HOW THE INTERNET OF THINGS IS MODERNIZING THE TRANSPORTATION AND LOGISTICS INDUSTRY

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Transportation + IoT = Success

The Internet of Things (IoT) has become one of the most comprehensive solutions for modernizing services and operations in the transportation and logistics industry. In fact, experts project that IoT technologies will have a $1.9 trillion impact on the industry. With so much opportunity, it makes sense that so many companies are looking to connect their assets and enter the IoT arena. For many companies, this transformation is already underway with 70% of retail and manufacturing companies already starting an IoT project to modernize their supply chain and logistics operations.

Estimated Spending On Connected Logistic Solutions
Marketandmarkets, 2015 report
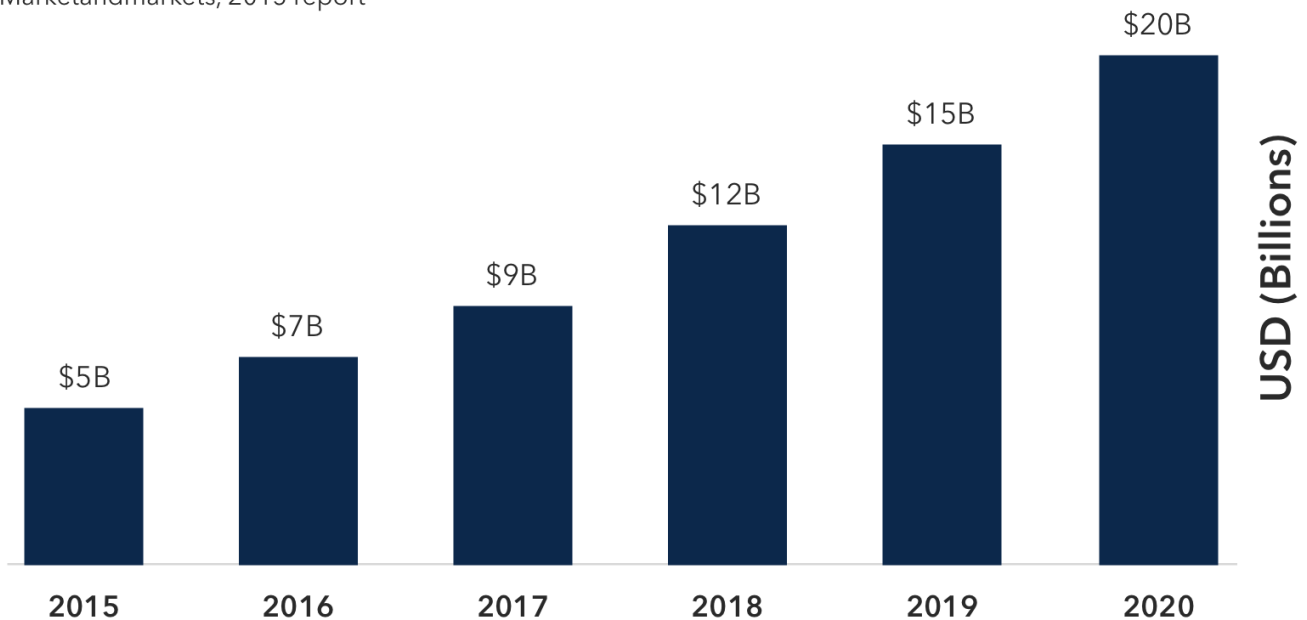
Why has IoT generated such a profound impact? IoT technologies enable enterprises to monitor their assets more effectively, which helps them make better decisions and save money. With the right IoT solution in place, enterprises can connect their operations, allowing them to track their assets remotely, be alerted the moment something starts to go wrong, and gain real-time visibility of their fleet management systems.

To illustrate this impact, this paper will outline how IoT technologies have transformed inventory, logistics, and more in the transportation industry. This paper will also explain how Particle's unique approach has helped clients develop effective IoT solutions that have transformed their fleet management systems.

What is connected transportation?

Fundamentally, connected transportation (or smart transportation) involves equipping vehicles or transportation-related infrastructure with sensors to enable Wi-Fi or cellular connectivity. Connected transportation means buses, trains, and even planes can be connected to the Internet at all times, which allows logistic providers to constantly track important shipments, or allows manufacturers to monitor car performance remotely. The possibilities of connected transportation are pretty endless, which is why this paper will dive into the many use cases and benefits of IoT-based transportation.

> **Connected transportation** involves equipping vehicles with modern technology to enable users to make smarter and more informed decisions.

The benefits of connected transportation

Maximize uptime
by monitoring vitals and taking preemptive actions when warning signs occur.

Reduce costs
by responding to vehicle issues remotely rather than deploying a technician.

Ensure compliance
by monitoring sensitive packages and supplies with IoT sensors and trackers.

Top 4 use cases of IoT in transportation

With the right IoT solution in place, enterprises can track their assets remotely, be alerted the moment something starts to go wrong, and gain real-time visibility of their transportation systems:

Asset Tracking
IoT enables businesses to track physical assets (like vehicles or packages) in real-time.

Preventative Maintenance
Enterprises can be automatically alerted when systems need to be fixed.

Cold-chain monitoring
Enterprises can receive alerts when an asset's temperature rises too high or low.

Remote Monitoring
With IoT hardware, companies can monitor and manage an asset from a remote location.

Automotive & ride sharing

Gartner forecasts that there will be a quarter billion connected cars on the road by 2020. Here are some ways businesses are using IoT to optimize transportation routes and improve public services:

Intelligent ridesharing services drive value

In 2015, Paris inaugurated an electric-car sharing program (called Autolib) that allows citizens to call a vehicle and reserve parking spaces in the city. The city remotely monitors and keeps track of these vehicles with IoT technologies. Electric scooter companies use similar sensors to keep track of rental scooters throughout the city. These sensors allow citizens to find and rent the nearest scooter with their mobile phone, which show the many ways IoT can be used to manage moving assets.

Connected bus routes

SafeTransport is using Particle to bring the field of fleet management to the school commute. With Particle's asset tracker, SafeTransport allows school administrators to remotely track and monitor school buses in real time. Administrators can monitor drivers' speeds, identify which buses are behind schedule, communicate proactively with parents, and more. With Particle, SafeTransport was able to cut its per-unit costs in half, and improve the stability and functionality of their service.
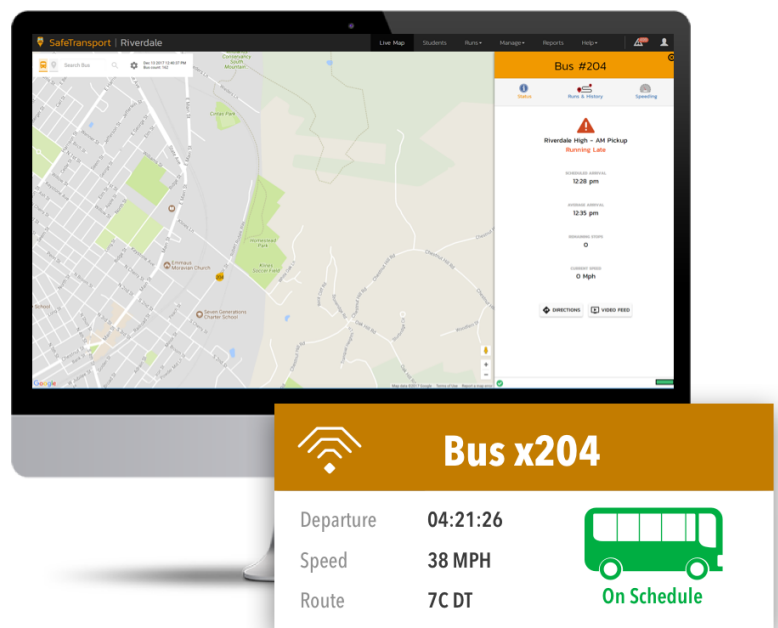
## Connected cars transform the way we drive

Car manufacturers are starting to use sensors to gather data on vehicles after they leave the assembly line. They can use these sensors to gather data on when vehicles start to experience maintenance issues, which allows car manufacturers to make improvements on their future line of vehicles. Car manufacturers are also using connected sensors to send over-the-air (OTA) firmware updates to introduce new features to their vehicles. In 2016, Tesla drivers woke up to find substantial new features to their car after the company sent out an OTA firmware update. Consumers could now self-park their cars without having to manually update their vehicles.

Freight forwarding & logistics services

According to the Bureau of Transportation, 49.3 million tons of freight (valued at more than $52.5 billion) was moved by the U.S. transportation system in 2015. However, it can be difficult for freight forwarders to track all of these assets and retain operational efficiency. Fortunately, there are a number of ways IoT can remedy this issue and benefit freight forwarders:

Tracking cargo ship containers

Wirelessly tracking containers and cargo boxes is becoming an increasingly common practice. Maritime shippers can attach sensors to cargo containers to track the temperature of important assets within them. With more visibility, maritime shippers can reduce their insurance premiums by offering higher reliability of the state of their cargo. With the right IoT solution, shippers can also monitor shipping equipment and react remotely if machines start to break.
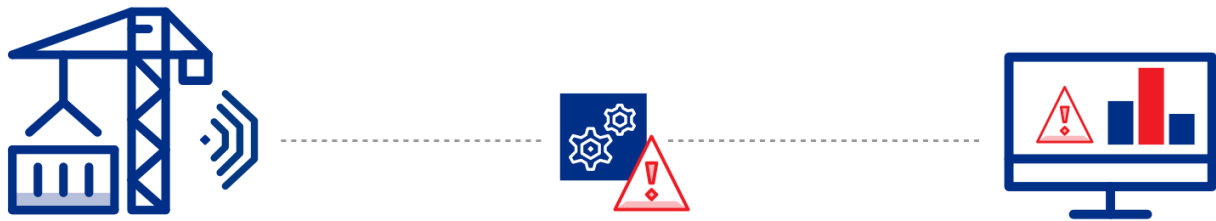
IoT solutions are changing cold-chain logistics

It's not just maritime shippers who can benefit from monitoring temperatures. Whether it is shipped via airplanes, trucks, or railroads, perishable or sensitive merchandise requires specific temperatures during transport to maintain quality. These packages can be equipped with IoT sensors so that operators can monitor shipping conditions and receive alerts the minute a package goes above or below optimal temperatures. IoT-based monitoring puts visibility on a previously invisible problem, and eliminates the need for operators to find and investigate what happened.

Connecting airport ground logistics

Airports use many different types of service operators and equipment in their day-to-day operations. From ground handlers to cargo freights, the number of constantly moving personnel and machines is significant. In fact, many major airline players are improving the efficiency of these services by using IoT technology. A connected set of vehicles, equipment, tools, and staff can help modernize aircraft maintenance processes and servicing. The ability to track luggage, cargo freight, and other equipment helps workers move more quickly and respond to possible issues efficiently.

Road & rail transporation

In 2017, the total volume of goods transported via rail in the United States was around 2.4 trillion ton-kilometers (tkm) . And with public transit options on the rise, road and rail transportation is looking better than ever. As such, many rail and road operators are using IoT technology to improve the operation, performance tracking, and maintenance of their locomotives and other rolling assets:
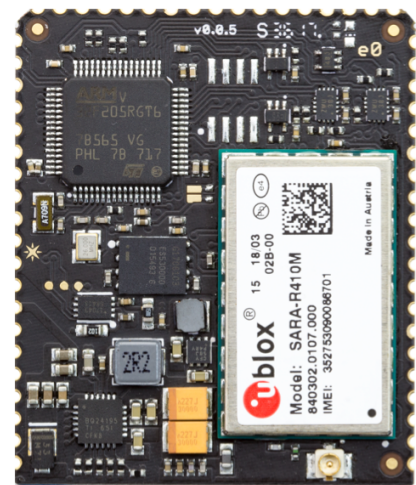
Developing a fleet management system for road and railways

Truck and railcar operators are using IoT for cargo tracking, vehicle monitoring, and more. For instance, trucking companies that often misplace trailers have equipped truck trailers with IoT sensors so they can keep track of them, and make sure they are assigned to the proper truck through identification numbers. Rail cars are also not always adequately tracked because they are equipped with offline legacy systems. This leads to significant problems with asset misallocation and makes maintenance operations rather cumbersome and expensive.

By equipping trucks with IoT-enabled sensors, truck and railcar operators can capture sensor data, and analyze this data to make improvements to their operations. In fact, organizations that implement fleet management solutions find a 12.2% percent increase in service profitability, a 27.9% increase in operator compliance, and a 13.2% reduction in fuel costs.

Preventing railway failures and maintenance issues

Railway operators spend around $500 million per year on railway maintenance. A majority of this expense goes towards the inspection process rather than the actual repairing process because maintenance staff must check a wide variety of variables. Deploying an IoT network is a cost-effective way to remedy this issue because IoT sensors consume low amounts of power and have long battery lifes. Cellular IoT sensors can be deployed to monitor railway conditions in real-time and alert operators when something is wrong. Cellular IoT sensors are perfect for applications like this because they are designed to make the most of every byte. A fully encrypted message can use as little as 50 bytes, or approximately 60x less data than a typical HTTPS request, which results in a lower cellular bill for businesses.

Particle's E Series is desgined for scale and can connect to the Internet over celluar networks

Developing a fleet management system

There are many fleet management services out there that organizations can use. But, if you're looking to develop your own internal asset tracking system, Particle offers a number of hardware solutions to get you started on your own fleet tracking journey.

> Particle **provides your business with the *hardware, software, and network infrastructure* it needs to overcome the innumerable challenges of IoT.**

Developing your own intelligent fleet management system has a few key benefits. First, you can easily customize and tailor a solution to meet your organization's specific needs. You will not be tied to a rigid system that cannot adapt to your fleet's evolution and shifting requirements. Second, you can scale new revenue channels by having open access to any business or performance data you need, and integrate these data streams into your existing analytics platforms.

Benefits of using Particle for fleet tracking

With Particle's industrial-grade modules, the E Series, you'll have all the hardware you need to create an enterprise IoT application. All E Series modules can be engineered with temperature sensors, accelerometers, and more to increase the scope of your remote monitoring. Particle also provides everything you need to add cellular to your product: SIM cards, global network, and cloud service. Your devices and cellular data consumption can be monitored by Particle's Device Console as well.

How to start your IoT fleet management journey

Starting your own IoT project may seem challenging or near impossible. As a matter of fact, nearly three-fourths of self-initiated IoT projects are considered a failure, while a third of all projects were not seen as a success. The two biggest contributors to the failure rate are: lack of internal IoT expertise and platform (hardware/software) reliability. With Particle, you have full access to IoT experts, a large community of IoT enthusiasts, support services, and professional engineering services (Particle Studios) to help you get your IoT projects off the ground. Additionally, you will be building on top of an enterprise-grade, production-tested IoT platform used across the industry.

Start tracking your valuable assets by checking out the E Series on the Particle Store or contact our team of experts at Particle.io/sales to discuss solutions development.