Deploying IoT Solutions to Streamline Logistics Management

#TimeToDoBig
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Introduction

The Internet has been through several stages of development, ever since the founding days of the ARPANET – the first TCP/IP network that led to its creation. The primary task for this worldwide communication network was to link computers that also evolved over the years with significant changes in the design and ecosystem.

Irrespective of the changing form factors and architectures of computing devices – desktops, laptops, smartphones and tablets – their primary functions were storage, processing and transmission of data. By connecting computers, the Internet made it possible to share the information stored in them across geographies.

More recently, however, we have touched a unique milestone in the journey of the Internet. It is the Internet of Things (IoT) – a networked link between objects of daily use that are not necessarily computers. We are witnessing a paradigm shift in our lifestyle where our cars can remind us of their service routines, air conditioners can adjust their settings to external temperatures, and wearable devices can monitor our physical exercises to disclose the number of calories we burn.

With its sensors and signals, IoT has also helped businesses to improve their operational visibility, deploy predictive maintenance solutions and reduce the costs of ownership. It is enabling better business models and driving enhanced customer experience.

Logistics – A Key Business Area for IoT

With a critical role in meeting supply chain goals, logistics is a pivotal business area for all manufacturers and e-commerce companies. IoT promises far-ranging payoffs for logistics operators, their business clients and the final consumers. The benefits span the entire logistics value chain including warehouse operations, cargo transportation and last-mile delivery.

IoT helps logistics companies to monitor the status of goods and people handling them in real-time. They can check how their business assets are performing and deploy changes wherever required. Logistics operators can also automate some business processes to improve quality and reduce costs. Eventually, they can apply advanced analytics to leverage the data from different sources and identify best practices for their industry.
Essentially, IoT in the logistics domain is about ‘sensing’ and ‘making sense’. Sensing concerns the monitoring of assets in a supply chain using a variety of technologies and mediums. ‘Making sense’ concerns the handling of the vast amount of data that is generated in logistics operations and transforming it into actionable insights.

Furthermore, now is the best time to leverage IoT for logistics, since the rise of mobility, faster networks, big data analytics and machine learning techniques have created a new technology push. These will drive logistics providers to adopt IoT solutions at a faster rate.

Business supply chains have become sophisticated over the past decade. In an era where millions of goods are sold daily through online marketplaces, logistics today does not merely concern the supply of stock from manufacturers to distributors and retailers. It is critical to ensure that each product is safely delivered to customers at the right time and place. The diversity of product portfolio makes this task even more complicated.

For different operators in the logistics value chain, the fundamental problem areas can be classified as:

### Suppliers
- Is the order complete and processed?
- Are we shipping the right items in the right quantity?
- Will we be able to deliver the order in promised time?

### Regional and Central Warehouse
- Have the items within an order been consolidated?
- Is the order complete for dispatch?
- When will the order be fulfilled?
- Has the inventory been updated?

### Yard Management
- When will/did the truck arrive?
- Where is it parked in the yard?
- For how long has a truck been idle?
In Transit

- What is the current location of my truck?
- Which alternate route can it take to avoid heavy traffic and poor road conditions?
- If the truck breaks down or fails to deliver the consignment, is there an alternative to ensure successful delivery?

Enterprise IT Systems (Backoffice)

- How do we get insights from my disparate supply chain points?
- Can we predict potential risks in the supply chain?
- Are our processes driven consistently by business rules?

The case of perishable products

In the market sectors that run the gamut from farms to manufacturers and retailers, supply chain management becomes even more challenging. From the moment a stock of fruits or vegetables is harvested, or bread is baked in ovens, time and distance become their enemies. Fresh products spend an estimated half-life in transit between the supplier and the seller: the clock starts ticking from the moment the stock begins its journey to the retailer’s shelves.

Due to unpredictable weather conditions and other impediments in transportation, perishable products are at a higher risk of spoilage. It is crucial to check their condition throughout the journey and ensure that the units reaching the sellers are fit for consumption.

Regardless of who is in charge of products, stakeholders need the correct data to be available for further action in a supply chain. It should also be auditable to confirm that a batch arrived in good condition at different points and complied with food and environmental regulations. Each stakeholder’s brand reputation is affected by the kind of quality that was maintained at their level.

Lack of visibility is a vital issue for logistics operators who need timely and accurate information on their shipments. To identify what is in transit, where it is, when it will reach a particular destination, and how much the delivery will cost, the concerned parties need to put together information from various sources – internal documents, carrier websites, phone calls, emails and other messages. This process is inefficient and time-consuming.

To streamline processes, eliminate redundant tasks, minimise errors and optimise the operating expenditure (OpEx), end-to-end visibility in logistics operations is essential.
IoT Solutions to Address Logistics Challenges

The visibility issues in logistics operation can be resolved by a logistics command centre solution that leverages IoT to create end-to-end visibility in the entire process. Such a command centre is a centralised repository with the ability to build on existing enterprise systems, sensor technologies, identification techniques and gateways, communication technologies, machine learning, automation, and business intelligence.

A logistics command centre can collect and aggregate data from all orders, shipments, inventories and assets to provide actionable insights to manufacturers, suppliers, warehouse managers, yard in-charge officers and fleet operators.

Here’s how the different components of an IoT-based command centre help in making logistics operations more effective:

**Sensors**

As the basic building blocks of IoT solutions and primary data sources, sensors transmit information from physical objects to enterprise systems. Sensor technologies can enable the capturing of data for temperature, humidity, pressure, torque, position, angle, displacement, force, vibration and sound, relative to the products being tracked. This helps to monitor their condition and ensure safe transit. It is particularly helpful in ensuring the quality of perishable products.

Data scientists can further use the information collected by sensors to analyse the gaps, if any, in processes and suggest ways for improvements.

Sensors also use satellite navigation technologies such as global positioning system (GPS) to provide geolocation of moving objects. GPS is commonly used to track fleets and assets in a supply chain. It also helps the truck drivers take the best routes to avoid traffic congestions and poor roads.
Communication technologies

Sensors send information to the cloud or connected computing devices using communication technologies such as general packet radio service (GPRS) and other cellular technologies, 4G, Bluetooth and ZigBee. The choice of communication channel depends on range, data transmission rate, power availability and security.

Cloud computing

When data is captured from the cloud, it must be transferred to secure data centres and processed to assist in informed decision-making. The processing becomes possible with continuous connectivity, remote monitoring of sensors, data cleansing, execution of business algorithms, identification of patterns, analytics, visualisations and generation of alerts.

Cloud platforms provide terabytes of space to store and process data extracted from logistics assets. Enterprise applications that are used to work on sensor data can be accessed from anywhere when they are stored in the cloud. The technology is, as a result, gaining ground and has been integrated with other IoT solutions to manage supply chains.

Machine learning

By using machine learning (ML) models, logistics companies can speed up the delivery of e-commerce orders. When a customer provides an address, businesses can use data analytics and machine learning models to break it down, relate it to other addresses in the area and create a geocode – a point on the map.

Later, when the delivery person reaches the area, an app on their smartphone pinpoints to the actual location versus what was shown by the geocode. Such feedback is used by ML models to improve the accuracy levels further over time.

Automation and robotic processes

Automation technologies on devices connected by IoT can help to drive more efficiency in warehouse operations. At Flipkart’s Bengaluru-based warehouse that processes more than one lakh shipments daily, the company uses automatic guided vehicles to work alongside employees. The robotic sorting helps them to meet unplanned and seasonal increases in orders. By deploying 100 AGVs, the company can achieve a 60% improvement in process efficiency.1
Robotics and automation can leverage to complete manual tasks that involve high labour costs or risks. They also help at jobs requiring immense accuracy and precise timing. With robots taking over repetitive and mundane activities, humans can be employed in high-value tasks such as analytics and customer service.

With centrally administered inventory management, supply chain monitoring, product quality inspection, fleet tracking and automation of processes, IoT can revolutionise the logistics domain.

Using IoT applications, logistics industry can improve its operations through:

**End-to-end supply chain visibility**

IoT provides complete visibility into connected systems and enables faster detection of issues to build a platform for timely decision-making. With IoT, an organisation’s online presence is combined with physical stores, and relevant data can be provided to managers at key points in the supply chain. It optimises supply chain responsiveness and unlocks doors for end-to-end customer satisfaction.

**Reduced costs of logistics and warehouse operations**

Improved visibility offered by IoT leads to long-term cost savings. Companies can track and optimise all elements from load logistics to vehicle usage, transport routes and fleet maintenance. Besides providing predictive insights, the process reduces maintenance costs and vehicle downtime by a substantial margin.

Automation for sorting products in warehouses also leads to lower costs and timely fulfilment of orders.

**Business Benefits of IoT in Logistics**

By connecting devices across a centralised cloud network, IoT and related mobile technologies help to collect and leverage business-critical data. They facilitate real-time visibility into logistics and transportation operations.
The applications and benefits of IoT in logistics have been widely acknowledged across the industry. However, technology has also brought some security concerns that arise out of connected devices. Common threats for any IoT model include:

**Espionage**
A hacker can use spyware systems to “snoop” on sensitive data collected by sensors.

**Data corruption**
By using more sophisticated technologies, hackers can also transmit false data (or prevent valid data from being sent), causing stakeholders to make wrong decisions.

**Physical harm**
When an IoT application controls physical devices such as industrial automation systems, an attacker can take over its control to damage the devices or the entire facility.

Companies can check the total carbon footprint of their shipments and use the data to map out ways for reduced emissions across the logistics cycle.
To mitigate such risks, it is essential to ensure that IoT applications are integrated with advanced security systems. By using unified threat management solutions with communication technologies and enabling a secure connection with the cloud, logistics companies can capitalise upon the benefits of IoT while also upgrading the integrity of their business assets.

Establishment of trust and responsible data ownership while overcoming privacy issues in IoT-enabled supply chains is a critical factor for the success of this technology in logistics.

**Conclusion**

As millions of manufactured products and e-commerce shipments move, get stowed and monitored by multiple machines, vehicles and people every day, it is evident that logistics and IoT are a good match.

It connects various assets moving through supply chains in significant ways and enables the analysis of data generated from such connections to capture actionable insights.

Meanwhile, the number of connected devices is increasing and is predicted to cross 20 billion by 2020. The falling prices of device components – actuators, sensors, semiconductors, migration to 5G networks, new data-crunching capabilities, and managed security solutions provided by IT firms will further increase the business benefits of IoT. Pushed by the sizzling speed of innovation, the technology is ready to transform the logistics domain over the next decade.

At Tata Tele Business Services, we have designed bespoke IoT products to help logistics companies attain high levels of operational efficiency while delivering personalised and dynamic services to their customers.

Leveraging the GPS technology, we created IoT applications for:

- **Asset Management System** - to track goods in transit
- **Fleet Management System** - to monitor a fleet of vehicles carrying merchandise, at any time from anywhere
- **Workforce Management System** - to track employees in a logistics chain in real-time

We also provide integrated security solutions to maximise the benefits of IoT for asset monitoring and data collection.

Moving forward, the idea of deploying IoT technologies will not merely concern the optimisation of single-use cases such as warehousing, transportation and last-mile deliveries. It will help to create and manage a smart network of assets that can seamlessly connect different verticals and horizontals in a fragmented logistics industry. That’s the kind of ecosystem our team builds on the technology landscape.
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Get in touch

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