Premium Air Cargo Tracking

Leveraging IoT and tracking platform data for enhanced visibility and investigation

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SHIPPING A WORLD OF POSSIBILITY
WE KNOW HOW

At Cathay Cargo, every shipment matters. From handling temperature-sensitive vaccines and fresh produce to caring for champion horses, our experts ensure that all our cargo arrives ready to make a difference to the world.

24/7
Customer Service

Cargo Handling
Expertise

Air Transport World's
Cargo Airline of the Year

CATHAY CARGO
MOVE BEYOND

Ultra Track: Cathay Cargo's Multi-dimensional Track-and-Trace Service

Multi-dimensional readings

24/7 Monitoring

Constant updates & visibility on cathaycargo.com & EzyCargo

Interface features live link to Flightradar 24

Near real-time shipment info & notification

Unit level

Proactive intervention in the event of temperature excursions, malfunctions, delays or damage

Live chat

Investigation and Claims

🔍 Investigation Challenges

Data Gaps
Critical information missing from incident timeline

No Real-Time Visibility
Delayed milestone-based tracking provides limited context

Uncertain Root Cause
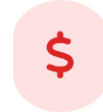Difficulty pinpointing exact time, location, and cause

Liability Disputes
Protracted investigations and disputes over responsibility

Increased Costs
Operational expenses due to investigation and resolution

📈 Financial Impact

Financial Challenge
Financial Burdens
From loss, damage, and theft incidents

Presentation Objectives

Traditional vs. Modern Tracking

Comparison of legacy milestone-based systems with contemporary continuous tracking solutions

The Role of IoT

How Internet of Things devices are revolutionizing cargo visibility with continuous data streams

Data Points for Investigation

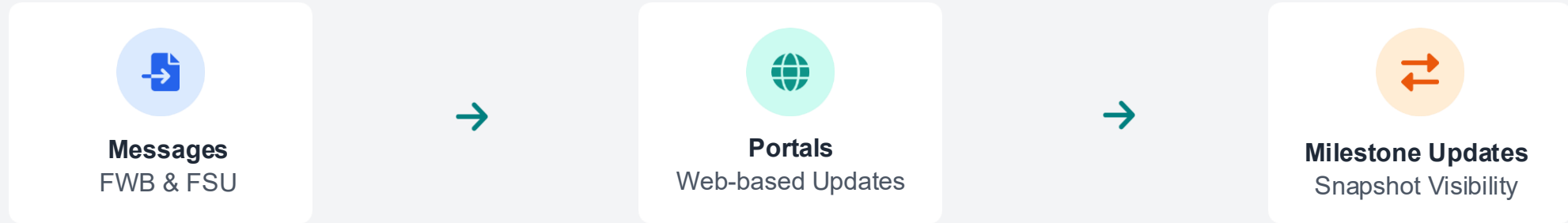Specific data elements collected and their utility in claims analysis and loss prevention

Platform Capabilities

Features of advanced tracking platforms that enable data analysis and reporting for claims

Legacy Tracking Systems: The Foundation

Milestone-Based Tracking

Traditional air cargo tracking relies on periodic status updates rather than continuous visibility

Messages
FWB & FSU

→

Portals
Web-based Updates

→

Milestone Updates
Snapshot Visibility

🏷️ Key Shipment Status Codes

RCS
Ready for Carriage

DEP
Departed

ARR
Arrived

RCF
Received into Warehouse

NFD
Notified

DLV
Delivered

ⓘ These codes indicate specific events, offering a view of cargo movement with limited visibility.

Limitations of Traditional Tracking

Traditional air cargo tracking systems fall short in meeting the granular data requirements of modern claims investigations.

Aspect	Legacy System Capability	Investigation Need
	ULD/Master AWB level	Item/piece-level, specific package identification
	Delayed, event-triggered	Real-time, continuous updates
	None	Temperature, humidity, shock, light exposure
	Airport/warehouse level	Exact GPS coordinates, indoor location
	Manual scans, limited	Automated, verifiable, time-stamped handovers
	None	Rule-based, immediate exception notifications

IoT Tracking Device Types

Modern air cargo logistics leverage various IoT tracking devices, each designed for specific applications and levels of granularity:

Bluetooth Low Energy (BLE) Tags

Key Features:

- ✅ Cost-effective, small form factor
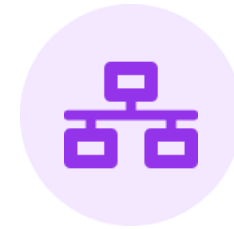- ✅ Communicates with nearby gateways
- ✅ Piece-level tracking

Cellular (4G/5G) Trackers

Key Features:

- ✅ Broad coverage area
- ✅ Uses cellular networks
- ✅ Continuous real-time updates

Hybrid Devices

Key Features:

- ✅ Multiple communication technologies
- ✅ Versatile adaptability
- ✅ Specific functionalities

Core Functions Across All Device Types

📍 Precise Location Tracking　　　🌡️ Continuous Condition Sensing　　　🗄️ Reliable Data Communication

Environmental & Physical Sensor Capabilities

IoT devices are equipped with sophisticated sensors that monitor environmental and physical conditions, providing critical data points for claims investigations. These sensors work in conjunction to create a comprehensive record of cargo conditions throughout the journey, providing investigators with granular data to identify root causes.

Temperature

Measures ambient temperature.

Investigation Use:
Detects excursions outside specified temperature ranges, crucial for temperature-sensitive goods like pharmaceuticals or perishables, indicating potential spoilage or damage.

Humidity

Measures moisture content in the air.

Investigation Use:
Identifies exposure to excessive humidity, which can lead to mold growth, corrosion, or damage to moisture-sensitive electronics and documents.

Light Exposure

Detects changes in light levels.

Investigation Use:
Signals unauthorized opening of a package or container outside of designated handling areas, providing evidence for theft or tampering.

Shock/Tilt

Measures sudden impacts (G-force) or changes in orientation.

Investigation Use:
Pinpoints the exact time and severity of mishandling events, such as drops or rough handling, directly linking physical damage to a

Pressure

Measures atmospheric pressure.

Investigation Use:
Can indicate changes in altitude or exposure to extreme pressure variations, relevant for sensitive equipment or goods that might be

Vibration

Detects continuous or intermittent vibrations.

Investigation Use:
Helps identify prolonged exposure to vibrations during transit, which can cause fatigue damage to delicate components or

More Granular Location Data

Location Intelligence

Precise Journey Timeline
Continuous GPS/cellular location creates a time-stamped record of every stop, movement, and dwell time

Strategic Geofencing
Virtual perimeters around airports, warehouses, and transfer zones create zones of interest for monitoring
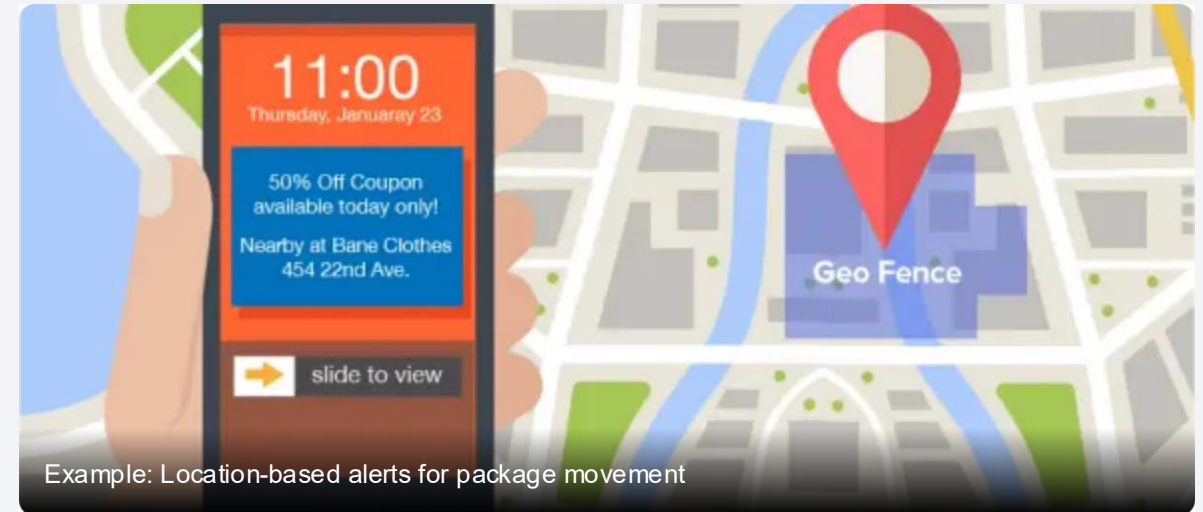
Immediate Alerting
Real-time notifications for unauthorized entry/exit provide instant awareness of deviations

Root Cause Analysis
Geofence violations indicate theft, misrouting, or unauthorized handling at specific locations

Geofencing in Action

11:00
Thursday, Januaray 23

50% Off Coupon available today only!
Nearby at Bane Clothes
454 22nd Ave.

slide to view

Geo Fence

Example: Location-based alerts for package movement

⚠ Alerts

Unauthorized Access
Entry/exit from secure areas

Route Deviation
Deviations from planned path

Dwell Time
Extended stops at locations

Transfer Events
Changes in handling custody

Condition Monitoring Logs

📋 IoT devices capture environmental and physical condition data, providing evidence for claims investigation

Timestamp	Location	Temperature (°C)	Humidity (%)	Shock Event (G-force)	Light Status
2025-09-14 08:00:00	34.0522, -118.2437	22.5	55	0.5	OFF
2025-09-14 09:15:00	33.9416, -118.4085	28.3	60	1.2	OFF
2025-09-14 09:30:00	33.9416, -118.4085	30.1	62	2.5 (Impact)	OFF
2025-09-14 10:00:00	33.9416, -118.4085	29.8	61	0.8	ON

🔍 Incident Analysis

Evidence Points

- Shock event at 09:30:00
- Temperature spike to 30.1°C
- Light sensor triggered at 10:00:00

Root Cause

Evidence indicates handling damage followed by temperature exposure and possible unauthorized access.

⚖️ Investigation Benefits

🕐 **Precise Timing**
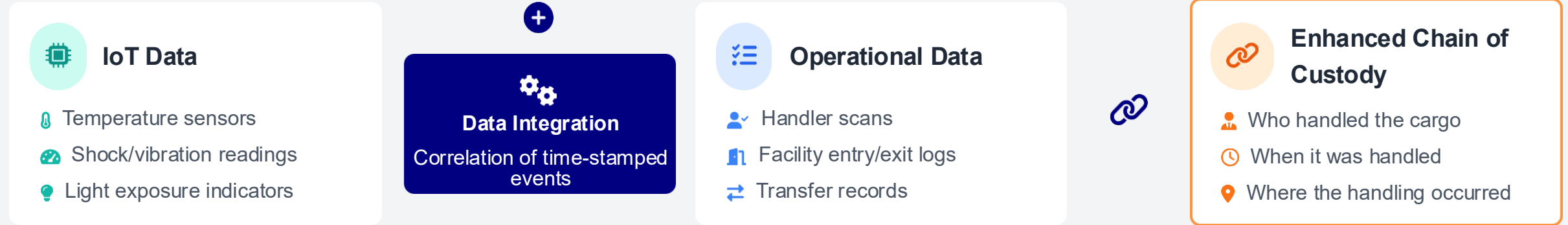Exact time of incidents to within minutes

📍 **Location Precision**
Known location at time of incident

🌡️ **Environmental Context**
Temperature and humidity data

Enhanced View on Chain of Custody

Combining IoT data with operational data, transforming abstract events into traceable actions.

IoT Data
- Temperature sensors
- Shock/vibration readings
- Light exposure indicators

+

Data Integration
Correlation of time-stamped events

Operational Data
- Handler scans
- Facility entry/exit logs
- Transfer records

Enhanced Chain of Custody
- Who handled the cargo
- When it was handled
- Where the handling occurred

💡 Example Application

When a temperature excursion is recorded during a transfer, and operational data identifies the responsible handling party, then investigators can assign responsibility and liability, transforming abstract events into traceable actions.

⭐ Key Benefits

Precise Accountability
Identifies responsible parties

Evidence Correlation
Connects physical evidence

Liability Assignment
Clarifies responsibility

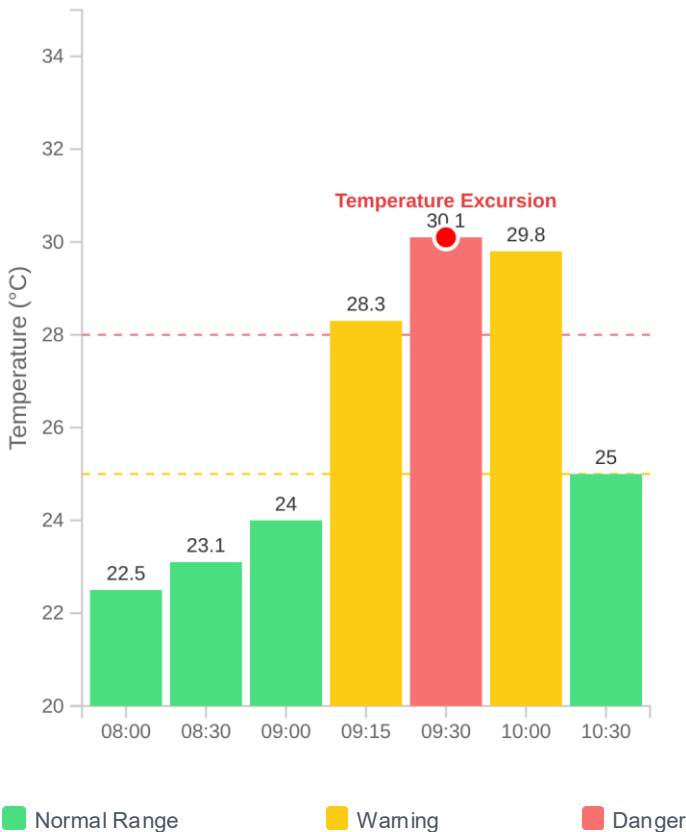# Case Study: Temperature-Sensitive Pharmaceutical

📋 Case Overview

📦 Temperature-controlled pharmaceutical shipment from Los Angeles to New York

🌡️ IoT device recorded temperature excursions during transit

📍 Handling point showed significant temperature fluctuation

🔍 Investigation Insights

🕐 Precise timing: Temperature excursion occurred between 09:15:00 and 09:30:00

📍 Exact location: Airport facility (33.9416, -118.4085)

🌡️ Cause: Temperature spike from 24°C to 30.1°C indicated equipment failure

📈 Temperature Timeline

Temperature Excursion

Time	Temperature (°C)
08:00	22.5
08:30	23.1
09:00	24
09:15	28.3
09:30	30.1
10:00	29.8
10:30	25

🟩 Normal Range   🟨 Warning   🟥 Danger

⚖️ Liability Assignment

👤✓ Airport facility showed temperature spike

🚚 Ground handling contractor responsible for temperature control

📑 Clear documentation of liability based on data trail

🥧 Business Impact

⏱️ Reduced investigation time from days to minutes

🔨 Accurate liability determination

🛡️ Proactive prevention of future incidents

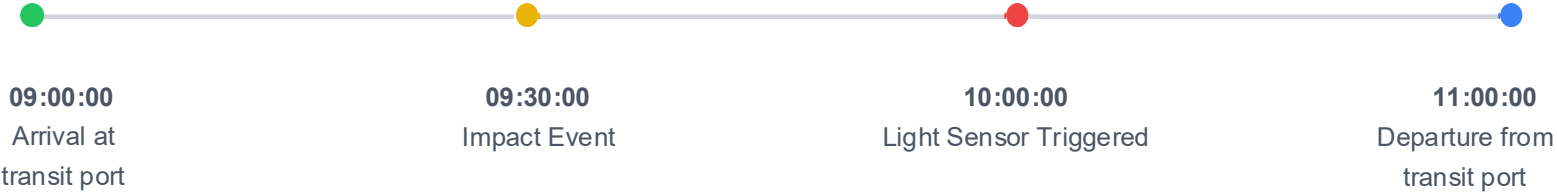# Case Study: High-Value Electronics Theft Investigation

Case Background

A high-value electronics package was reported missing during transit. Traditional tracking showed only that the cargo had left the origin and was now at the destination airport.

⚠️ **Challenge:** No visibility into handling after departure, making it impossible to determine if and when the package was tampered with.

💡 **Solution:** Deploy an IoT tracker with light sensor and geofencing capabilities.

Investigation Timeline

09:00:00
Arrival at transit port

09:30:00
Impact Event

10:00:00
Light Sensor Triggered

11:00:00
Departure from transit port

💡 Light Sensor Evidence

Light sensor changed from OFF to ON at 10:00:00, indicating the package was opened during transit.

📍 Location Data

Package was at location 33.9416, -118.4085 when the light sensor triggered, indicating it was at an airport facility.

⚡ Shock Event

Shock event of 2.5 G-force registered at 09:30:00, suggesting the package was dropped or roughly handled.

🖼 Geofencing Alert

The package left a geofenced airport zone without authorization, triggering an alert that initiated the investigation.

✔ Investigation Outcome

Using the IoT data, investigators determined the package was tampered with at 10:00:00 at an airport facility, allowing them to file a detailed claim with the responsible carrier and prevent further losses.

Case Study: Damage Assessment for Fragile Cargo

⚠️ The Challenge

A temperature-sensitive pharmaceutical shipment experienced damage during transfer between facilities. The cargo, containing fragile medical equipment, showed signs of physical impact and temperature excursion.

> ❓ **Key Questions:** Who was responsible for the damage?

🔍 Investigation Process

● **Data Collection**
IoT sensors captured shock events and temperature data throughout the journey.

● **Event Correlation**
Shock event at 09:30 correlated with temperature spike and package opening.

● **Chain of Custody**
Operational data linked specific handlers to the impact event timeframe.

📈 Shock Event Analysis

Legend: ▮ Shock (G) — Temp (°C)
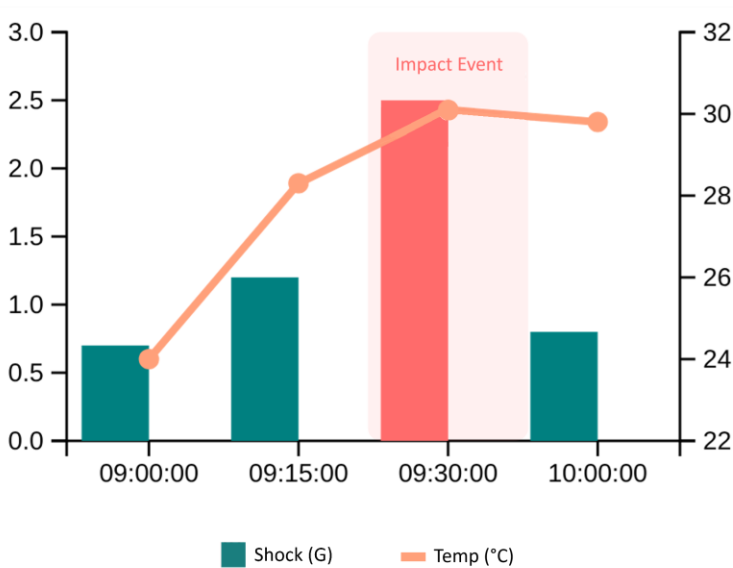
> ℹ️ **Key Finding:**
> The shock event (2.5G) at 09:30 precisely matched the

🔨 Determining Responsibility

🔗 **Digital Chain of Custody**
Combined IoT and operational data created an irrefutable record of who handled the cargo and when.

👤✓ **Clear Assignment**
Impact data linked the shock event to a specific handler's actions during transfer.

✅ Outcome & Benefits

📄 Reduced dispute resolution time from weeks to days

🛡️ Prevented similar incidents through improved training

⚖️ Accurate liability assignment based on concrete evidence

🎛️ Proactive alerts implemented to prevent future damage

Data Privacy & Security Considerations

Balancing operational needs with data privacy requirements

Security Challenges

- ⚠️ Data interception during transmission
- 🏛️ Unauthorized access to systems
- 🗄️ Data breaches compromising supply chain

Data Privacy Measures

- 🔑 End-to-end encryption for data
- 👤🔒 Role-based access controls
- 🕘 Audit trails for data access

Regulatory Compliance

- 📋 GDPR compliance for EU operations
- 📋 Industry-specific regulations
- 📋 Relevant regulatory compliance

⚖️ Balancing Security with Operations

- 🎛️ Real-time monitoring vs. security
- ☁️ Data retention policies
- 👥 Staff privacy training

Future Outlook: AI and Predictive Analytics

AI-Driven Capabilities

Predictive Risk Analysis
Anticipate and prevent delays or damages before they occur

Automated Intervention
Self-correcting systems that respond to potential risks

Supply Chain Integration
Greater data integration across the entire logistics ecosystem

Resilient Networks
More transparent and adaptive logistics infrastructure

💡 "It is crucial for all stakeholders, especially those in claims and loss prevention, to embrace these evolving tools to maximize their effectiveness and drive continuous improvement."

Key Takeaways

Leverage IoT for Continuous Evidence

Modern tracking provides continuous data, offering far more granular insights than traditional milestone-based tracking. Transform intermittent updates into continuous visibility to bridge the data gaps in cargo journeys.

Use Condition Data to Prove Causation

Sensor data on temperature, humidity, shock, and light exposure can precisely pinpoint when and where damage occurred, directly supporting causation in claims. This granular evidence helps establish liability and validate claims.

Utilize Platform Alerts for Early Intervention

Automated alerts for predefined exceptions enable immediate action, mitigating potential losses before they escalate. Rule-based notifications for temperature excursions, unauthorized access, or route deviations provide critical early warning.

Demand Comprehensive Data Reports

Tracking platforms can generate detailed, irrefutable reports that serve as robust evidence for claim filings and liability assignments.

The air cargo industry is transforming from reactive, milestone-based tracking to proactive, data-driven visibility—moving from investigating incidents to actively preventing them.