IoT Defined:
An Introduction to the Internet of Things

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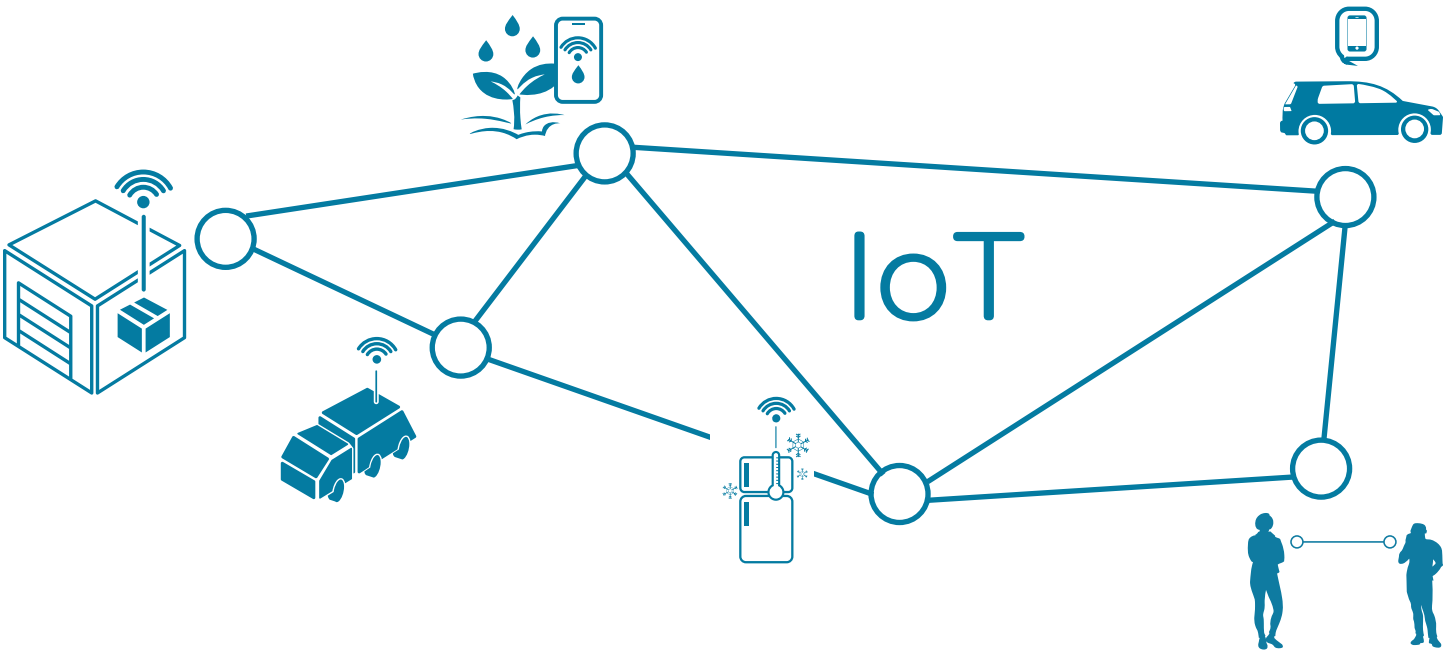
Executive Summary

IoT isn't just a buzzword - it's an important business tool that leverages technology and data. But IoT is more than installing smart sensors or adding devices to a network. This guide will demystify how IoT works and show how you can apply it to your operations.



The Basics of IoT

The Internet of Things (IoT) began to take shape in the early 1980s. The concept is simple - add a sensor to an object that collects data and then transmits it over a network. This added intelligenge allows the device to interact with others using a wireless protocol such as Wi-Fi, Bluetooth, or RFID. Two-way communication allows a user to send and recieve information remotely. Collecting and analyzing this stream of data reveals important insights that are used to improve operations.

IoT = Device + Connectivity + Analytics

IoT Use Cases

IoT devices are far more common than you might think. Smartphones are the best example, with their numerous apps and programs. But IoT is a large technology category that has many uses for consumers, businesses, and even the military. Examples of innovative applications include:

- **Consumers:** smart thermostats, speakers, fitness trackers, water bottles
- **Medical:** an implantable insulin pump that transmits readings to an app or a cochlear implant with an embedded alert system
- **Transportation:** electronic tolls, fleet management, cargo tracking
- **Warehouses:** cold storage monitoring, inventory tracking, forklift telematics
- **Buildings:** people-counting systems, automated energy management
- **Manufacturing:** plant safety, predictive machine maintenance
- **Agriculture:** soil readings, self-driving tractors
- **Military:** remote monitoring of vessels, munitions, and vehicles

The First IoT Device Was A Vending Machine

Engineering students at Carnegie-Mellon University and their love of caffeinated beverages are credited with the first use of IoT. The problem was basic – because the Coke machine was restocked by students, it was hit-or-miss whether the bottles were cold at any given time. And because the machine was located several floors away, it was annoying to walk all that way only to be disappointed by a room-temperature drink [1].

The solution was to add sensors that determined how many bottles were present and how long they had been there. After a bottle was registered for a three-hour window, it was classified as "cold." A status program kept a continuous log so anyone could check using a specific request over ARPANET, a network that would eventually lead to the Internet [2].

Because IoT has expansive use cases, it's easy to assume this technology is complex and costly. In reality, IoT is a scalable solution that allows companies to start small and expand over time. In fact, some of the most effective IoT solutions are the simplest. No matter the size of an IoT deployment, its success relies on this three-pronged approach:

1. Use a device to detect an event
2. Understand the event data
3. React to the findings

This third step is where many businesses fail to capture the financial benefits of IoT. Connectivity only doesn't mean intelligence. You need data contextualization in order to have a true IoT solution. For example, you can make a smart toaster. But few people will ask their smart speaker to fire up the toaster. Nor will they analyze how often they toast bagels over baguettes. IoT is only successful if a connected device uncovers a useful trend that you can act on.

Let's say you want to add a sensor to a boiler. Because you can remotely monitor performance readings, you've immediately recouped labor savings. Now scale those sensors across 10 boilers. With continuous data, you can forecast the life expectancy of each unit with greater precision. Rather than pay the expense of an emergency failure, you can stay ahead of repairs and replacements. These insights cost no more than a $100 sensor and a gateway with a nominal monthly subscription, yet they could save hundreds, if not thousands, of dollars.

IoT analytics is where businesses reap the greatest ROI. This constant stream of data provides a level of operational insight you weren't able to achieve previously. The key is making strategic changes once you have that information. Data should be used to uncover inefficiencies, provide visualization, capture trends, or trigger an automated sequence.

The Importance of IoT Strategy

What problem can IoT solve for your business? This is the single most important question to answer before adopting IoT solutions. Without connecting the dots between your operations and IoT data, you won't yield any concrete benefits to your bottom line.

"For IoT specifically, a common problem that businesses face is trying to solve an issue without a proper strategy in place," finds IoT Business News. "There are two types of scenarios enterprises typically come across: 1) business outcome-driven IoT solutions and 2) general adoption of smart IoT solutions. Those that implement solutions to address a real need are often driven by business results that align with corporate goals and objectives. Whereas companies adopting smart solutions for the sake of marketing and sales typically risk invalidating the initial investment and a business' progress forward"[3].

An IoT strategy doesn't have to be complicated. In many cases, there is a straightforward problem that you want to eliminate. It might look like a freezer door that's always left ajar, the inability to prove when a driver is on their phone, or preventing lost inventory. IoT strategies typically fall in one of these areas:

- Customer service
- Equipment performance
- Employee efficiency
- Inventory management
- Automation

"[IoT] can be used to detect patterns, make recommendations, and detect possible problems before they occur," according to IBM. "With the insight provided by advanced analytics comes the power to make processes more efficient. Smart objects and systems mean you can automate certain tasks, particularly when these are repetitive, mundane, time-consuming, or even dangerous"[4].

Examples of IoT Strategy in Action

Warehouses

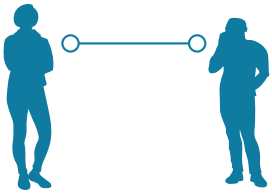
What happens if a crate gets misplaced in a 30,000-square-foot warehouse? Good luck quickly locating it again. But now imagine adding a sensor to every asset that continuously broadcasts its location. An interactive map allows forklift operators to drive to the exact spot every time.

Asset Monitoring

Your construction site has been riddled by theft. Place a tracking sensor on high-value assets like copper piping, machinery, and portable generators. In the event items are stolen, the GPS beacon can help recover them more quickly.

Social Distance Zones

How do you keep people working in close proximity safe from transmittable diseases? Most companies are in the dark if there's an exposure and they need to pinpoint who needs to quarantine. But with badges that keep a record of employee movement, you can avoid a complete shutdown with contact tracing and targeted cleaning.



Agriculture

You are a farmer using a weather station but need more precise information to stay ahead of inclement weather, especially frost that affects machinery. Additional soil sensors could be installed that detect frost conditions. The sensors can then help indicate that it is time to turn on a heater located near sensitive equipment.

Driver Safety

Your drivers are making it from Point A to Point B, but how safe is their driving along the way? They represent your business every second they are behind the wheel. With the right combination of sensors, you can uncover risky behavior by collecting data about their phone usage, idle time, and harsh driving.

Refrigeration

You are having constant problems with cooler performance, but that can be resolved with temperature monitors. With real-time measurements, you can identify fluctuations that indicate a motor repair or replacement. Or receive an automated alert when a threshold is out of range. You could also automate temperature logs to streamline compliance with FDA reporting.

Parting Thoughts

The beauty of IoT is that you can gain significant outcomes by starting small. It's like the old adage of "there is only one way to eat an elephant: a bite at a time." A handful of sensors paired with a strong strategy can reap concrete results. When you finally solve a problem with an IoT solution, that's when you will realize an ROI. Iterating that success is where IoT will fundamentally transform your operations.

Ready Wireless

Ready Wireless is a go-to provider for IoT solutions. Embracing IoT solutions that align closely with Ready's core capabilities; the company has brought a handful of products to market:

- Ready Fleet helps mitigate risk from distracted driving, improves vehicle productivity and keeps track of your vehicles in real-time.
- Ready Asset Tracking makes it easy to manage all business assets in one convenient online portal.
- Ready Asset Pro is a provider of over 100 IoT sensors built to be flexible and economical. Businesses can utilize our IoT sensors to predict maintenance and optimize their processes – resulting in cost savings. Ready Asset Pro also powers our Safe Distance contact tracing solution.
- Ready Connect offers an easy-to-install Internet back-up connectivity solution. Ready's failover router for restaurants, bars, retail stores and remote office locations detects outages and automatically switches to 4G LTE coverage, ensuring your computers and equipment stay online.

Our commitment to quality at scale is represented in our long-standing customer relationships and industry recognition, including serial listings on Inc. 5000 from 2012 through 2018.

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