

# INTERNET OF THINGS IN LOGISTICS



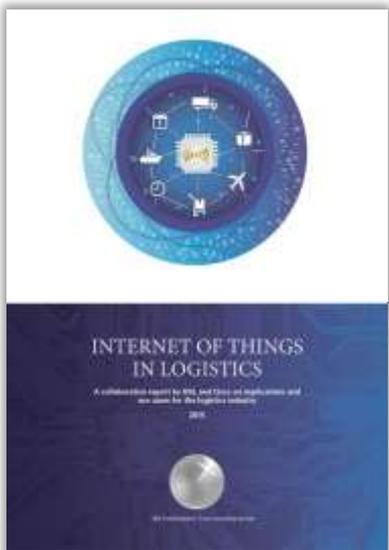
# WHAT IS IOT?



Source: Cisco

# IOT IN LOGISTICS

Joint report with Cisco on the implications for IoT in warehousing, transport and last-mile operations. Report launched at the Tech. Conference and took approx. 10 weeks to produce.



Source: DHL Trend Research [www.dhl.com/iot](http://www.dhl.com/iot)

# WHY IOT IN LOGISTICS?

## IoT is “sensing and sense making” in the world of logistics

### Technology Push

- **Mobile computing** growing steadily with more mobile phones expected in 2020 than people in the world
- Due to the **consumerization of IT**, sensor technology has become more mature and affordable to be used for industry purposes in logistics
- With the move towards **5G**, wireless communication will reach a new level of maturity connecting everything anytime
- **Cloud computing and big data** technologies will enable new data based services



### Need for Logistics Solutions

- High need for transparency and integrity control (right products, at the right time, place, quantity, condition and at the right cost) along the supply chain
- End-consumers are asking for detailed shipment tracking to have transparency in real time
- Business-Customers asking for integrity control especially for sensitive goods
- Logistics companies need transparency of networks and assets being used for ongoing optimization of efficiency and network utilization

Source: DHL Trend Research

# DHL'S HAS ALREADY STARTED IT'S IOT JOURNEY

Maturity of IoT Technology



Source: DHL Trend Research

Time

# 1. IoT in Warehousing



# USE CASES:

## 1). Smart Inventory Management



Sensors tags on pallets and items transmit data on location, condition (e.g. temperature) to enable real-time visibility into inventory levels and increase quality of warehousing operations

## 2). Optimal Asset Utilization



By connecting machinery and vehicles to a central system, managers can monitor all aspects of an asset in real-time such as productivity, speed and location to optimize asset management (See [Swisslog](#))

## 3). Connected Workforce



Workers can connect via smartphones and wearables to monitor health and fatigue and to identify areas where process paths can be optimized and potential collision risks with vehicles

## 4). Smart Energy Management



Lighting costs which account for up to 70% of energy use in a warehouse could be optimized by combining intelligent LED lights with data from the warehouse floor to dim areas where there is no activity

## 2. IoT in Transportation



# USE CASES:

## 1). Location & Condition Monitoring



Tagged items enable more accurate and faster track & trace and condition monitoring of all shipments across various modes of transportation, improving integrity control and decision making in the supply chain.

## 2). Fleet & Asset Management



Sensors monitor and transmit data on asset utilization, location, and spare capacity to improve fleet management and enable dynamic consolidation on routes. This includes assets such as trucks, ULDs and containers.

## 3). Predictive Maintenance



Sensors in key areas of the truck identify and transmit data on material degradation or damages. Analytics can predict asset failures and automatically schedule maintenance checks when needed (See [MoDE](#)).

## 4). End-to-end SC Risk Management



Central platform integrates data from all assets as well as data from external sources such as weather and traffic data on key trade lanes to intelligently conduct risk assessment and trigger corrective action real-time.



### 3. IoT in Last-mile Delivery

Automatic order placed for:  
Fridge: milk, eggs, fresh fruits  
Goods: cat food, diapers, washing powder

Automatic order placed for:  
Product BRA03252AB x 200  
Product TRA24989 x 350

Notification: delivery of your parcel  
scheduled for 13:30 this afternoon.  
Re-route delivery to your neighbor?

Notification:  
Groceries have been delivered  
Temperature 1°C

Pick-up of clothes (1.5kg) requested  
Address: 5a Clovelly Road  
Payment: complete  
Bring back to parcel center for  
packaging and processing

Transmit data on:  
Road condition  
Traffic  
CO2 emissions  
Noise pollution

# USE CASES:

## 1). Optimized Mail/Parcel collection



Sensors in official and private post boxes can notify the customer whether a package has been delivered and to the logistics provider whether a collection needs to take place.

## 2). Automatic Replenishment



Intelligent products and home appliances as well as shelves at retailers automatically schedule an order when a product is running low on stock. This reduces lead time and avoids costly stock out situations.

## 3). Flexible Delivery and Pick-up



Smart homes detect whether the recipient is home or not and can allow secure remote access for the delivery man. Logistics providers can also connect with surrounding homes to provide ad hoc pick-up services (see [shyp](#)).

Pictures: LG, Shyp, Diageo

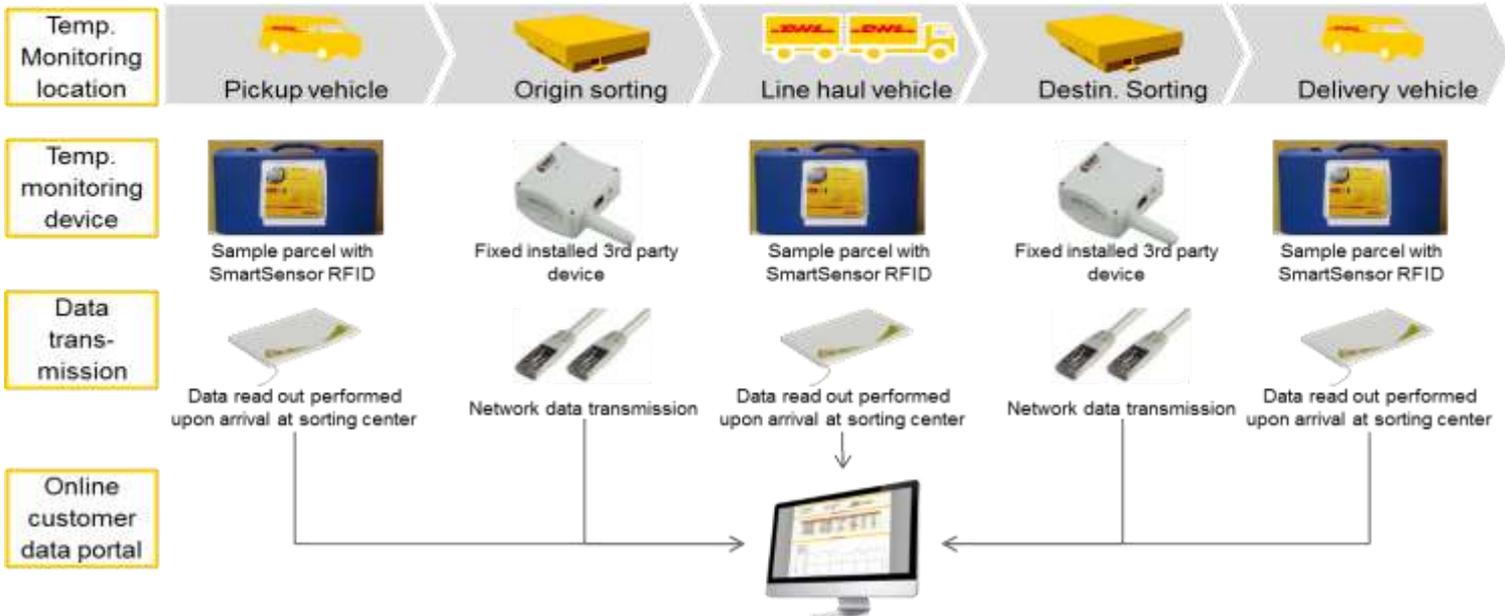
## 4). Next-generation Visibility



Proliferation of printed smart labels that track temperature and humidity will enable consumers to monitor the integrity of potentially all perishable and temperature sensitive goods in the future

# CASE STUDY: DHL PHARMA EXPRESS

- Who?** DHL Express Spain  
**Goal?** Shipment level temperature monitoring  
**Devices?** DHL SmartSensor RFID, USB RFID Readers, Data Export interface  
**How?** Shipment temperature derived from vehicle and sorting center temperature monitoring



# CASE STUDY: DHL OCEAN SECURE

## Combined container and shipment level monitoring



### At **container** level



- Primary unit to maintain integrity of entire container
- Active checks of container location and conditions
- In-transit alarms in case of predefined exceptions

**Outer surveillance layer to spot any developing exceptions before they can affect the shipment.**



### At **shipment** level



- Completely redundant data loggers inside container
- Pharma-validated temperature and humidity records
- Granular monitoring down to single cargo items

**Core surveillance layer to verify nominal cargo conditions were maintained from door to door.**



# CHALLENGES FACING IOT IN LOGISTICS

1

Logistics is still a **fragmented industry** so end-to-end solutions often requires cooperation of various logistics player along the Supply Chain

2

Being such a **networked business**, implementing new solutions requires adjustments for entire networks resulting in high investment needs

3

**Willingness to invest** in new solutions for integrity control is still low and limited to niche markets such as Life Science or High Value Goods

4

**Regulations** (e.g. Aircraft) and lack of network availability (e.g. remote locations on Oceans) limit the full usage of real time tracking

Source: DHL Trend Research

# KEY SUCCESS FACTORS FOR IOT IN LOGISTICS

- 1 Clear and **standardized** approach for the use of unique identifiers for various types of assets among different industries on a global scale
- 2 Seamless **interoperability** for exchanging sensor information in heterogeneous environments
- 3 Establishment of trust and ownership of **data and overcoming privacy** issues in the supply chain
- 4 Clear focus on **reference architecture** for the IoT
- 5 Change in **business mindset** to embrace the full potential of IoT in logistics



Source: DHL Trend Research