# 6 steps to harnessing the IoT to transform your cold chain fleet

Businesses with multiple vehicles use fleet management solutions to track, manage and optimize their fleet. Most commercial vehicles are already equipped with some form of telematics system including multiple M2M (machine-to-machine) applications to track location, travel speed, cargo temperature, fuel consumption, distance logged, average speed, vehicle utilization and more.

Provisioning, configuring, updating and managing M2M applications has typically required a time-consuming appointment with a technician, who requires hands-on access to the vehicles. This process is inconvenient and expensive, taking valuable assets out of commission.

The IoT (Internet of Things) is different than M2M in that the IoT breaks down silos formed by M2M vertical solutions. Companies are now able manage all their devices remotely over the air and to capture sensor data horizontally across domains, enabling limitless applications across the domains. For example; collecting surrounding vehicle temperature and traffic data from the Internet, GPS and humidity data from the vehicle sensors, all correlated using edge analytics in near real time. This allows the data and actions to be processed locally in absence of cellular connectivity (e.g., dead zones) or localized alerts that are latency sensitive.

Fleet Managers who are willing to consider new approaches and technologies can realize not only significant cost savings, but can also drive improvements to customer satisfaction, safety and employee performance.

The opportunity for the IoT is huge and the possibilities are endless. Machina Research, a leading provider of market intelligence in the (IoT) sector, recently predicted that the total number of IoT connections will grow to 27 billion in 2025, generating worldwide revenue of $3 trillion (up from 6 billion devices and $750 billion in revenue in 2015).

Companies that embrace the IoT today will have a significant advantage over the competition tomorrow, benefiting from:
- greater connectivity between devices and the data derived from them
- streamlined operations, driven by efficient delivery routes, reduction of paperwork and reduced vehicle maintenance
- increased visibility of all aspects of their business, including driver behavior, activities and fuel consumption. A UPS study shows a 34% reduction in damage costs, 24% decrease in driver incidents 36% reduction in insurance premiums
- stronger customer relationships and satisfaction, leading to more on-time deliveries and the ability to make informed business decisions that anticipate, meet and exceed the needs of your customers

## Fleet Management Example

Our Fleet Management IoT solution securely integrates real-time visibility, analytics and sensor-driven automation into the entire supply chain. As illustrated below, this includes collecting telematics information (e.g., GPS devices track speed, direction and movement in real time) and sensor data (e.g., temperate/humidity data is collected from within truck compartments), as well as device and application management capabilities.



FACTORY    Temperature ——    Humidity ——    Time ——    RETAIL
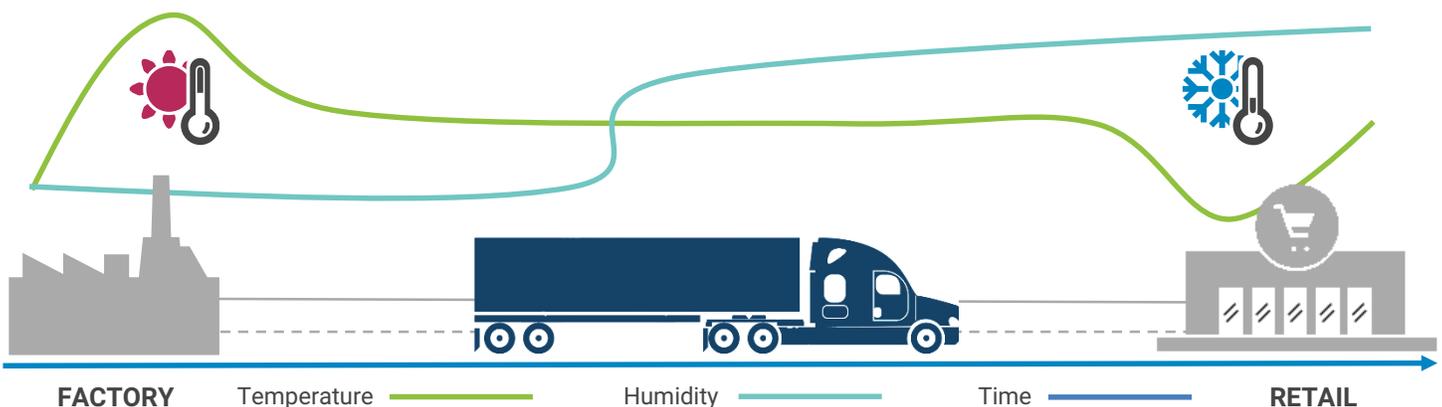
# Follow these 6 best practice steps to implement IoT-enabled fleet management

## 1 | Establish critical business metrics and benchmarks

Fleet managers are always looking for ways to: quantify and control costs; train and retain drivers; manage information about the vehicles and their use; and provide information to the rest of the organization. Fleet Management systems equipped with IoT technology introduce an entirely new framework. Managers can collect more data, much of it in real time, analyze it, then share it. Having real-time data also allows for more accurate tracking, which can then be compared with industry best practices to identify areas of improvement. Once identified, key performance indicators (KPIs) can be set up and matched to key business objectives including:

- Travel time, distance and fuel consumption between destinations
- Hours logged by drivers and compliance logs
- Cost of products spoiled before delivery
- Value of tools and assets lost per year

## 2 | Identify important data sources to monitor

Today there are often multiple different applications on each truck targeted at a specific data source. Some of the data never leaves the vehicle and the data that does get transferred to the cloud is often in silos, which limits the insights you can gather from the data. It is important to first identify which data sources are valuable. Based on the business objectives and KPIs established by the business, different data will be required, including:
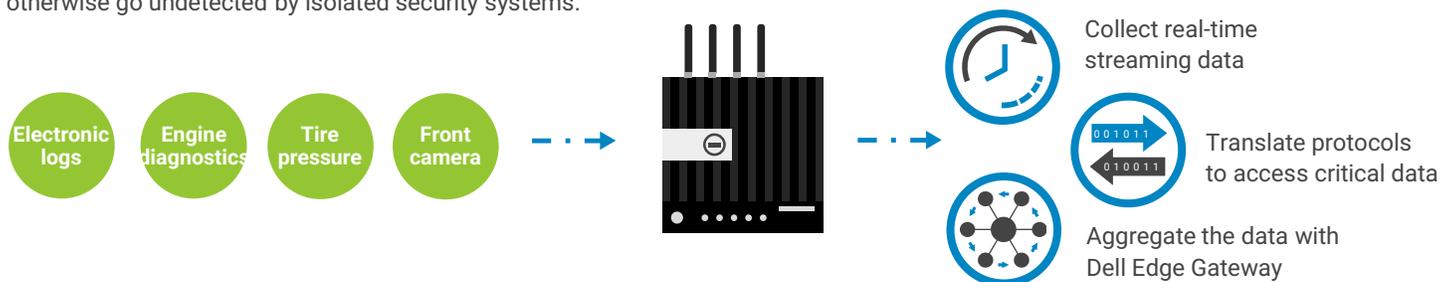
- Temperate/humidity data from throughout compartments and containers to reduce spoilage, often with wireless sensors on pallets.
- GPS data that tracks speed, direction and movement in real time to help truckers route around congested areas
- Safety data from lane departure sensors, blind spot sensors and cameras
- Consumption and wear-and-tear data (fuel consumption, tire pressure and oil life, for example) to inform maintenance crews
- Geo-fencing to report vehicle misuse or theft
- Electronic logging devices (ELDs) are used to log driving time and manage hours of service compliance and comply with regulations
- On-board diagnostics (OBD) data that reports a vehicle's health information as well as when a vehicle is driving vs sitting idle
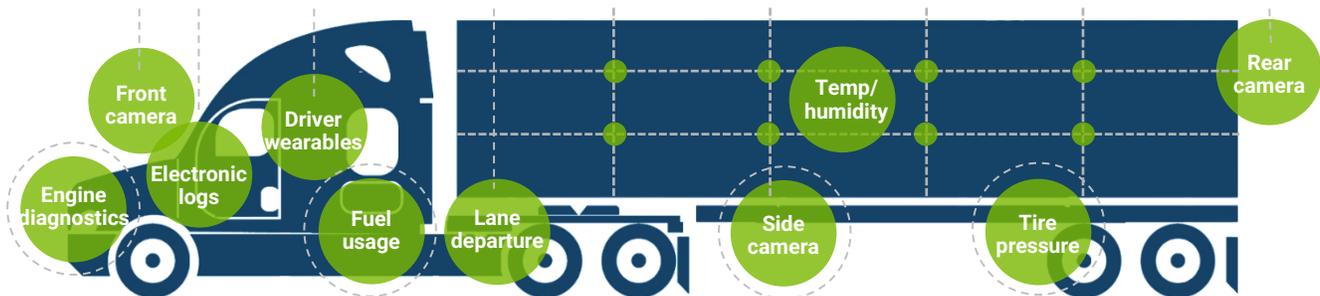


## 3 | Securely access and integrate critical data

With the critical data identified, the next step is to securely access the real-time data and aggregate the data at the Dell Edge Gateway located in the vehicle. The gateway must be able to work with a variety of critical protocols, data sources, and types of data to be able to break down the silos. When deploying an intelligent gateway it is also important to consider device management, including what happens when firmware needs to be updated, as part of your strategy to access and integrate data.
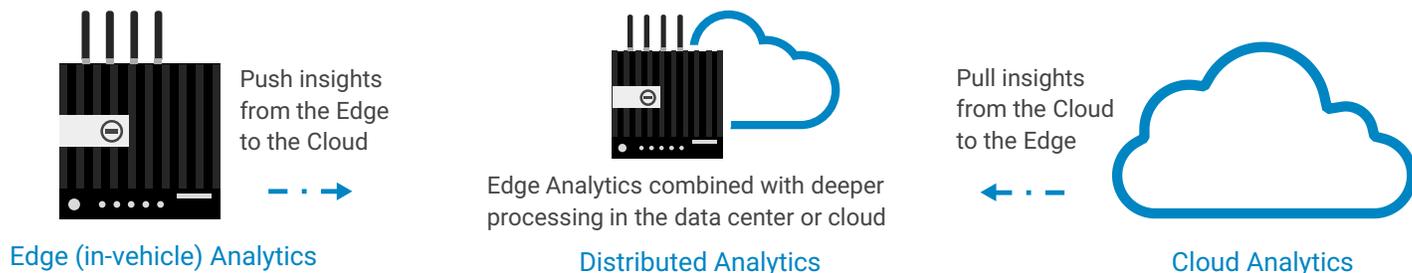
If the data being gathered (and/or transmitted outside the vehicle) is sensitive, an evaluation of the risks associated with the device being hacked, and the data being exposed, must be conducted. A security management solution is recommended to monitor, analyze, correlate threats and have authority to mitigate the threats in real time. This is preferred for protecting your data from threats that could otherwise go undetected by isolated security systems.



Collect real-time streaming data

Translate protocols to access critical data

Aggregate the data with Dell Edge Gateway

## 4 | Determine the right level of in-vehicle compute

After data collection an appropriate data architecture for distributed analytics must be designed based on a few central questions: How does the collected data get pushed to the cloud? How does it then get pulled back from the cloud for reporting and analysis purposes?

Edge (in-vehicle) and Cloud analytics should be balanced to reduce the burden of streaming perishable data on your cloud deployment, while reducing cost and bandwidth of data transmission. A distributed approach enables you to detect and respond to local events at the edge as they happen, taking action immediately on streaming data, while simultaneously integrating additional data sources in the cloud. The Dell Edge Gateway can analyze streaming data in memory for real-time response and filter out unnecessary data before it is relayed to the cloud.

Push insights from the Edge to the Cloud

Edge Analytics combined with deeper processing in the data center or cloud

Pull insights from the Cloud to the Edge

**Edge (in-vehicle) Analytics**

**Distributed Analytics**

**Cloud Analytics**

## 5 | Develop business applications to continuously monitor KPIs
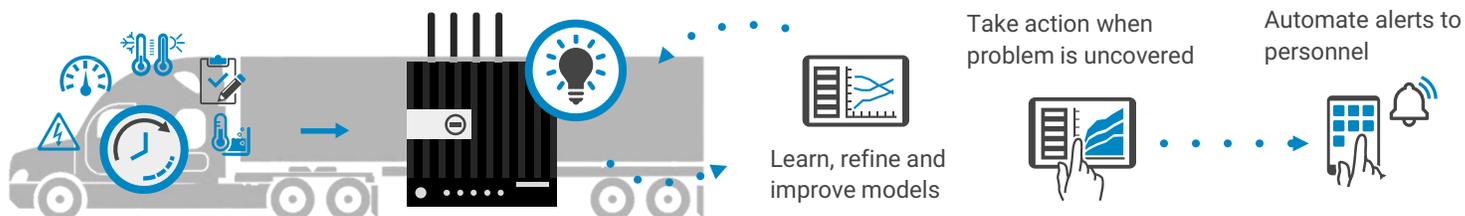
The Fleet Management IoT solution also allows for the proactive monitoring of various sensors and for the corresponding analysis of the collected data. One of the biggest challenges will be making sense of the vast amounts of data in order to determine actionable business insights that can be evaluated and reviewed. To convert IoT data into meaningful insights, business applications should be developed. Dashboards and reports provide excellent tools for monitoring the various KPIs that were established during the first step. These activities help to prevent potential issues from impacting service.

With the Fleet Management IoT solution, managers can leverage real-time information to efficiently organize and direct the day-to-day operations of their fleet services. With the real-time information that a connected fleet vehicle provides, the Fleet Manager has access to work order and inventory tracking, vehicle information such as location, maintenance, and diagnostics information.

## 6 | Moving from reactive to proactive with automation

Once the solution is in production, and data is being displayed to management in reports and dashboards, the resolution of some issues can be automated. For example, an on-board sensor could report that the temperate inside a truck compartment has surpassed a maximum level. Although this data might be visible on a dashboard, or on a daily report, it might not garner the appropriate attention. If immediate action is not taken, there is a danger that a large quantity of perishable goods being transported might spoil. In this case, an alert can be sent to the driver's mobile device, or to a regional dispatcher, notifying the driver of the issue. Allen Lund, a logistics transport company, notes that their customers intervene 10% of their shipments so they can solve problems before they become claims.

Deploying automated alerts and notifications, based on data that is captured from various sensors and IoT devices, highlight previously hidden equipment issues that can lead to more serious problems. Identifying these issues early helps to improve the quality, availability and reliability of your fleets.
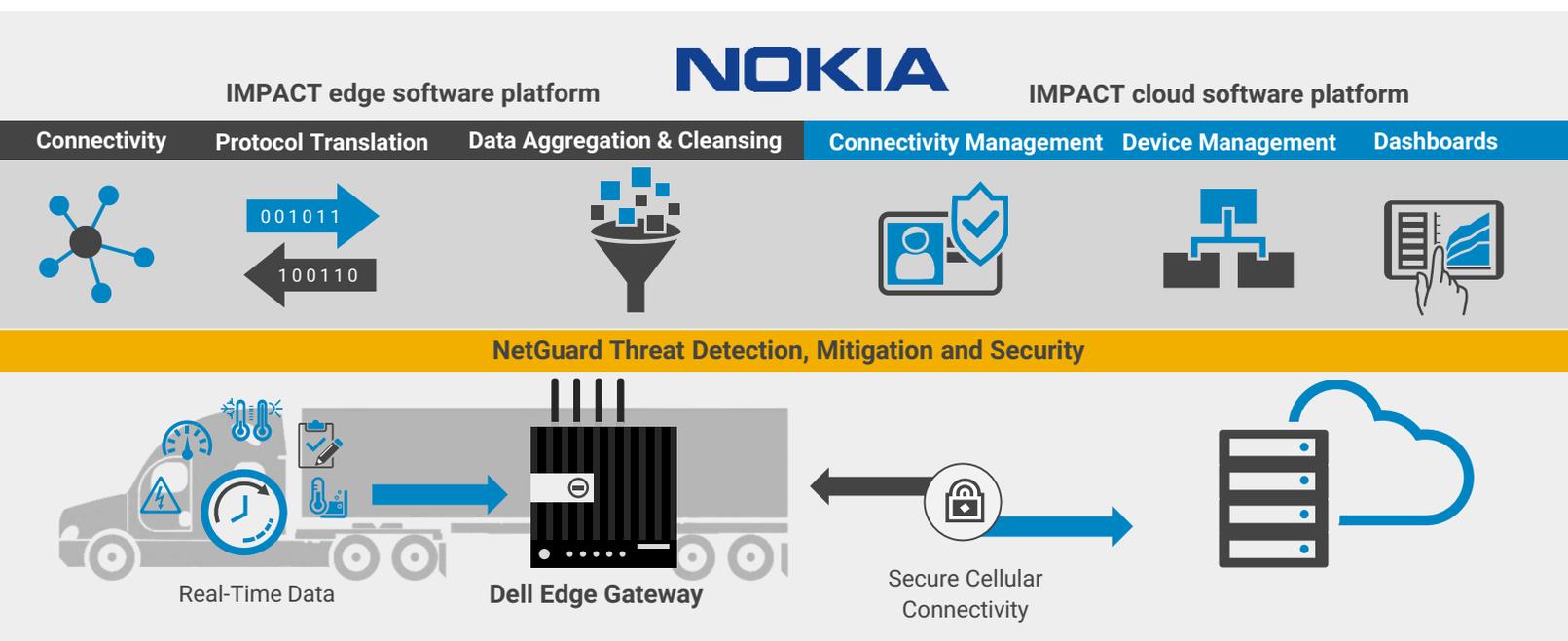
Learn, refine and improve models

Take action when problem is uncovered

Automate alerts to personnel

DELL

# Fleet Management Solution Example

**This example represents just a single solution provided by the industry-leading partners listed below. Your specific Fleet Management solution might involve a combination of these (or other) technology providers within our IoT Partner ecosystem.**

To provide a blueprint for you to build your Fleet Management deployment, Dell has developed a flexible architecture centered around the Dell Edge Gateway with qualified partners for a complete solution. The Dell Edge Gateway enables you to collect, analyze, relay, and act on real-time data from vehicle sensors. Nokia IMPACT is a secure horizontal platform covering connectivity, data collection, analytics, and business application development, on top of device and service management.

The IMPACT edge software platform running on the Dell Edge Gateway provides connectivity for all the diverse sensor/things in the fleet vehicle, translates the protocols and exposes the sensor data through standards-based protocols to the IMPACT cloud-based platform. The edge platform also provides device management for all the connected things, including the Dell Edge Gateway itself.

The IMPACT cloud software platform covers cellular connectivity management (including management of SIM cards, connectivity billing, etc.), device management (such as device discovery and firmware management), data collection and exposure of data through the device-agnostic application for the enterprises. Nokia's NetGuard solution is integrated with IMPACT, assuring security across all layers of the IoT solution. Our Fleet Management IoT solution securely integrates real-time visibility, analytics and sensor-driven automation into the entire supply chain.

## NOKIA

| IMPACT edge software platform | | | IMPACT cloud software platform | | |
|---|---|---|---|---|---|
| Connectivity | Protocol Translation | Data Aggregation & Cleansing | Connectivity Management | Device Management | Dashboards |
| | 001011 / 100110 | | | | |

**NetGuard Threat Detection, Mitigation and Security**

Real-Time Data → **Dell Edge Gateway** → Secure Cellular Connectivity →

**Along with our IoT Solutions Partners, we provide technology you can trust to help you get started quickly and efficiently.**

Dell takes a pragmatic approach to the Internet of Things (IoT) by building on the equipment and data you already have, and leveraging your current technology investments, to quickly and securely enable analytics-driven action.

The Dell IoT Solutions Partner Program is a multi-tiered partner ecosystem of technology providers and domain experts to complement Dell's broad portfolio of IoT-enabling technologies.

**To learn more visit us online at: www.delliotpartners.com**

Contact Dell Sales today to learn more about the Dell Edge Gateway 5000, our ecosystem of qualified partners, and to deploy this flexible cold chain fleet management solution.

## DELL IoT Solutions Partner Program

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