



# IOTG

Internet of Things Group

LoRa Proof of Concept

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# Stock Tracking

## PROBLEM inventory distortion

- Huge retail industry problem
- \$800 billion globally  
(<https://bit.ly/3d9orWr>)

## SOLUTION Report a shelf stock levels in real-time

- Allow workers to maintain & track shelf stock levels
- Link with the rest of the supply line logistics



# Current PoC (Smart Shelf)

## Elements

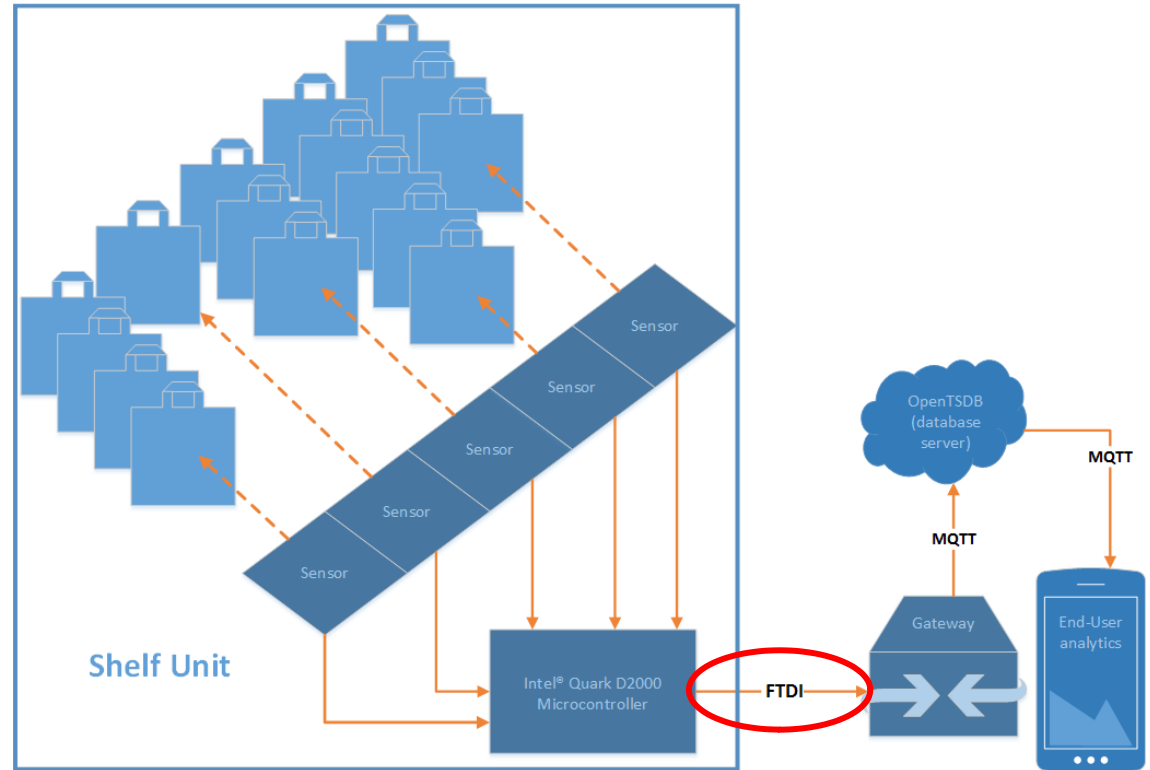
- Sensors (IR distance sensors)
- MCU (Quark D2000)
- Gateway (WindRiver OS)
- Database (OpenTSDB)
- End-User interface (webpage and an Android app for mobile & smart-watch)



# Technical Problems

## Shelf -> Gateway

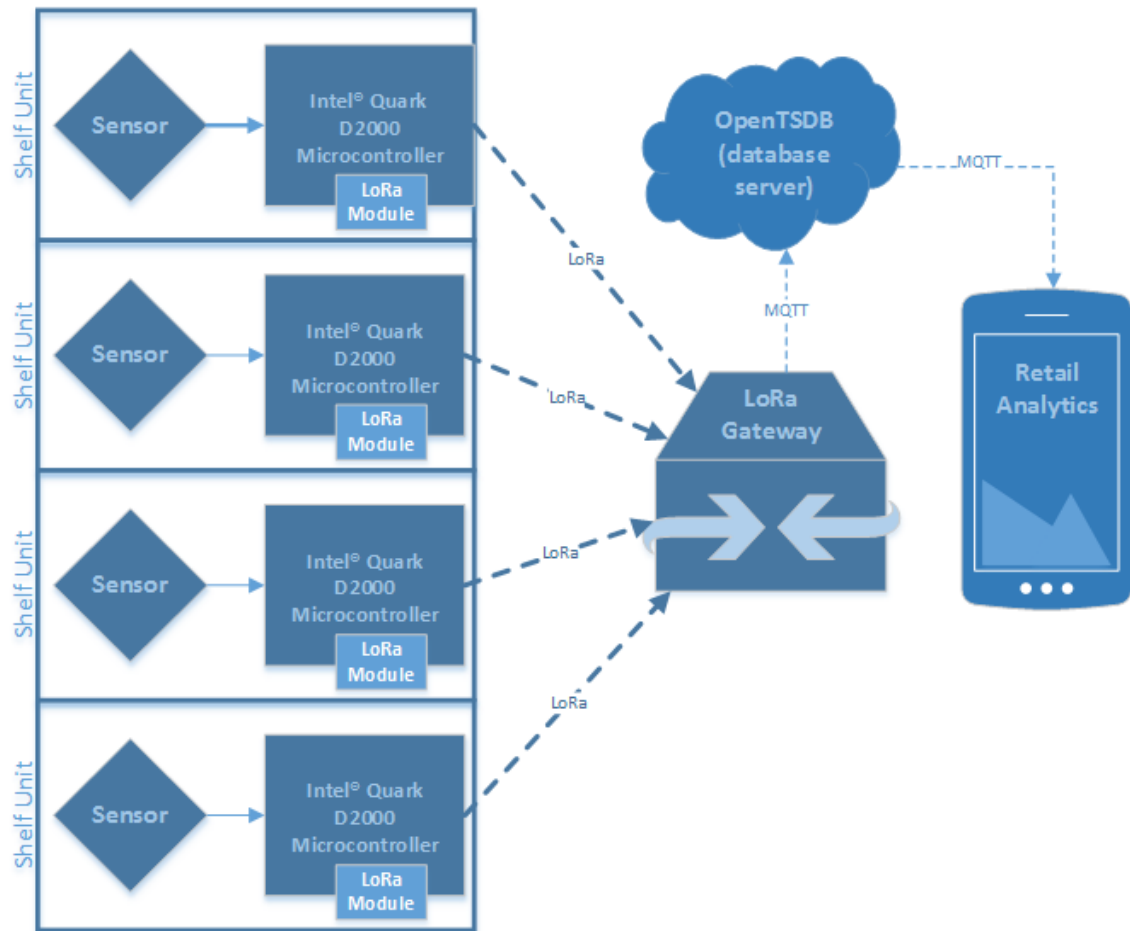
- Each shelf needs an FTDI (cable) link between itself and the Gateway
  - Physical limitation in the distance between shelves & gateways
- Hard limit on max number of **shelves per gateway**
  - Number USB ports on Gateway



# Solution

## LoRa (wireless - LPWAN)

- **Scalable**
- Shelves become self-contained units
- *Much* lower number of Gateways required per x shelves
- Increases physical distance between Shelf & Gateway
- Allows for rx on the shelf units
  - Improves flexibility
  - Potential for further improvements



# Implementation

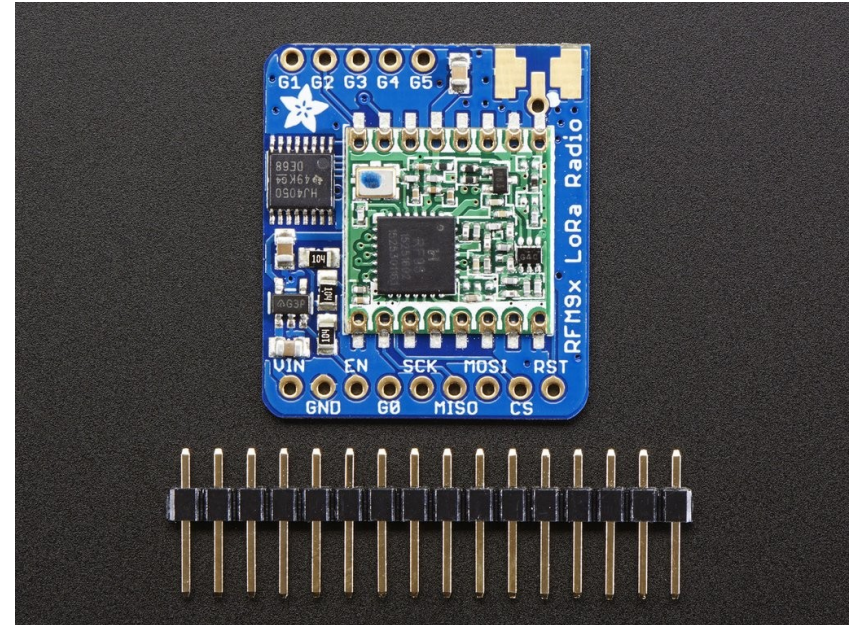
## Option 1 - Adafruit RFM95x

### Challenges

- 0 libraries for Quark
- Quark Microcontroller Software Interface (QMSI), **SPI register r/w**

### Outcomes

- In-depth knowledge of the SX1267 (LoRa chip)
  - Functionality & register mapping
  - Apply to all modules using this chip



# Implementation

## Option 2 - SODAQ LoraBee (Microchip RN2483)

### Challenges

- 0 libraries for Quark
- Quark Microcontroller Software Interface (QMSI), **UART**

### Outcomes

- A working LoRa demo
- Fairly simple implementation

