



Comprehensive Asset Tracking and Monitoring for Logistics on Microsoft Azure

Intel Connected Logistics Platform Hosted on Microsoft Azure: A Capgemini Integrated End-to-End Shipping Solution

Companies ship millions of tons of goods and materials every year. When a shipment is compromised in transit (due to damage, loss, delay, theft, or spoilage), companies lose revenue and productivity as well as goods.

Capgemini uses the Intel[®] Connected Logistics Platform as a basis for its IoT hardware/software solution to increase the visibility, integrity, and security of shipments as they move through the supply chain. The end-to-end solution, built on Intel[®] IoT hardware with Microsoft Azure* cloud capabilities, provides near-real-time tracking and monitoring of shipment location, temperature, humidity, shock, ambient

light, pressure, and tilt; provides a comprehensive Azure-based dashboard for effortless monitoring and analysis; and includes programmable notifications and alerts for quick intervention.

Challenge: Lack of cost-effective, current shipment visibility

Current shipment tracking solutions either fail to provide close to real-time visibility or are too expensive for package-level deployment, which hinders the ability to mitigate loss, assess responsibility, and identify process issues.

1 out of 10

US e-commerce packages arrives damaged¹

1,582

containers lost at sea each year²

800+

cargo thefts in 2016 in the US and Canada, with an average value of USD 207K³

15% to 25%

of perishable goods worldwide lost/damaged along the cold chain⁴

1 Mohan, Anne Marie. "E-commerce packaging pitfalls & opportunities," Packaging World, December 4, 2014, <https://www.packworld.com/article/trends-and-issues/distribution/e-commerce-packaging-pitfalls-opportunities>.

2 Grey, Eva. "Cargo theft: a billion-dollar problem," Ship Technology, July 30, 2017, <https://www.ship-technology.com/features/featurecargo-theft-a-billion-dollar-problem-5882653>.

3 American Journal of Transportation. "CargoNet's 2016 Cargo Theft Trend Analysis," January 31, 2017, <https://www.ajot.com/news/cargonets-2016-cargo-theft-trend-analysis>.

4 Jedermann, R.; Nicometo, M.; Uysal, I.; and Lang, W. "Reducing Food Losses by Intelligent Food Logistics," Philos. Trans. A. Math. Phys. Eng. Sci., June 13, 2014, <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4006167>.

Solution Architecture: Intel® Connected Logistics Platform

The solution consists of disposable sensor tags, an IoT edge gateway, a mobile device app, a Microsoft Azure* dashboard, and Microsoft Azure cloud applications:

- 1 **Sensor tags:** Placed on packages to collect data (temperature, tilt, shock, light, humidity, GPS, and barometric pressure). The tag uses a credit card form factor with a typical battery life of up to a hundred days depending on use case (battery life depends on frequency of data upload and amount of transferred data) and includes a security chip and wireless connectivity adapter.
- 2 **IoT edge gateway:** The familiar smartphone form factor uses Intel® IoT Technology to manage sensor tags, aggregate data, and transmit data to the cloud for analytics. The gateway battery is rechargeable, with a single charge lasting up to 40 days depending on use. Azure IoT Solution Accelerators can be quickly set up to pull data from the Intel® Connected Logistics gateway or any other source. The gateway communicates to the Azure cloud, where Capgemini's XIoT platform and custom applications help gain insights on sensor data.
- 3 **Onboarding tool:** This mobile app is used by workers to pair/unpair the shipment with a specific gateway.
- 4 **Azure IoT and cloud applications:** The gateway virtual appliance, a middle-tier application component hosted on Azure, manages shipment and sensor data along with necessary storage components (e.g., COMOS database, SQL database). Azure applications capture and process huge amounts of data with the ability to apply machine learning for continuous improvements and insights.
- 5 **Azure dashboard:** The visibility portal helps with business integration by tracking shipments as well as monitoring sensor data and sending notifications/alerts for quick action.

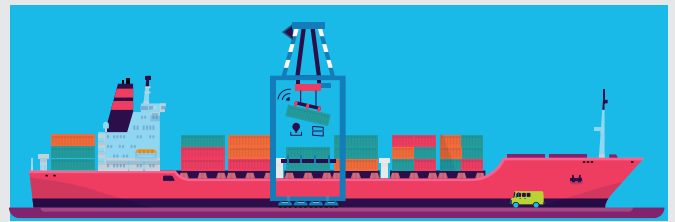
End-to-end visibility from powerful, scalable Intel® technology and Microsoft Azure

- **Near-real-time risk mitigation.** Visibility into package-level condition and shipment location helps prevent and reduce losses.
- **Geofencing.** GPS-enabled tracking across the entire journey ensures accurate routing. Users receive alerts when a shipment is off track and proof-of-delivery notifications when shipments are delivered.
- **Predictive analytics.** The Azure dashboard enables shipment monitoring and provides data to help triage problems to optimize the supply chain. Analytics and deep learning can be applied to optimize any container's location and anticipate delivery needs.
- **Cost-effective.** An accessible price point for all-in-one devices allows package-level tracking while reducing costs associated with product waste and inefficiencies. Capgemini offers flexible payment options including, but not limited to, licensing fees per device and pay per day, per asset.

How it works

The Intel and Capgemini solution includes inexpensive, disposable sensor tags; hardwired or battery-powered mobile gateways; an intuitive visibility dashboard; and Azure cloud applications. In typical usage, the sensor tags are affixed to each container, pallet, box, or item, depending on the level of granularity desired. Cameras also can be used for asset tracking. The Intel® technology-based gateways are placed in shipping containers to gather data from tags, provide intelligence at the edge, and push select data to the cloud via the XIoT solution. Altogether, the solution delivers near-real-time tracking and monitoring during transit, proof of delivery, near-real-time alerting, and data logging. In addition, the multimodal device infrastructure eliminates reverse logistics and provides intelligence at the edge with hardware-level security.

Use cases



Track and monitor high-value, sensitive equipment

Challenge. Excessive tilt or shock can damage large, costly items such as laboratory equipment or machinery.

Common solution gaps. Shock/tilt indicators only provide data upon delivery and don't indicate time and place of an incident.

Solution. The near-real-time Microsoft Azure dashboard sends alerts for location and excessive tilt and shock, enabling root-cause isolation and triage.



Track and monitor goods at risk of theft

Challenge. High-value shipments—like consumer electronics, branded goods (perfume, clothing, and/or alcohol and tobacco products), pharmaceuticals, or intellectual property—are often targeted for theft.

Common solution gaps. Package-level tracking can be cost prohibitive, and analog devices don't provide a means to identify and address theft.

Solution. With cost-effective GPS-enabled tracking along the entire shipping journey, sensors detect near-real-time changes in the environment and conditions, reporting if a single item/package is separated from the others.



Track and monitor conditions during temperature-regulated shipments inside and outside of package

Challenge. Perishables like pharmaceuticals, produce, and chemicals must maintain specific temperatures to prevent spoilage and meet regulatory standards.

Common solution gaps. Analog devices only provide after-the-fact information and are cost prohibitive for package-level tracking.

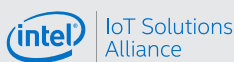
Solution. Cost-effective sensors monitor regulated interior and outside temperatures in near-real-time.

Transform logistics and gain a competitive advantage

- Ensure asset tracking and monitoring of shipment quality, integrity, and security at every stage of the supply chain, anywhere in the world, through Intel® technology-based IoT gateways.
- Deploy an easy-to-set-up visibility dashboard with the familiar Microsoft Azure user interface, customized for your enterprise needs.
- Seamlessly integrate devices into existing workflows with minimal onboarding.
- Track packages worldwide, and scale with your business.
- Deploy robust end-to-end data security and device protection through Intel technology.

Get on board today!

- The Intel and Capgemini XIoT solution can be provided via SaaS or as a shared revenue engagement.
- Intel tags, a gateway, and a virtual gateway offer optimal device management.
- Integration with Azure Services provides faster integration and scalability, smoother data aggregation and delivery, and the ability to take the correct course of action through insights gained from predictive/trend analytics.
- Capgemini integrates hardware and cloud technologies and generates APIs for customer data access.
- The flexible architecture allows for customization.



For more about Capgemini integrated Smart Services Solutions

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Learn more

Contact your Intel representative for more information about the Intel Connected Logistics Platform,
or visit intel.com/supplychainiot.
For more information on Microsoft Azure IoT Solution Accelerators, visit azureiotsolutions.com/accelerators.

About Capgemini

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