on
- And always listening
  - Samsung TV with voice control
- Your smartphone
- Do you trust your vendor?

***Privacy is dead - Get over it!*** Scott McNealy, CEO Sun Microsystems, 1999

# 20+ Billion

The estimated number of devices to be connected to the internet by 2020

Vs

About 5 Billion today



# What Is the Internet of Things?

“And I think over time, the IoT is going to be very much like the fabled elephant -- that it will be much much bigger than any of us can imagine it being today”

- Tyson Tuttle - CEO, Silicon Labs