

Curriculum

1. The Internet of Trillions of Things (IoT2)
2. Wiliot Overview
3. Auto-ID & Location Building Blocks
4. Bluetooth RF Fundamentals
5. Auto-ID Carriers Compared
6. What you Need to Know to Deploy
7. Getting to Know Your Kit

Wiliot Investors



SoftBank Vision Fund 2



- ✓ Financial Investors
- ✓ Semiconductors
- ✓ Pharma
- ✓ Food & Beverage
- ✓ eCommerce/Cloud
- ✓ Logistics
- ✓ Telecommunications
- ✓ RFID

Wiliot IoT Pixels are Postage Sized Computers

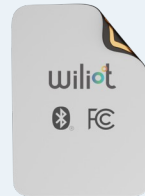
Powered by
recycling radio frequency energy

Any item, package, or surface
connected to the Wiliot Cloud can be
aware of its own location,
conditions and surroundings



Wiliot IoT Pixel

Licensed at Zero Cost



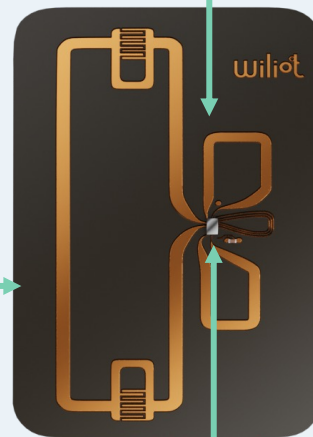
Standard Connectivity Leverages Existing Infrastructure

World's first Bluetooth certified label



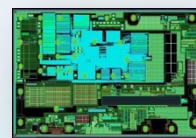
Energy Harvesting
Eliminates Battery

*100x better sensitivity than RFID,
1000x better than standard harvesters*



Antenna Imaging for
Sensor-free Sensing

*Temperature, Proximity, Content Level
Future: Humidity, Ripeness, and more*

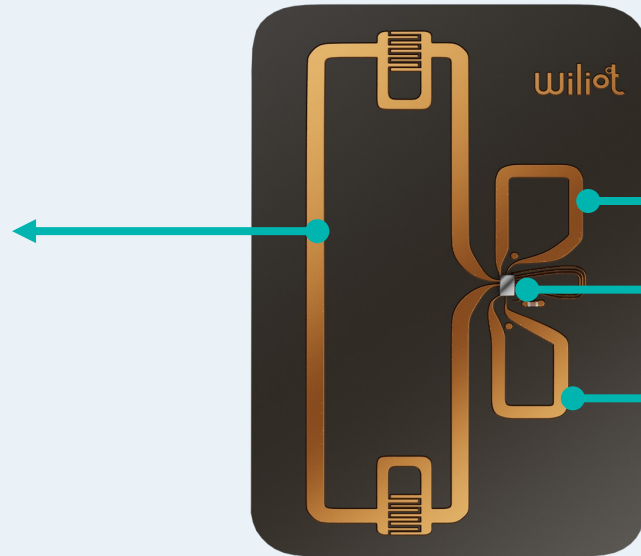


Standard (ARM) Computing

1nA retention power is 300x better than competition, paper label production

What is a Wiliot Battery-Free Pixel?

Sub-1 GHz
(LoRa, Energous,
UHF RFID)
Harvesting Antenna

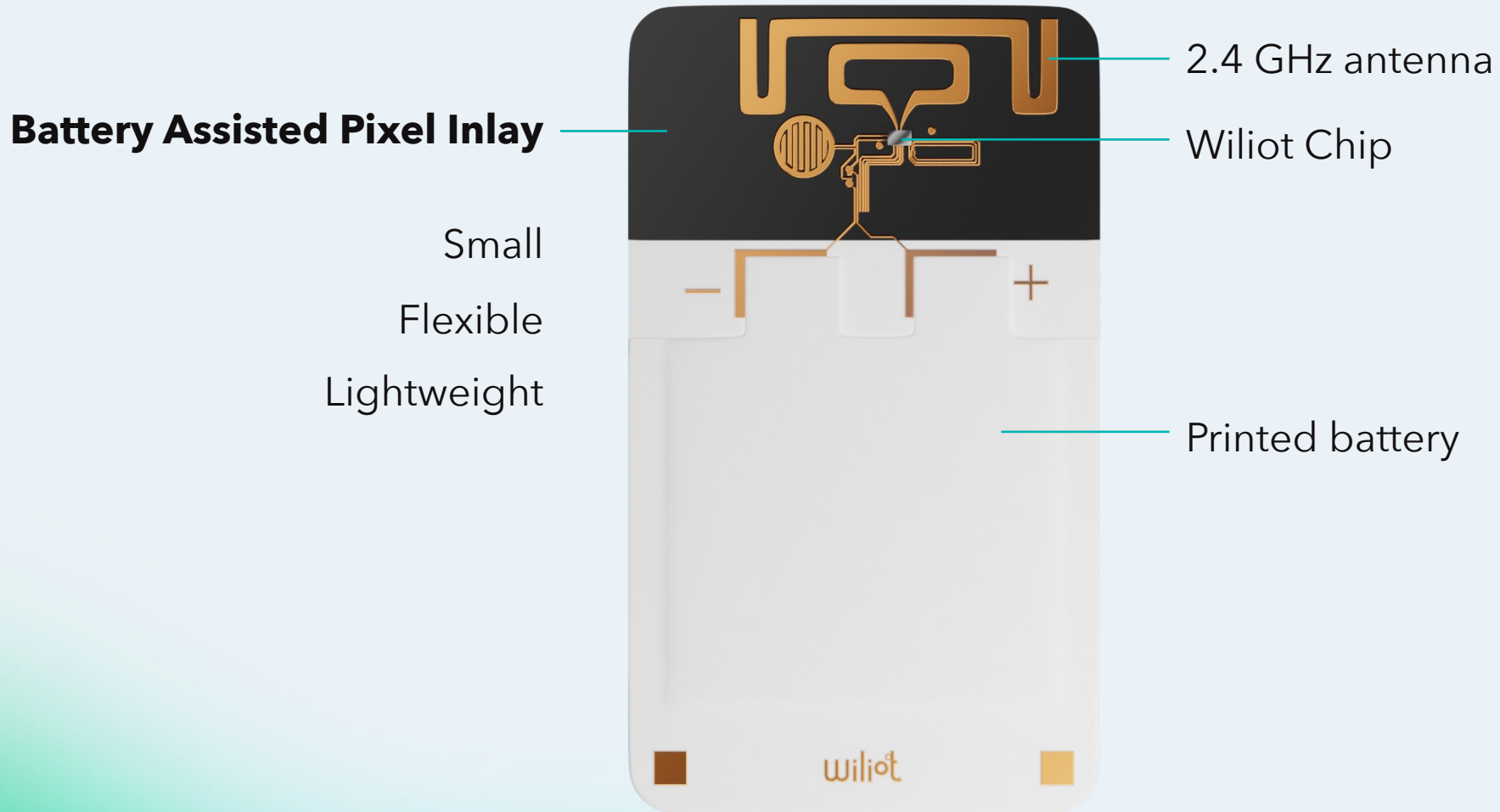


2.4 GHz Harvesting Antenna



Wiliot Chip

2.4 GHz Transmission Antenna

Battery Assisted Pixel



Battery Assisted Pixel vs Regular Pixel

Name	Cost	Range	Energy Source	RF Protocol	Broadcast Frequency	Size
Battery Assisted Pixel (BAP) 	\$1-2	10 meters	From dedicated battery (4 yr lifespan)	BLE 2.4 GHz	Every 4 s	3.6 x 6.0 cm
Dual Band Pixel 	< 10c - 40c+	10 meters	Harvested from nearby bridge	BLE 2.4 GHz	0.5 s - 1 min	2.8 x 4.4 cm

The Wiliot Solution Dataflow

High-level flow of the Wiliot solution

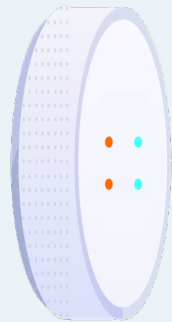
Data can be traced from the Wiliot IoT Pixels to the Data Owner:



Pixel/Tag

Asset is tagged with a Wiliot IoT Pixel

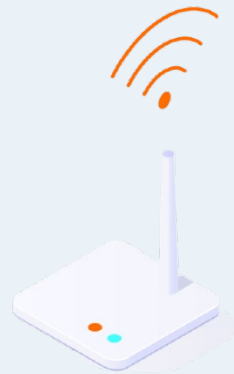
Pixel Data
Energy



Bridge/Reader

A Bridge device energizes the Wiliot IoT Pixel

Pixel Data



Gateway or Mobile

Pixel data is received by a Gateway device

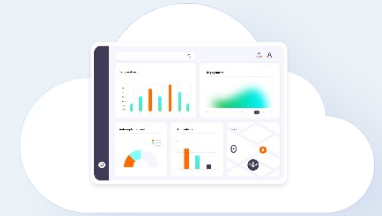
Pixel Data



Wiliot Cloud and PlayBook

Data is sent to the Wiliot Cloud, where it is decrypted and analyzed. With the ability to define rule-based, code-free Playbooks

PlayBook Data

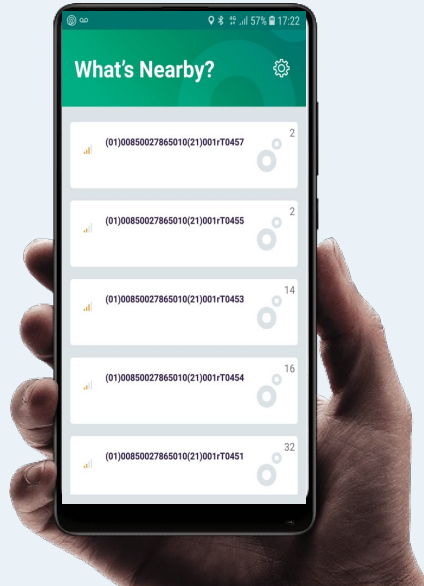


Any connector or 3rd Party IoT Platforms

The actionable data is made available from the Wiliot Cloud into other platforms or as a message to any connector

Wiliot's Supported Gateways

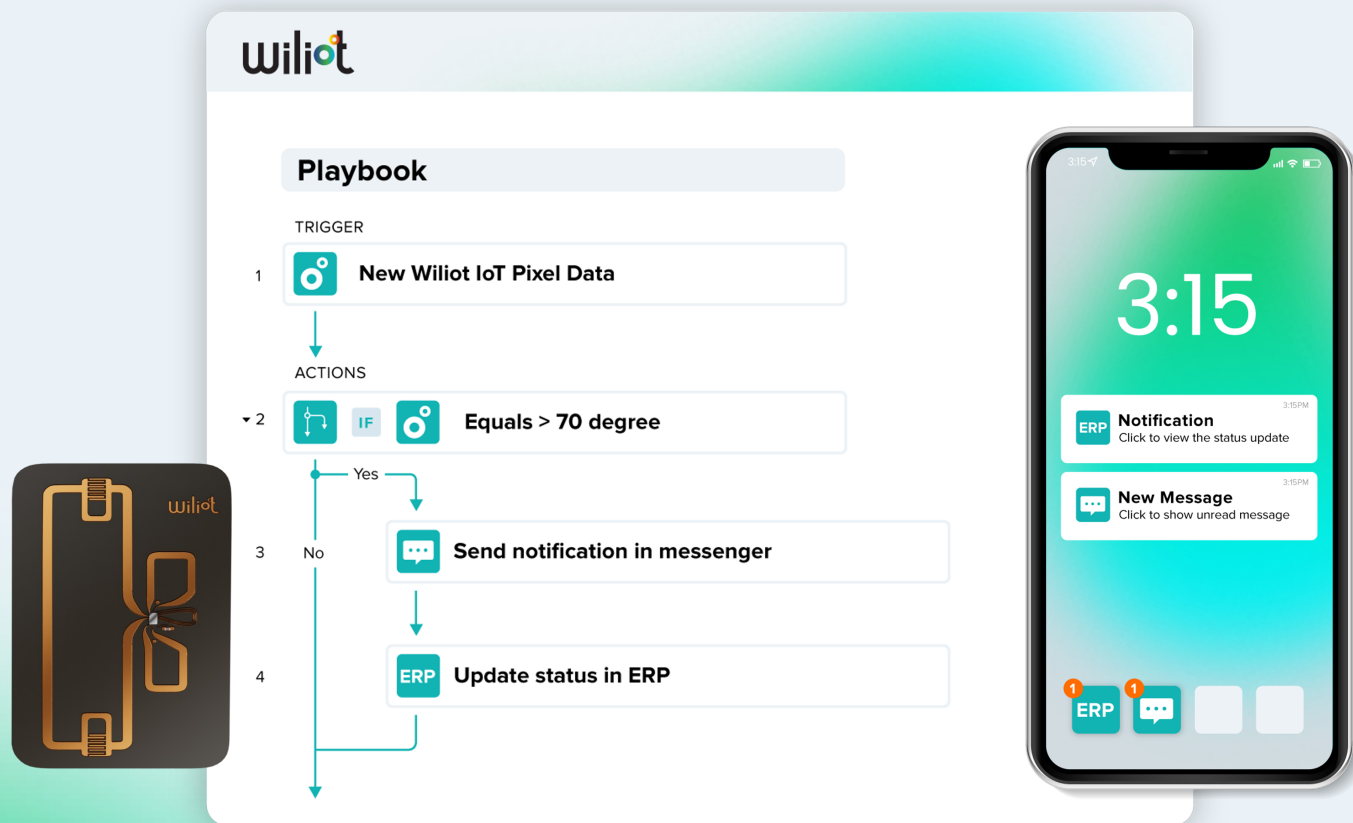
BLE to Wiliot Cloud connectivity






- Device name: **Gateway 1.0 (BWG840XE or BWG840E)**
- Bluetooth to WiFi Network
- OTA and remote management support
- [Vendor's description](#)

Cloud Platform

This is What Wiliot Sells



Immediately customize actions based on:

-  Location
-  Time
-  Sensor Data

Software on the edge and in the cloud

Accessible via

1. Web services
2. Third party applications
3. Wiliot Universal Automation Platform (connectors to enterprise apps + code-free platform)

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Beacons & Tags - Introduction

Orientation

- Bluetooth Beacon Discovery Protocol
- Beacons versus Tags
- Bridges & Gateways
- Presence & Zones
- Location
- Proximity
- Realtime Location Systems



Bluetooth Beacons are Simple

- No connection
- One way communication

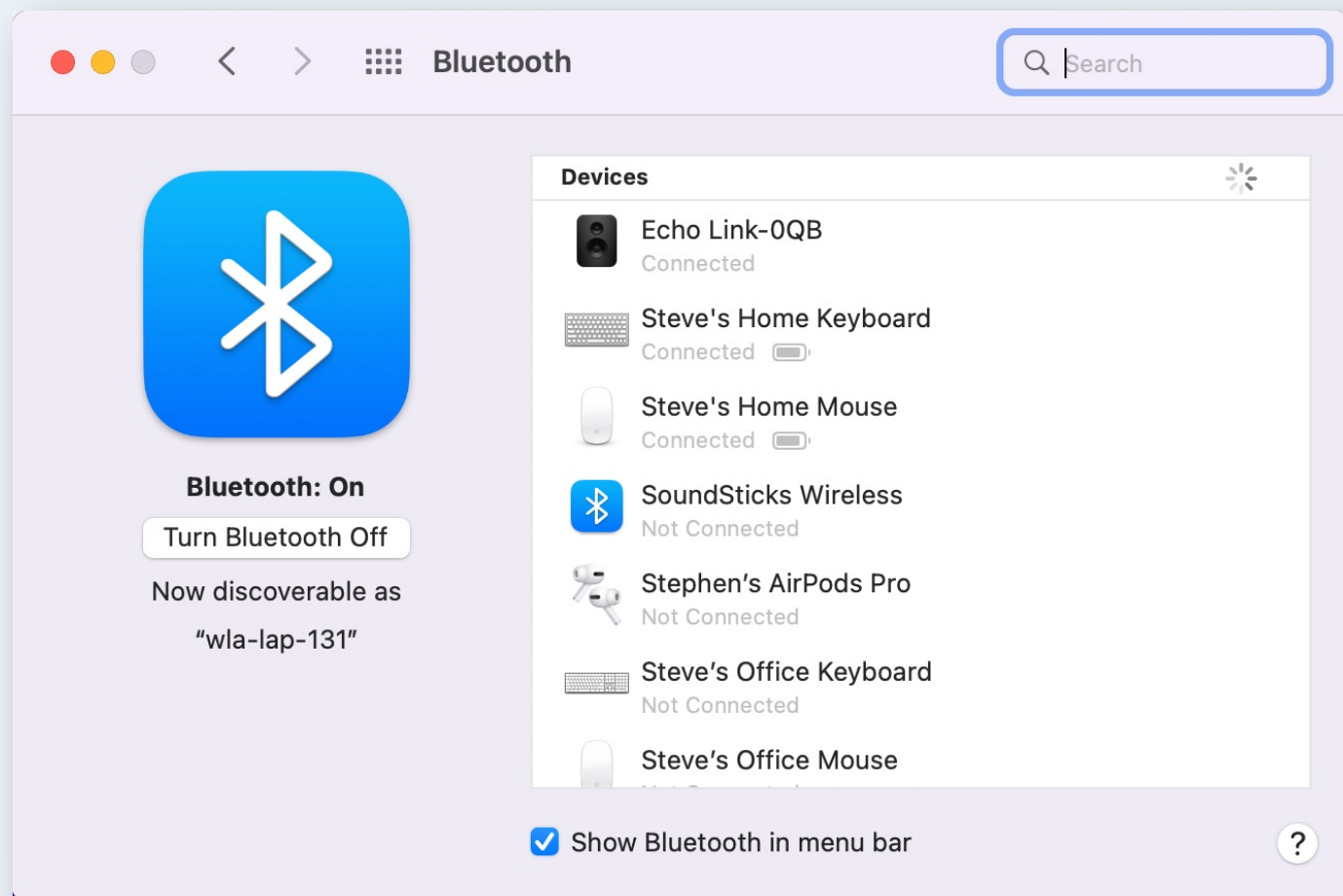


Beacon Protocol



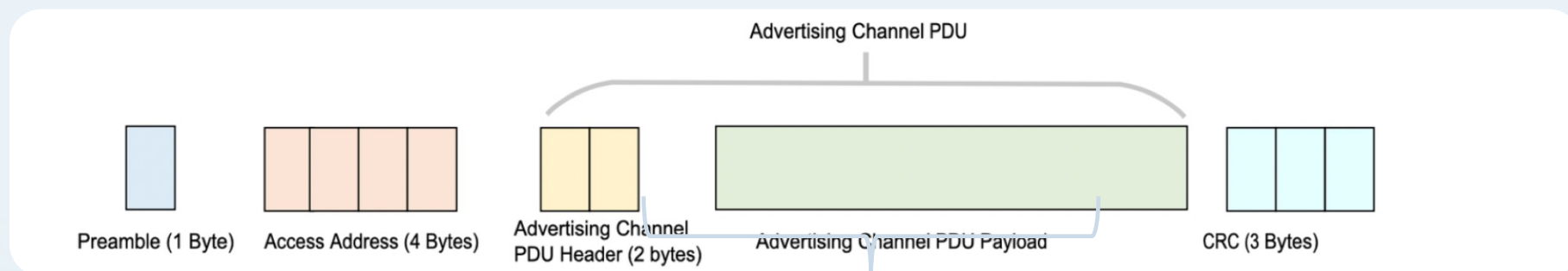
Discovery

... is part of the
Bluetooth
Protocol



What is a "Beacon" in Bluetooth terms?

- Short message carried over a standard Bluetooth format sent in LE mode
- Broadcast
- Sent using the Bluetooth Advertising Channel Protocol Data Unit (PDU) over the air
- Different payload types depending on the application/vendor



- Apple iBeacon
- Google Eddystone
- Estimote
- Wiliot

Just to confuse you ...

“Bluetooth Beacon” can mean multiple things

The Devices

That use the beacon protocol for Indoor Positioning



Protocol

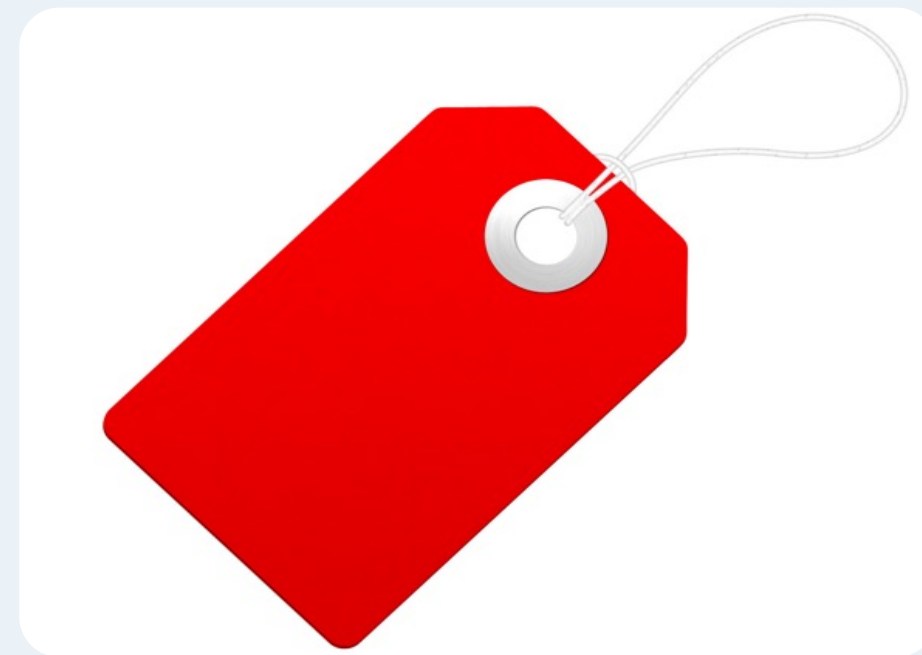
The radio packet used as part of Bluetooth device discovery

Beacons vs. Tags

Beacons



Tags

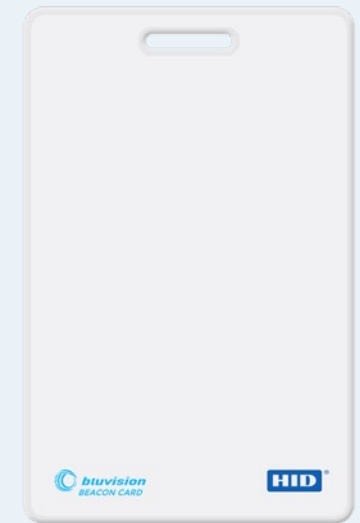
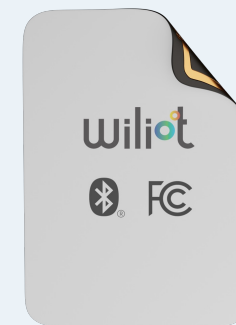


Bluetooth Beacons v Tags

Beacons



Tags



Bluetooth Beacons v Tags

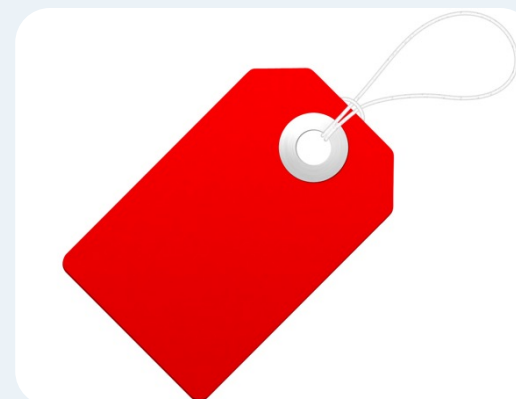
Beacons

- Fixed location
- Used for navigation
- Strong signal
- Fast duty cycle
- Larger - Batteries



Tags

- Mobile
- Used for asset tracking
- Weaker signal
- Slower duty cycle
- Smaller - Batteries
... or no Batteries



Presence

Beacons

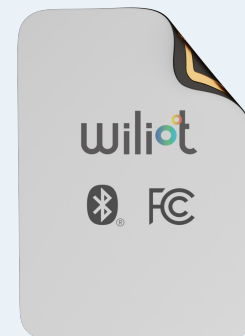


e.g. Eric is present in the store

Presence

Tags

Reader
Bridge

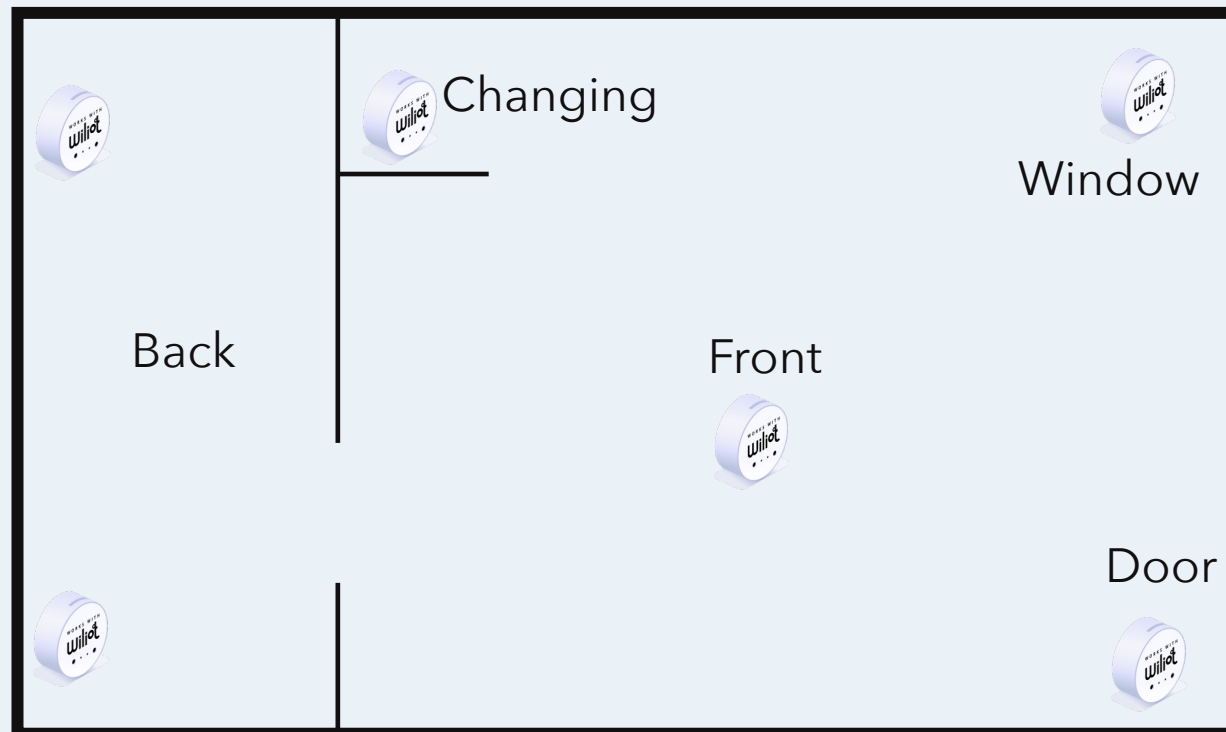


e.g. The Red XXL Denim Jacket is in the changing room

Wiliot exposes changes in presence via API

Presence

Zones



- Zones or Points of Interest are marked with Wiliot Bridges
- Wiliot exposes changes in presence via API

Three Tier Architecture: Tag → Bridge → Gateway

Bridges are optional, extend range, allow transmissions from many tags to be filtered to Gateways

1. **Energize** – Providing energy for Wiliot Pixels to harvest
2. **Read & Repeat** – Select & repeat amplified Bluetooth broadcasts
3. **Location** – Establish zones or Points of Interest for locating tags

Gateways

- Relay from Bluetooth to WAN
- Can be phones or dedicated devices



Proximity



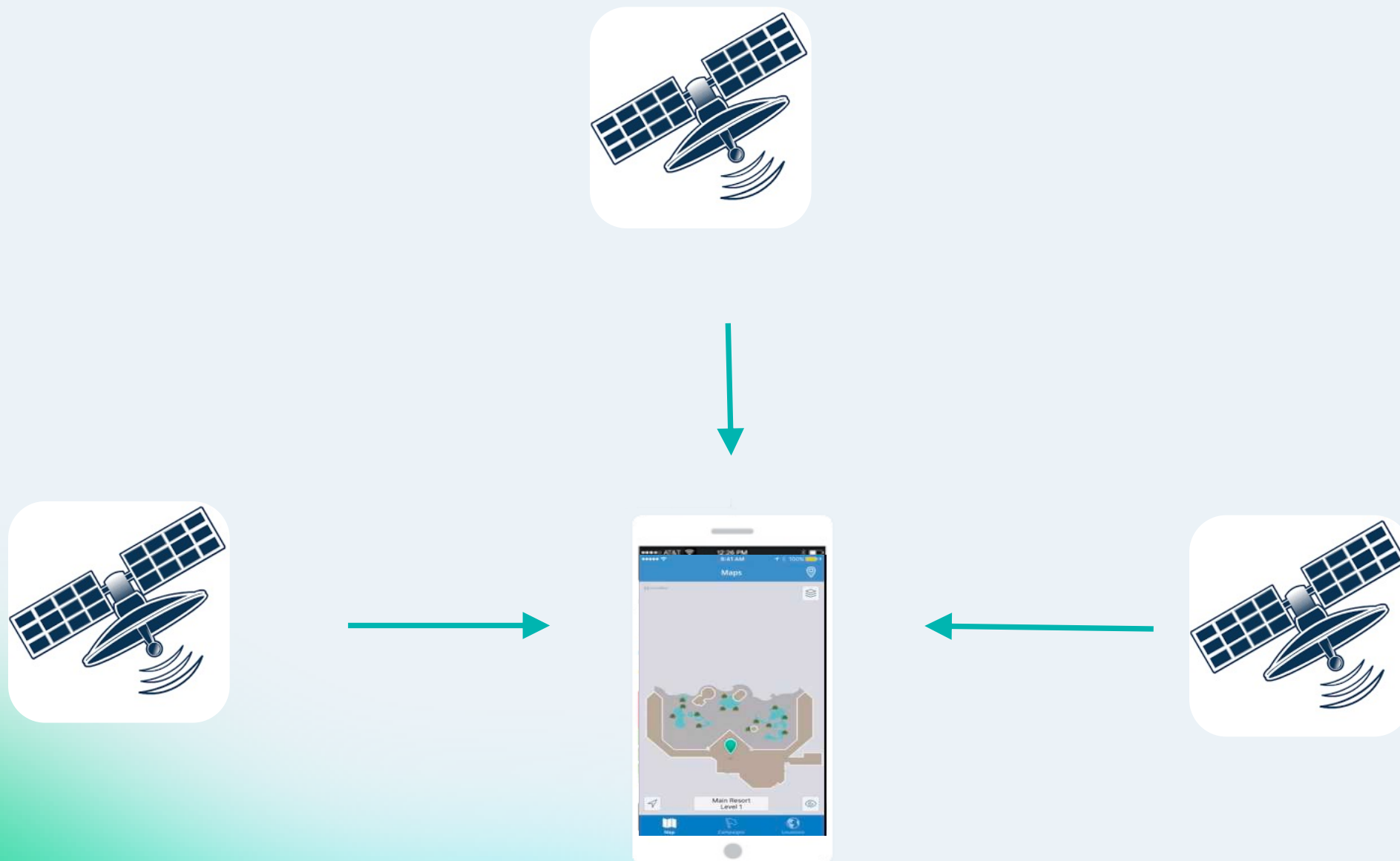
Proximity Measured by dB

- Received Signal Strength
- More Decibels (dB) = Closer



Wiliot doesn't expose RSSI to developers currently ... although there are exceptions

Location

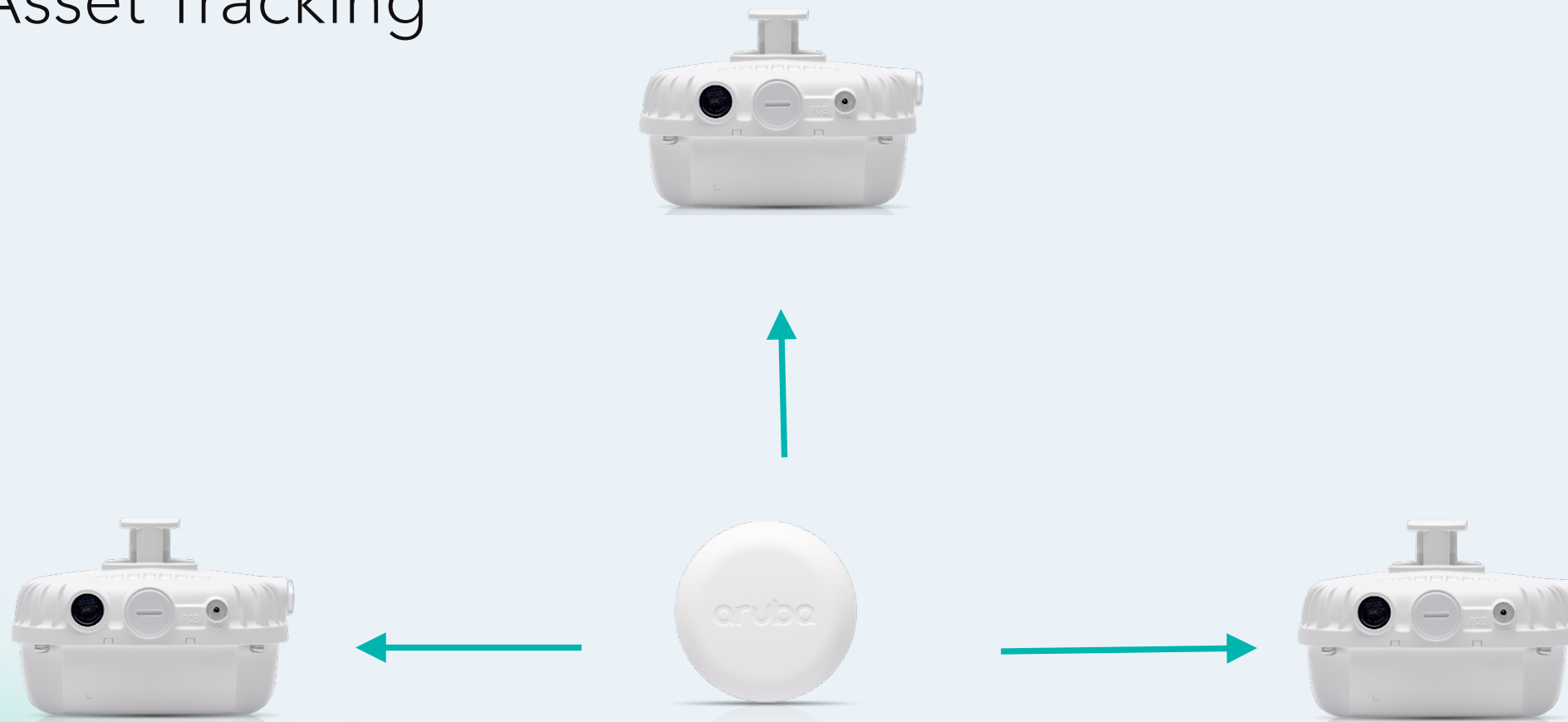


Location



Reader is Mobile

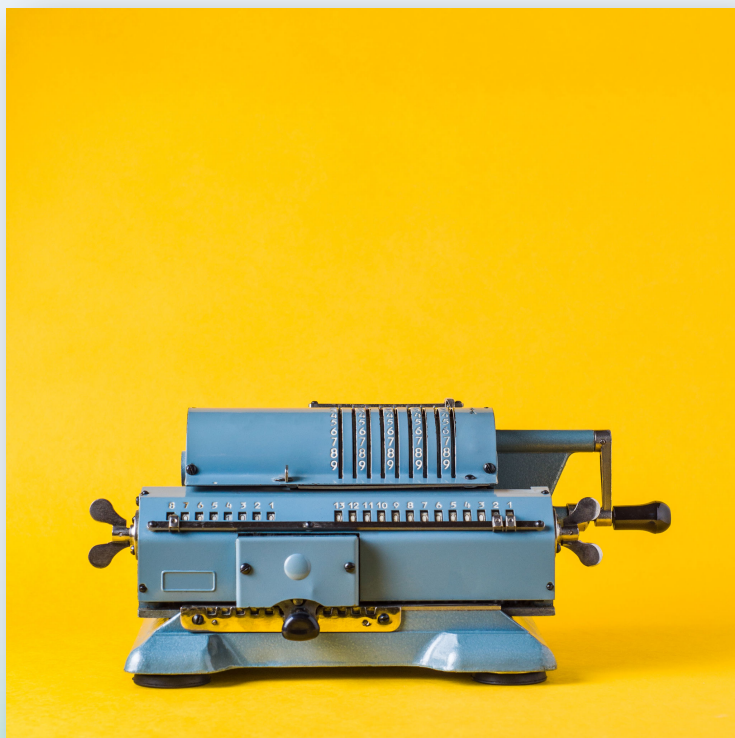
Real Time Location System (RTLS) Asset Tracking



Beacon/Tag

Reader is Static

Summary



- Bluetooth Beacon Discovery Protocol
- Beacons versus Tags
- Bridges & Gateways
- Presence & Zones
- Location
- Proximity
- Realtime Location Systems