Delivering end-to-end asset visibility

The next generation of IoT-driven asset track and trace

Contents

The need for asset visibility

The results of poor asset visibility can be extremely costly:

- Downtime costs auto makers up to $22,000 per minute[3]

- 70% of organizations don't know when equipment is due for maintenance, upgrade or replacement[4]

- 30% of preventive maintenance activities occur too frequently[5]

- Construction firms lose up to $1 billion in lost assets each year[6]

- U.S. nurses spend up to 40 hours each month searching for equipment[7]

- Up to a third of the assets that organizations list don't actually exist[8]

Digitally re-inventing asset track and trace

Digital transformation is now a core activity for every organization. A recent Accenture survey found 63% of executives saying they were accelerating their transformation initiatives[1]. One area where the move from paper-based, manual work-flows to automated, digital processes offer the most benefit is asset track and trace. Implementing IoT-driven track and trace not only improves your current asset management performance, but it also introduces entirely new capabilities to reduce costs and risk, improve efficiency and drive innovation.

On the face of it, the questions around asset track and trace are very simple: What assets do we have? Where are those assets? How are the assets being used and how are they performing? Do any assets need repaired, replaced or retired? Are all our assets properly accounted for and compliant? Simple questions but gaining the visibility into your assets to answer those questions has been anything but simple.

The most common approaches to asset management have revolved around spreadsheets, handwritten lists and visual inspections in order to track the location, status and performance of assets. In many cases, organizations are still operating in this manner are well aware of just how labor-intensive, error-prone and inefficient it is.

Even where more sophisticated asset management systems are deployed, organizations are often not able to answer those basic questions effectively as they lack the necessary real-time data to realize the benefits from the asset data.

Without complete asset visibility, it's not possible to optimize asset performance or know the health of each asset. As a result, assets are under-utilized, fall through the maintenance cracks or fail completely. Staff do not know where assets are located and may spend hours searching or even purchase unnecessary replacements. This also leaves the asset vulnerable to damage and theft.

In addition, it's difficult to know when an asset needs to be replaced or, even, when it has been replaced. Many organizations find themselves with 'ghost assets' that they are still paying for and insuring long after they have been retired.

What is IoT-driven asset track and trace?

Today, asset track and trace is one of the strongest use case for IoT investment with estimates suggesting there will be over 260 billion IoT tracking devices deployed worldwide by 2027[2].

The development of IoT has brought the physical asset into the digital world. By adding IoT devices, like sensors and accentuators, to the asset, you can receive real time data on every aspect of the asset – including inventory levels, location, condition and performance.

Attached to individual assets, IoT devices capture, and report detailed information about current asset conditions as well as where and how they're being used. This information is fed back to a central IoT platform either in real time or at scheduled intervals.

Previously, digital asset track and trace solutions used RFID tags to deliver basic information back into the system. However, IoT devices have matured to offer greater intelligence to capture and process information at the edge. It has enabled organizations to gain deeper and broader insight into the asset – not only the location and status but the condition and real time performance levels.

This opens the potential to deliver the asset information not only to the central team but also to everyone who needs it such as plant operators, engineers and maintenance staff. A central IoT platform collecting data from all assets within an organization delivers a holistic, real time picture of cross-site and inter-site assets to quickly identify issues and bottlenecks and optimize asset performance. For example, you can quickly see how two similar assets are operating at different plants and amend production schedules accordingly.

With the level of highly granular asset data available through IoT, an organization's track and trace strategy will receive many benefits including:

- Complete visibility of inventory within the organization

- Increase speed and efficiency of the inventory process

- Eliminate human error through automated asset management

- Real-time tracking of asset status, condition and location

- Improve the flow of assets along the supply chain

- Optimize asset utilization and performance within a plant and across the enterprise

- Eliminate costly and non-compliant ghost assets

- Minimize risk from theft or damage

- Accelerate process and production adjustments based on asset condition

- Categorize and analyze asset failure to identify root cause faster

- Move from scheduled and preventative to condition-based and build to predictive maintenance

- Combine IoT data with other asset data and documentation within a digital twin to create a 360-degree asset view

- Use the newly created digital twin as the foundation for the management of assets throughout their lifecycle

Ultimately, IoT-driven asset track and trace is now offering new, innovative business models and revenue streams to forward thinking companies. By being able to monitor and control asset performance, for example, a manufacturer can begin to offer high value, predictive maintenance services to its customers.

Benefits of IoT asset track-and-trace

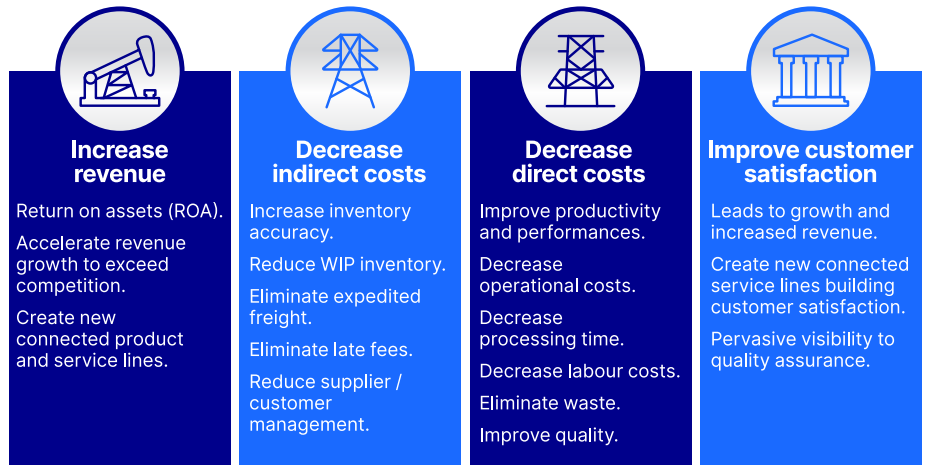| Increase revenue	Decrease indirect costs	Decrease direct costs	Improve customer satisfaction
Return on assets (ROA).	Increase inventory accuracy.	Improve productivity and performances.	Leads to growth and increased revenue.
Accelerate revenue growth to exceed competition.	Reduce WIP inventory.	Decrease operational costs.	Create new connected service lines building customer satisfaction.
Create new connected product and service lines.	Eliminate expedited freight.	Decrease processing time.	Pervasive visibility to quality assurance.
	Eliminate late fees.	Decrease labour costs.	
	Reduce supplier / customer management.	Eliminate waste.	
		Improve quality.	

Figure 1: The benefits of IoT asset track-and trace

Key use cases for IoT-enabled asset track and trace

Overcoming the challenges of traditional asset track and trace starts with applying IoT to transform asset operations and management. This disruptive technology allows organizations to go further with what can be achieved in a number of key areas including:

Inventory management

The first step in asset track and trace is to know what assets your organization actually has. You need to know how much inventory you own, where your inventory resides, and the status of your inventory. This is key to reducing the time associated with lost or misplaced assets. It helps prevent inventory theft or loss that is estimated to cost over $1 billion to the US construction industry alone[9]. In addition, it removes the risk of ghost assets incurring cost and compliance issues long after they have been removed. According to Forrester, anywhere between 10% and 30% of lost, stolen, or broken assets are still on balance sheets in the average organization[10]. IoT-enabled inventory management systems automate manual processes, reduce errors in recording inventory location, movement and transactions as well as providing real-time visibility into the entire asset portfolio
for the organization.

Asset tracking

IoT allows you to track all assets as they move through production facilities or your supply chain. IoT asset tracking solutions continuously record the location and movement of assets - from individual tools to complete pieces of machinery – and periodically or in real-time displays that information on pre-defined dashboards to quickly allow everyone to see where the asset is and its condition. In addition, many asset tracking IoT platforms can be configured to automatically send out warnings or notices with location information when an asset hasn't moved to the next stage of production within the correct amount of time. GPS and geo-fencing functionality allows you to continuously monitor mobile assets and notify you immediately when the asset moves outside the defined area or deviates from the defined path.

Asset utilization and performance

IoT-driven track and trace capabilities help you to receive and interpret granular data on asset usage, wear and tear, inventory levels, and asset turnover. Based on this information, the technology can provide automatic notifications directly from the asset related to its status and condition. You can quickly and easily see when an asset is being under-utilized or where it's operating outside its optimum operating conditions. With a complete view across all assets, it's possible to optimize asset performance at enterprise levels and switch operations to increase productivity and extend the lifetime of the assets. In addition, the insight into asset condition and performance allows you to make informed decisions on maintenance, purchasing and asset retirement.

Condition-based and predictive maintenance

IoT devices can help predict, plan and take proactive steps for maintenance activities like parts repair or equipment failure before it occurs. Instead of relying on preventive or scheduled maintenance that can lead to equipment being serviced too often or, alternatively, not soon enough. With IoT-enabled monitoring, you have real-time information on the condition of every asset. You can pre-define notifications and alerts when the piece of equipment exceeds its operating parameters. That information can be made securely available to your own maintenance engineers as well as transient or contract teams. Deloitte suggests that poor asset maintenance can reduce production capacity by up to 20%[11] so the transition to condition-based maintenance powered by IoT-enabled monitoring translated to many millions in revenue for medium and large organizations.

Production flow monitoring

IoT sensors can monitor your production lines and analyze everything from machine performance to product packaging. You can get insights from production data and use it to make the necessary equipment or process changes. The information gathered provides insight into asset profitability at a product unit level. To boost overall equipment efficiency, organizations can deploy track and trace service to measure the real-time performance of inputs like production, transportation and warehousing. Through production flow monitoring, you can gain visibility to improve the lead times necessary to assemble all the parts required in manufacturing. Excessive lead times are quickly identified to remove bottlenecks due to parts being misplaced or absent.

Supply chain management

IoT real-time asset tracking solutions help manufacturers extend their just-in-time manufacturing processes to their suppliers. Integrating IoT with other supply chain applications improves cross-channel visibility and improves decision-making. It helps in building collaboration across supply chain partners including suppliers and 3PLs as each party has in-depth information on the location and condition of assets – from individual products to containers to trucks and airplanes - as they pass through each segment in the supply chain.

The central role of the digital twin

A digital twin is a digital representation of a physical object, instantiated as a software object that mirrors a unique physical object's characteristics, performance and condition. Built upon a cloud-based IoT platform, the digital twin accepts data from IoT devices and other data sources to deliver a system of record for the asset. It provides a foundation for the information sharing and collaboration necessary to manage and optimize the asset throughout its lifecycle.

The digital twin should include the following elements:

- **Initial asset configuration** - The data that establishes the properties and characteristics that the asset originally has. This is usually developed as a model

- **Operational data** - The data from the connected asset changes over time. This includes historical data for analysis and insight and real-time data for maintenance and asset optimization

- **Data integration** - Integration with other business and operational systems to gain access and connectivity to supporting data and documentation on the asset. This provides a 360-degree view of the asset and ensures that all of the information about the asset is correct – wherever it resides – over its lifetime

- **Bi-directional communication** - Some IoT platforms give the ability to both receive and send data to the IoT device allowing for remote maintenance and remedial work to take place quickly from the digital twin

The IoT platform is central to the digital twin. It receives the IoT data from the device, aggregates and cleans the data and makes it available to the people who need it as well as preparing it for analysis to improve operational and business performance. In this way, customized and targeted IoT applications – such as asset track and trace or monitoring – can be layered upon the digital twin (See figure 2).
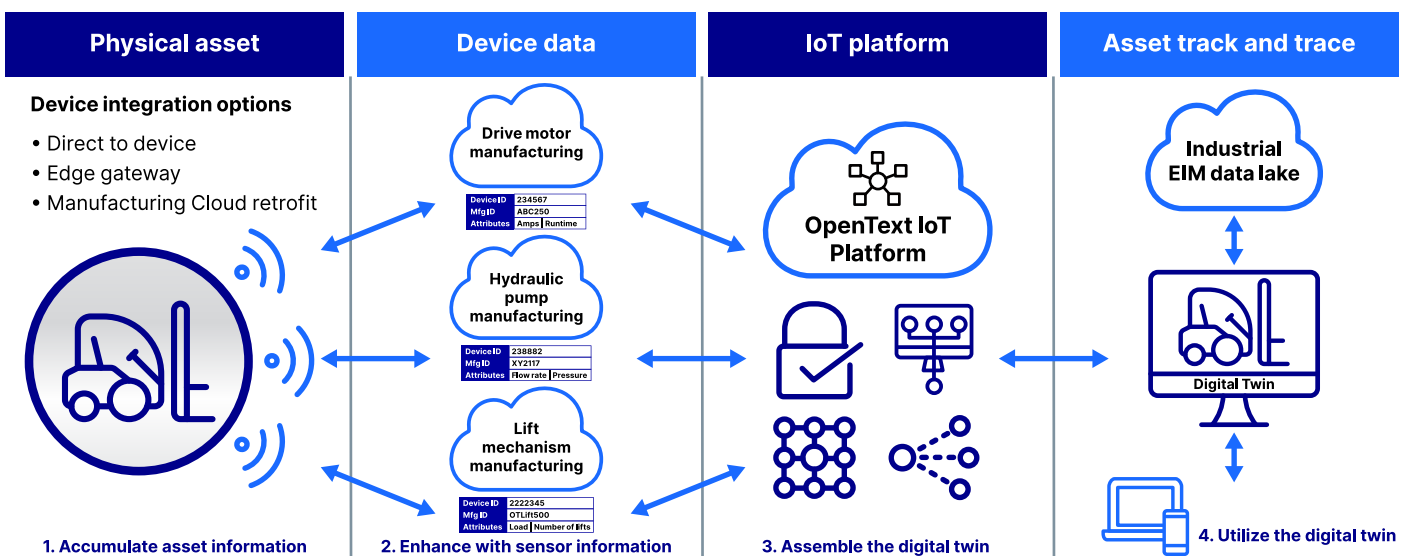

Figure 2: Digital Twin: The foundation for asset track and trace

Creating the Digital Ecosystem

As well as managing the relationships of IoT sensors and devices, the digital twin needs to accommodate and securely enable the numerous roles and personas that must interact with the asset. This requires the seamless and secure connectivity and communication of connected people, systems and things. This provides a holistic and 'identity-centric' approach to bringing big data, IoT, analytics and Artificial Intelligence together to achieve end-to-end asset management and deliver the transformational use cases like track and trace and remote monitoring.

Connected People	Connected Systems	Connected Things
The identity personas and lifecycle of everyone that interacts with your digital assets and connected products. – employees, suppliers, customers.	The secure sharing of information between systems in the right format at the right time and to the right device.	Advanced IoT services for the many devices and things that need to connect and exchange information.

In effect, the organization is creating a 'Digital Ecosystem' - of which IoT devices are only one component (See figure 3). The ecosystem is built around a single digital backbone that connects and integrates with any person, device or enterprise system across a highly complex environment both within a single plant or across the entire enterprise.

Figure 3: The 'Digital Ecosystem'

Deploying the IAM-driven IoT platform

The basis for deploying and managing a digital ecosystem is the enterprise-wide IoT platform. This central platform enables organizations to quickly build and deploy new IoT applications, such as digital asset inventorying, track and trace and remote monitoring. The key for all organizations looking to fully exploit a cloud-based IoT platform is to provide security for the entire digital ecosystem while ensuring everyone and everything has the access it needs.

Taking an 'identity-centric' approach to IoT allows for the development of an IoT platform that enables the rapid development and delivery of a wide range of components to drive comprehensive asset intelligence, tracking, monitoring and eventually transformational insights (See figure 4). Key capabilities of the IoT platform include:

- **Secure device management** - Protects all operating assets by automatically and securely provisioning, managing and retiring IoT devices across your asset base

- **Ecosystem integration** - Integrates and delivers seamless information flow across industrial enterprise systems. This enables the seamless exchange of sensor-based information with key business systems - such as ERP, WMS and TMS – and with people inside and outside of the organization

- **Unified messaging** - Aggregate information from disparate systems to obtain a single data feed to enable any-to-any communication. This provides complete transparency, governance and data tracking and visibility

- **Actionable insights** - Apply artificial intelligence and machine learning to monitor condition, boost performance and maximize availability of serviceable equipment and assets

The IAM-driven IoT platform enables vast amounts of structured and unstructured data from a wide variety of sources to be rapidly ingested and aggregated in large data sets. A unified data model allows for all data to be normalized across the entire ecosystem. The platform can then apply a series of services to the data to meet the asset management needs of your organization.

Embracing and extending business applications through an identity-centric approach provisioning people, systems and things

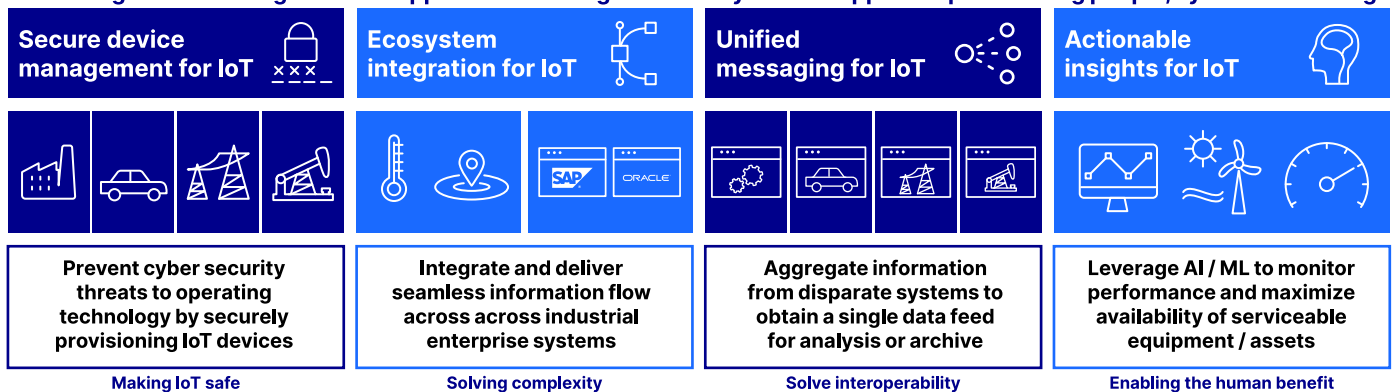| Secure device management for IoT	Ecosystem integration for IoT	Unified messaging for IoT	Actionable insights for IoT
Prevent cyber security threats to operating technology by securely provisioning IoT devices	Integrate and deliver seamless information flow across across industrial enterprise systems	Aggregate information from disparate systems to obtain a single data feed for analysis or archive	Leverage AI / ML to monitor performance and maximize availability of serviceable equipment / assets
Making IoT safe	**Solving complexity**	**Solve interoperability**	**Enabling the human benefit**

Figure 4: The IAM-driven IoT platform

An evolutionary approach to IoT-driven asset visibility

With 360-degree asset visibility you gain the ability to track, monitor, and visualize the location and condition of assets across people, systems, and things. OpenText has created a comprehensive suite of IoT-driven asset management solutions to deliver visibility and control. Built on the OpenText IoT platform, it comprises four components (See Figure 5) that build incrementally to allow you to evolve you track and trace capabilities as your business requires. You can achieve end-to-end operational visibility with:
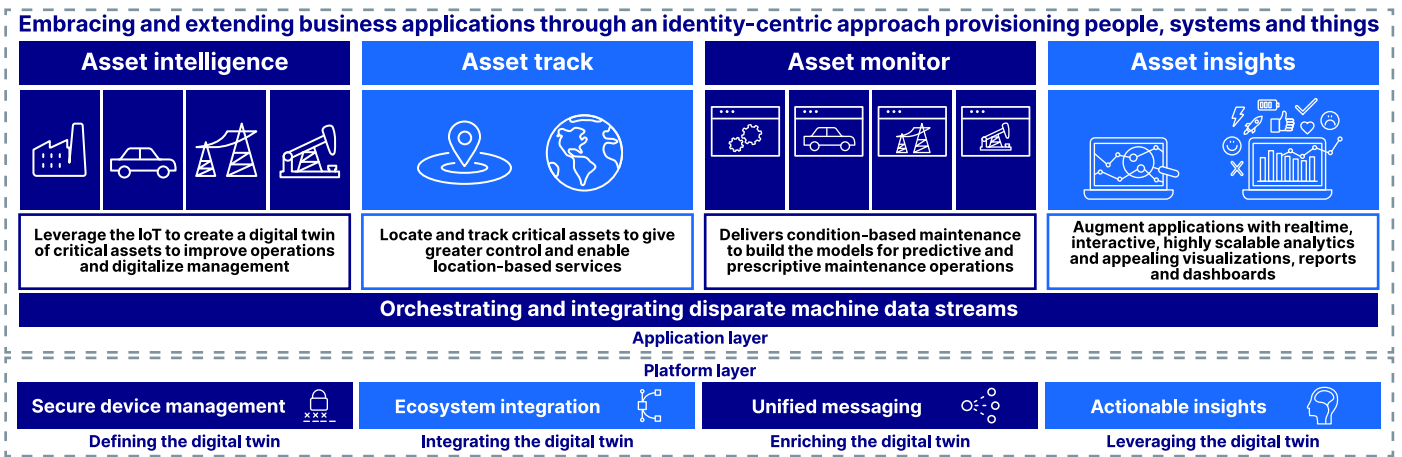

Embracing and extending business applications through an identity-centric approach provisioning people, systems and things

Asset intelligence	Asset track	Asset monitor	Asset insights
Leverage the IoT to create a digital twin of critical assets to improve operations and digitalize management	Locate and track critical assets to give greater control and enable location-based services	Delivers condition-based maintenance to build the models for predictive and prescriptive maintenance operations	Augment applications with realtime, interactive, highly scalable analytics and appealing visualizations, reports and dashboards

Orchestrating and integrating disparate machine data streams

Application layer

Platform layer

Secure device management	Ecosystem integration	Unified messaging	Actionable insights
Defining the digital twin	Integrating the digital twin	Enriching the digital twin	Leveraging the digital twin

Figure 5: Building comprehensive IoT asset track and trace capabilities

Asset Intelligence

OpenText Asset Intelligence allows you to transition from paper to digital asset inventorying. It allows you to create and manage an accurate, real time inventory of all your assets. It enables you to collect a rich set of information – both IoT and related data and documentation – to build a digital twin of the asset and is the starting point for creating additional use cases from this newly created digital twin. It securely orchestrates and disseminates the digital twin data to key stakeholders, customers or regulators based on their role in the asset's operation. With Asset Intelligence, you have effective inventory management that increases asset usage, and improves inventory turns while decreasing costs.

Asset Track

Building on the advantages gained from Asset Intelligence, the Asset Track solution uses location-based services to pinpoint an asset's location in real time. You are able to track the location and movement of assets in real time to reduce production bottlenecks, optimize routes and reduce lost, stolen or misplaced assets. Once an asset is registered, a location-based sensor or device is attached to the asset allowing its location to be tracked in real time. Using Asset Track, you can ensure you maximize your current asset operations and eliminate cost overruns due to additional time spent locating existing assets for processing or maintenance.

Asset Monitor

As assets are used, their condition, health and performance can be viewed as more important than its physical location. The Asset Monitor solution allows you to monitor the condition of an asset across a wide range of variables - such as operating range, capacity utilization, temperature and humidity – to understand how an asset is being used across operations and facilities. It gives you visibility of all similar assets in the organization to gain insight into asset optimization. The solution provides the basis to move towards condition-based and eventually predictive maintenance operations. Building on the digital twin, it gives an accurate, real time system of record to ensure that engineering and maintenance staff are given the right information while in the office or the field.

Asset Insights

Understanding how an asset is utilized can be extremely beneficial to an organization. The Asset Insights solution empowers organizations to visualize all their assets as an ecosystem, using an exception dashboard to quickly identify underperforming assets or those that are missing in action. Combining IoT and non-IoT data within the digital twin allows for more effective planning and execution in areas such as inventory management, the reducing of operational bottlenecks, asset utilization and performance as well as providing a basis to develop new IoT data-driven revenue streams.

Conclusion

The potential for IoT-enabled asset management is enormous. Whether pinpointing inventory, detecting changes to asset condition, tracing lost or stolen goods or optimizing your supply chain, IoT-enabled asset management solutions provide the tools to improve efficiency in a wide range of industries dramatically. However, achieving full success when implementing the new generation of asset management must be carefully planned and executed. OpenText's IoT-enabled asset management solutions allow you to create a digital twin of all your assets and incrementally layer capabilities to reach 360-degree asset visibility at the pace and cost that suits your business and the developing use cases.

Resource

[OpenText Aviator IoT ›](#)

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