

# atmosphere'23

**BELGIUM**

## Access Points as a IOT Gateway for IOT & Smart Buildings

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**Tim Tijssens**, Team Lead Systems Engineer

19 October 2023





# More Than

# 70%

of the survey recipients indicated that the top benefit they try to achieve from IoT deployment is improve productivity and drive costs reduction.



Hospital



Hotel



Government



Store



Warehouse



School

IDC, Worldwide Internet of Things Infrastructure Forecast, 2022–2026, doc#US48853922, July 2022

**83%**  
of respondents agree that  
sustainability is one of the  
most important criteria for  
IT buying decisions

Source: IDC, Future of Digital Infrastructure: 2023 Trends Driving As-a-Service (XaaS) Growth, doc#US50440123 March 2023

**Sustainability**



# FINDING THE COMMON GROUND

How can I reduce energy costs?

How many people are coming into the office?

Where do I go?

Where is it?

How do I get help?

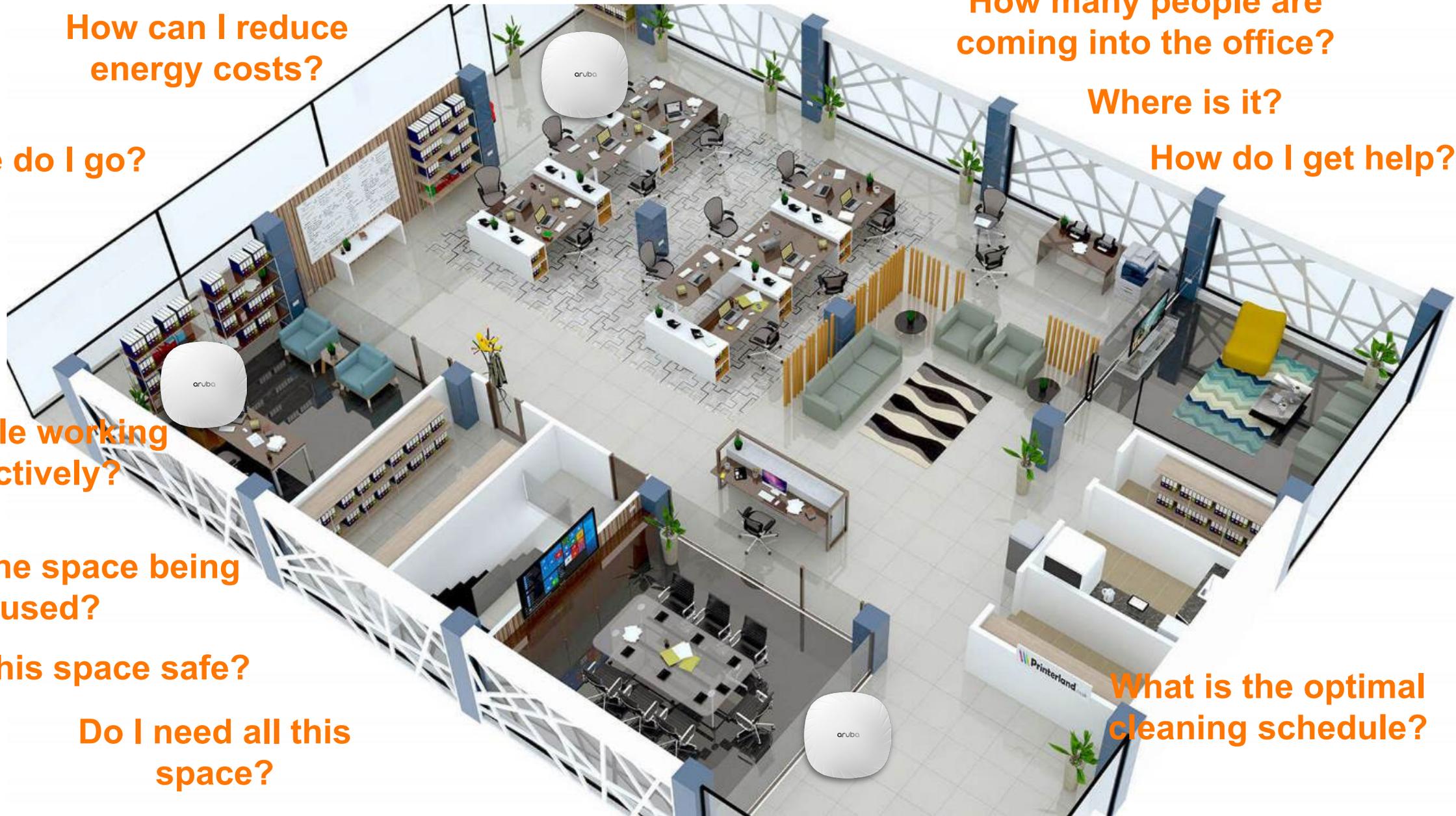
Are people working productively?

How is the space being used?

Is this space safe?

Do I need all this space?

What is the optimal cleaning schedule?

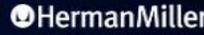
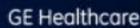


# ARUBA NETWORKS IoT APPROACH

-   
BLE
-   
ZIGBEE
-   
3<sup>RD</sup> PARTY



## ARUBA ECOSYSTEM PARTNERS

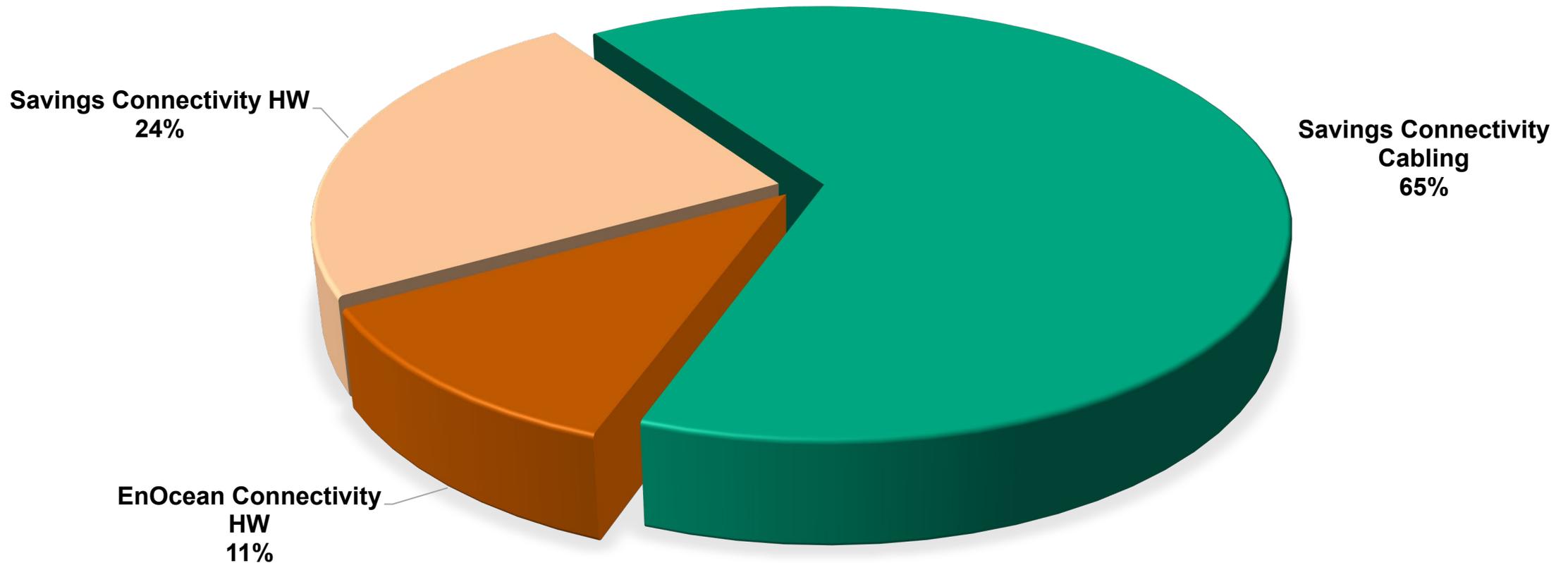
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-    
- 

...and many more

## Cost savings of leveraging infrastructure

Integrated solution with access points

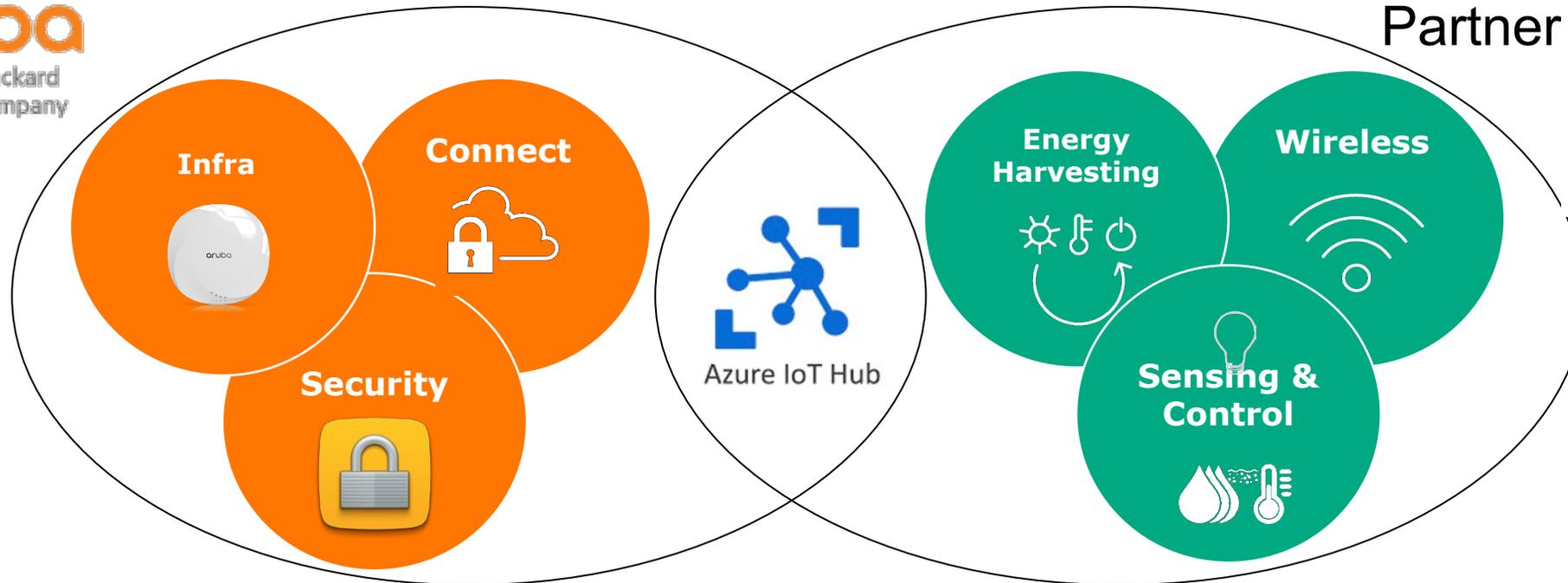
**About 89% of connectivity cost (29% of total hardware cost) can be saved**



Source: E-Shelter

# Aruba, Microsoft & EnOcean – A strategic partnership

Combining core technologies for easy to deploy IoT projects



Ecosystem  
Partner



- Energy harvesting sensors do the work without batteries
- EnOcean Sensors provide data that cloud services demand
- Aruba access points eliminate the challenge of installing separate gateways
- MSFT Azure Cloud services analyze and react to the data creating a Hyper-Aware building



Microsoft Azure  
IoT Platform

# USE CASES

# PEOPLE COUNTING

## Benefit & Devices

No cables needed (ideal for retrofit, no cabling cost),  
No issues regarding the European GDPR (no camera used)



**Desk Utilization**  
(desk or chair mounted)



Multisensor  
(Vibration / T / rH / Lux)



**Activity Sensor**  
(ceiling mounted)



# of movements per  
time  
(passive infrared)



**People Counting**  
(door mounted)



# of door activations  
(contact switch)



**People Counting**  
(entrance)



# of people passing  
(in and out)

# ENERGY SAVING



## Benefit & Devices



Up to **30%**  
energy saving  
via single room  
control \*)



Heating valve controller  
(thermal powered)



Smart Metering &  
Switching Plug



Thermostat



Presence  
detection

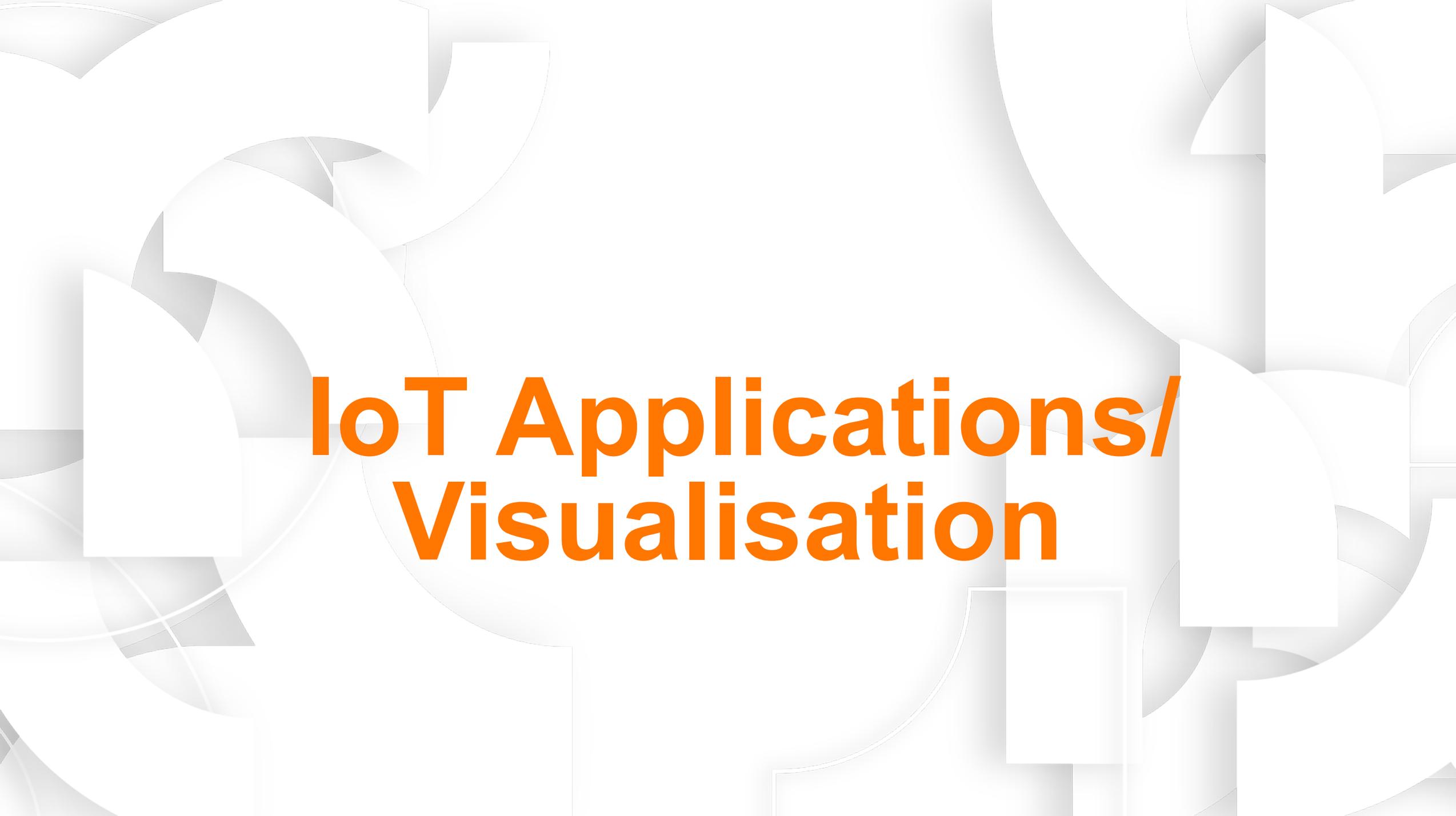


Window status



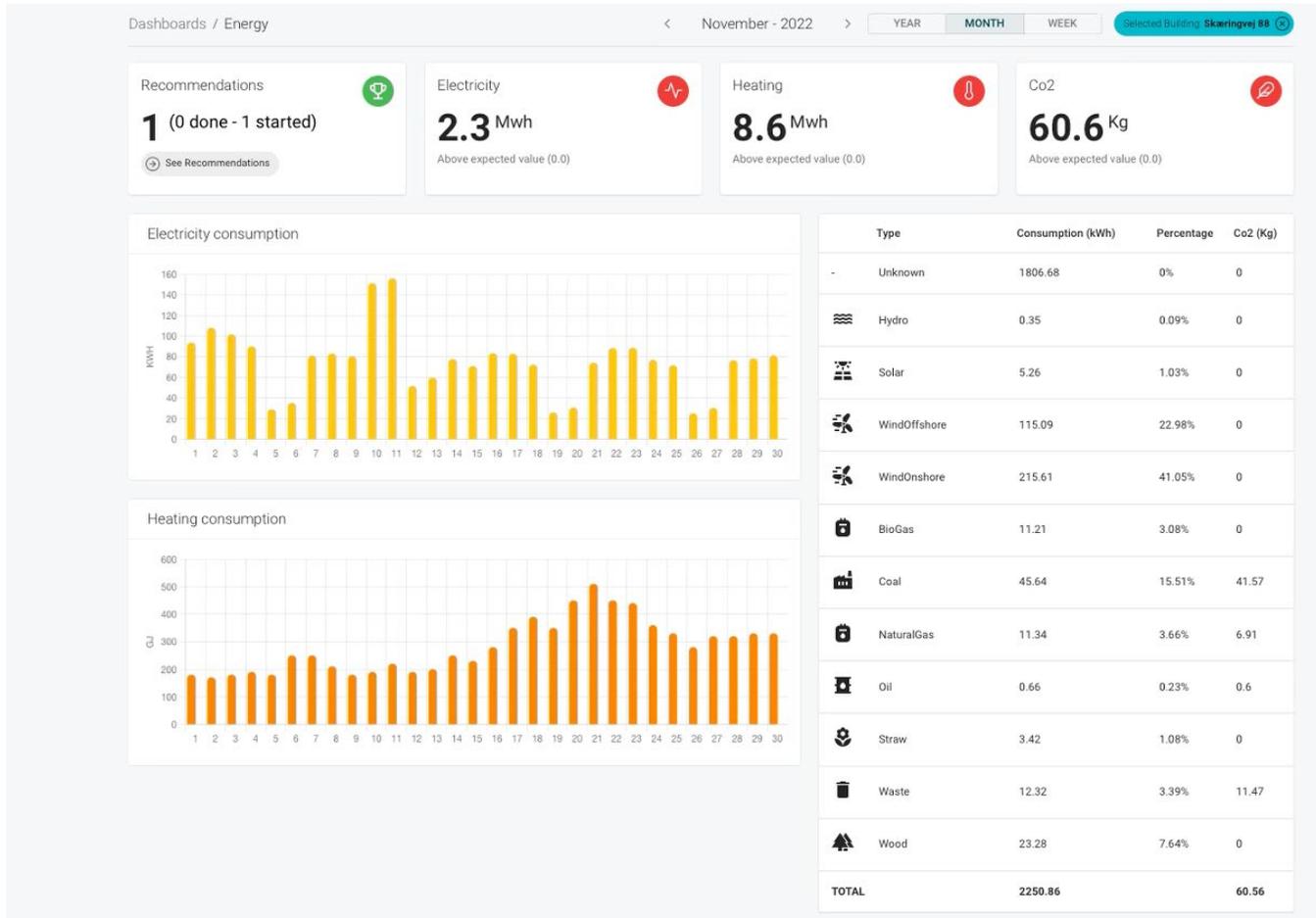
Switch

\*) Source: [https://iolite.de/en/projects/lp16\\_en.html](https://iolite.de/en/projects/lp16_en.html)



# **IoT Applications/ Visualisation**

# Sustainability As A Service: Environmental Dashboard



- Leverages Energy Harvesting Sensors with Aruba AP as an IoT gateway.
- Solves multiple challenges, energy, occupancy, climate, air quality.
- Integrates with most know BMS platforms
- Whitelabel Partner/ Customer Branded dashboard
- All Azure hosted
- Removes 89% of infrastructure costs.





# Management – Aruba IoT Ops

# Aruba IoT Operations – Reducing Complexity

## Available apps

 <b>AOS8</b> Version 441 The App emulates the AOS-8 telemetry websocket connections By Aruba <span style="float: right;">Installed</span>	 <b>Aruba Devices</b> Version 8 The Aruba Devices app classifies all Aruba BLE devices. By Aruba <span style="float: right;">Upgrade Available</span>	 <b>Eddystone Devices</b> Version 2 The Eddystone Devices app classifies all Eddystone BLE devices By Aruba <span style="float: right;">Upgrade Available</span>	 <b>dormakaba</b> Version 38 Enable connectivity between dormakaba electronic door locks and the Ambiance Access Management software By Aruba <span style="float: right;">Not installed</span>
 <b>iBeacons</b> Version 2 This app classifies and parses iBeacons. By Aruba <span style="float: right;">Installed</span>	 <b>EnOcean BLE</b> Version 3 The EnOcean app classifies all EnOcean BLE devices. By Aruba <span style="float: right;">Upgrade Available</span>	 <b>Minew Devices</b> Version 2 The Minew Devices app classifies Minew BLE devices By Aruba <span style="float: right;">Upgrade Available</span>	 <b>Blyott Devices</b> Version 2 The Blyott Devices app classifies all Blyott BLE devices By Aruba <span style="float: right;">Upgrade Available</span>
 <b>EnOcean</b> Version 36 This App enables the EnOcean USB stick for Aruba Access Points - APs must be upgraded to AOS 10.4.0.0 or later By Aruba <span style="float: right;">Not installed</span>	 <b>Hanshow</b> Version 5 Enables the Hanshow USB Gateway for Aruba Access Points - APs must be upgraded to AOS 10.4.0.0 or later By Aruba <span style="float: right;">Not installed</span>	 <b>SOLUM</b> Version 5 Enables the SOLUM NewtonUSB Gateway - APs must be upgraded to AOS 10.4.0.0 or later By Aruba <span style="float: right;">Not installed</span>	 <b>ASSA ABLOY</b> Version 9 Enable connectivity between Assa Abloy electronic door locks and the Visionline management server. By Aruba <span style="float: right;">Not installed</span>

# IoT Operations

## Extending visibility



aruba Central Search or ask Aruba

Global Visibility Saas Express UCC IoT Operations 3 hours

Manage

- Overview
- Devices
- Clients
- Guests

Applications

- Security
- Network Services

Analyze

- Alerts & Events
- Audit Trail
- Tools
- Reports

Maintain

- Firmware
- Organization

Connectors | By status

1 IoT Connectors

- Online
- Offline

Show Connectors

IoT Devices | By network communication type

57 IoT Devices

- BLE

Show Devices

IoT Applications

IoT-Connector Jens Home Lab

Developers' Documentation

The latest from developers  
Updates and fixes

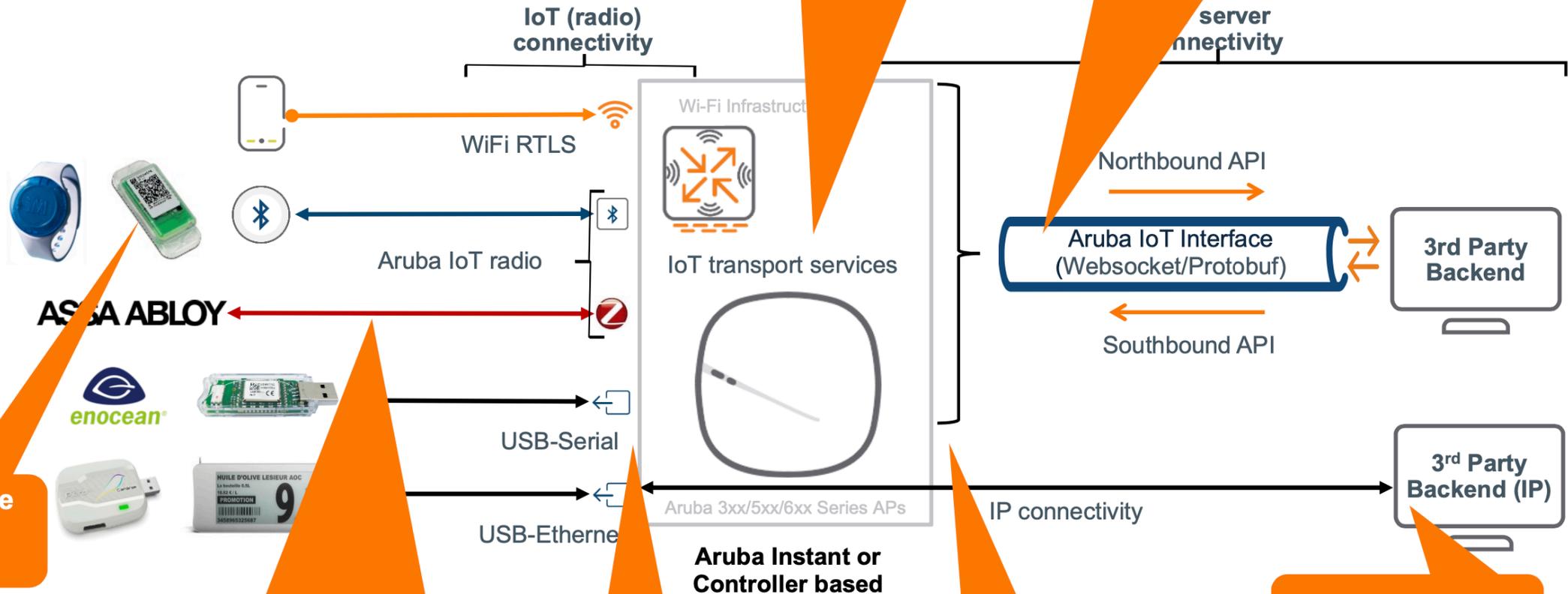
Devices on all connectors (47)

Address	Classes	Last Seen	Last reported by	T...	Local Name	Company Identifier
7B:88:79:4C:92:26	Unknown	10/3/2021, 6:15:02 PM	ap505	BLE		Apple
E4:D2:D8:DD:5A:1C	Unknown	10/3/2021, 6:14:32 PM	ap505	BLE	Hue go	
CA:54:1B:B9:68:85	Unknown	10/3/2021, 6:14:32 PM	ap505	BLE	Tisch Mitte	
F8:04:2E:F4:64:AB	Unknown	10/3/2021, 6:14:32 PM	ap505	BLE	[TV] Samsung 9 Series...	Samsung Electronics Co. Ltd.
F1:0C:86:F2:48:95	Unknown	10/3/2021, 6:14:32 PM	ap505	BLE	Hue Lamp	
E2:F1:CC:66:82:F0	Unknown	10/3/2021, 6:14:32 PM	ap505	BLE	Hue Lamp	
50:31:AD:03:0D:B0	ABBSENSOR	10/3/2021, 6:14:32 PM	ap505	BLE	C2000005E1	
F4:B8:5E:9B:5F:B9	ArubaBeacon	10/3/2021, 6:14:32 PM	ap505	BLE	5AAA=mUWS54m5PU...	Apple, Hewlett Packard Enterprise
E9:C0:D1:6D:82:F0	Unknown	10/3/2021, 6:14:32 PM	ap505	BLE	Hue Lamp	
5C:E5:0C:CB:AB:49	Unknown	10/3/2021, 6:14:32 PM	ap505	BLE		Xiaomi Inc.
B0:91:22:F2:51:48	iBeacon	10/3/2021, 6:14:31 PM	ap505	BLE	blukii BAJXUF B09122...	Apple
D5:44:84:30:F1:84	iBeacon	10/3/2021, 6:14:02 PM	ap505	BLE	BlueUp-10-001691	Apple
4D:7B:5D:9E:19:2D	Unknown	10/3/2021, 6:14:02 PM	ap505	BLE		Google
AC:23:3F:A2:55:F8	Eddystone	10/3/2021, 6:14:02 PM	ap505	BLE		Apple
50:31:AD:03:0D:B1	ABBSENSOR	10/3/2021, 6:14:01 PM	ap505	BLE	C2000005E2	
DB:73:0C:27:85:C7	Unknown	10/3/2021, 6:14:00 PM	ap505	BLE	MI Smart Band 4	Anhui Huami Information Techn...
20:4C:03:BB:79:8D	ArubaAccessPoint	10/3/2021, 6:13:59 PM	ap505	BLE		Hewlett Packard Enterprise

# IoT Security Overview

**Transport: What is sent where? (Aruba)**

**HTTPS/WSS/SSL Tunnel to 3rd party backend. No way to breakout on AP (Aruba + Vendor)**



**IoT Device Security (vendor)**

**IoT Device RF Communication Security (vendor)**  
 BLE: Optionally encrypted  
 Zigbee: encrypted (beware default key)  
 Proprietary: depends

**USB ACL (Aruba)**  
 Allow only specific USB devices

**Ethernet Emulation (Aruba)**  
 WiredAP / Wired Role

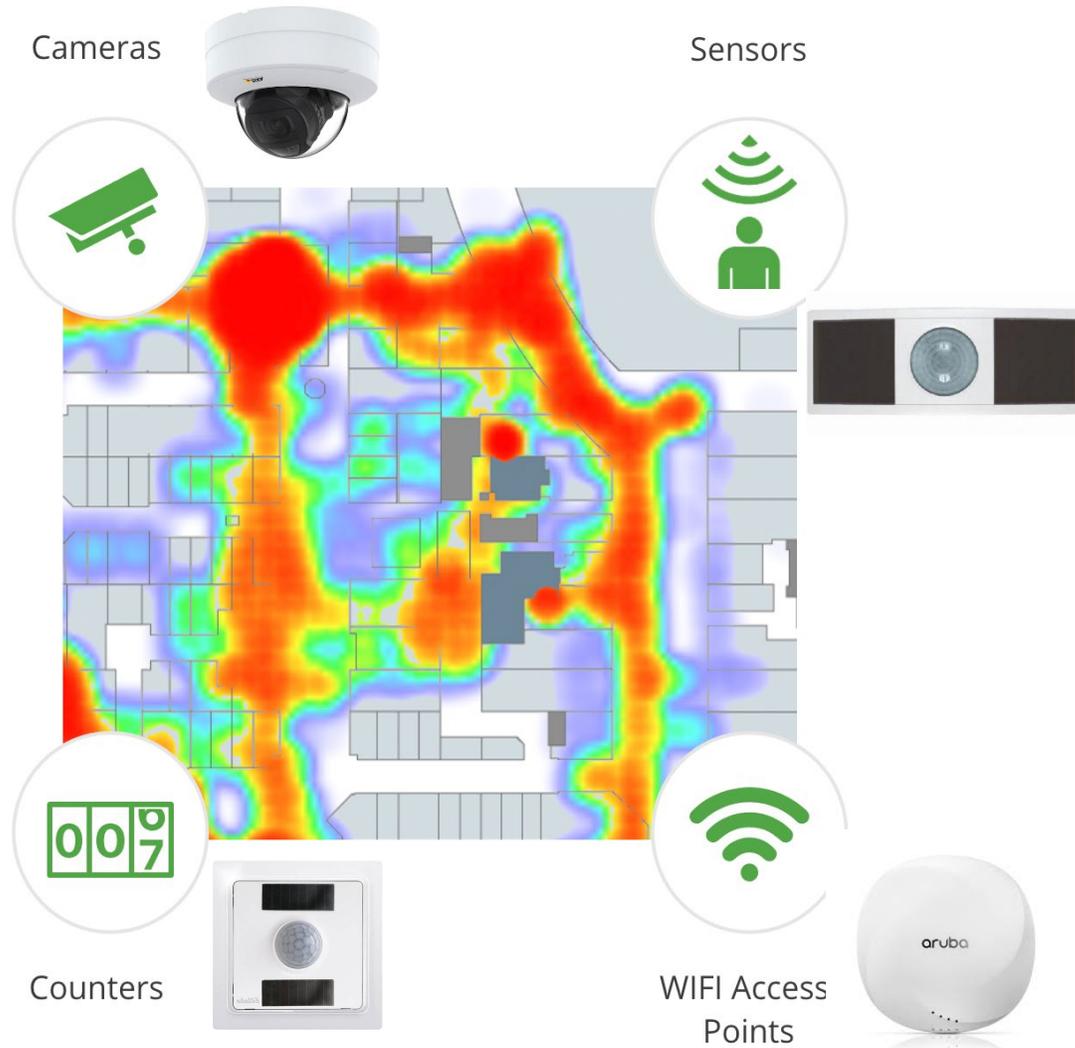
**Backend Security (vendor)**





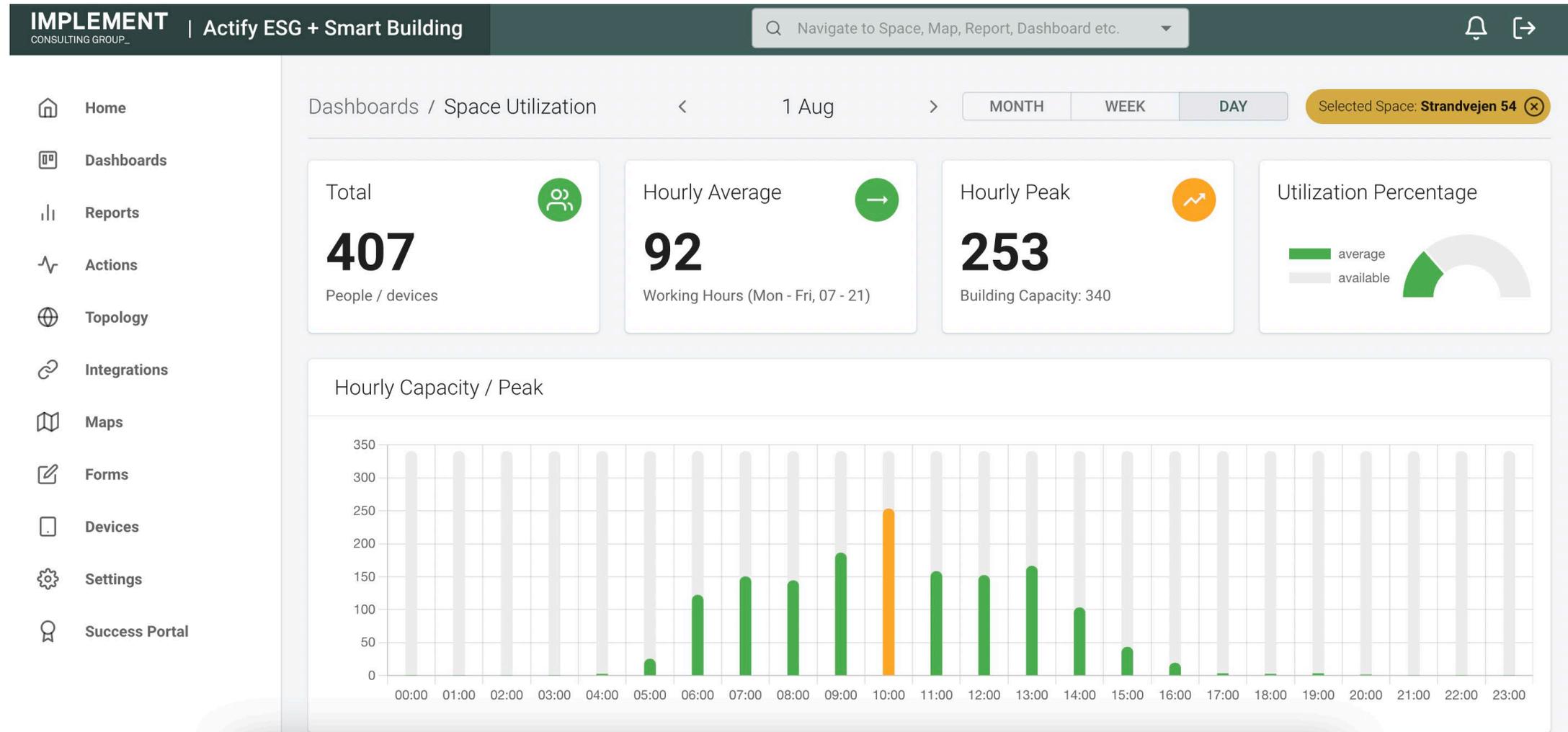
# **Analytics & Occupancy**

# Use Cases: Supplemented by IoT sensors



- Optimize facility flow, site upgrades, and visitor experiences based on footfall data and dwell times.
- Real-time analysis of parking dissects the flow of on-site visitor traffic and identify infrastructure improvements.
- Measures footfall across the site to inform staffing, security, and infrastructure decisions.

# Inspari – Occupancy Analytics

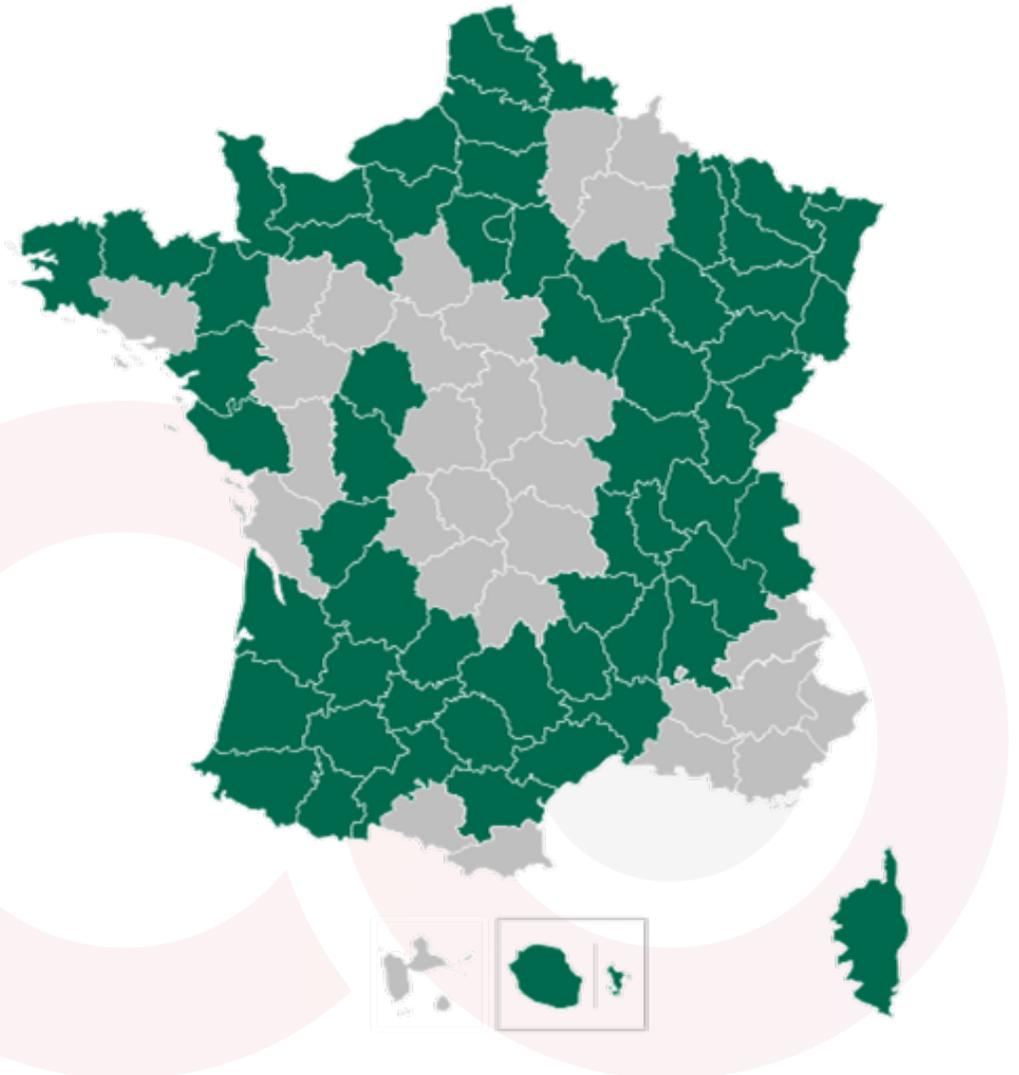




**REAL EXAMPLES**

## Use Case examples: Credit Agricole

- Inventory of employment positions and capacity monitoring
- Occupancy measurement across the entire property complex (Smart Building data integration)
- Leave reports imported into Jooxter
- Outlook room schedule synchronized with Jooxter
- The solution is aligned with CSR standards and procedures.
- **This is a first step towards compliance with the BACS (Building Automation & Control Systems) regulation, which requires commercial buildings to control their energy consumption by 2025. In other words, to limit their energy usage**





# Location Services

# Industry Challenges with Location Services



**Indoor location services relies on hand placed reference points which are prone to errors.**



**Costly professional services effort to map and place APs for each refresh**



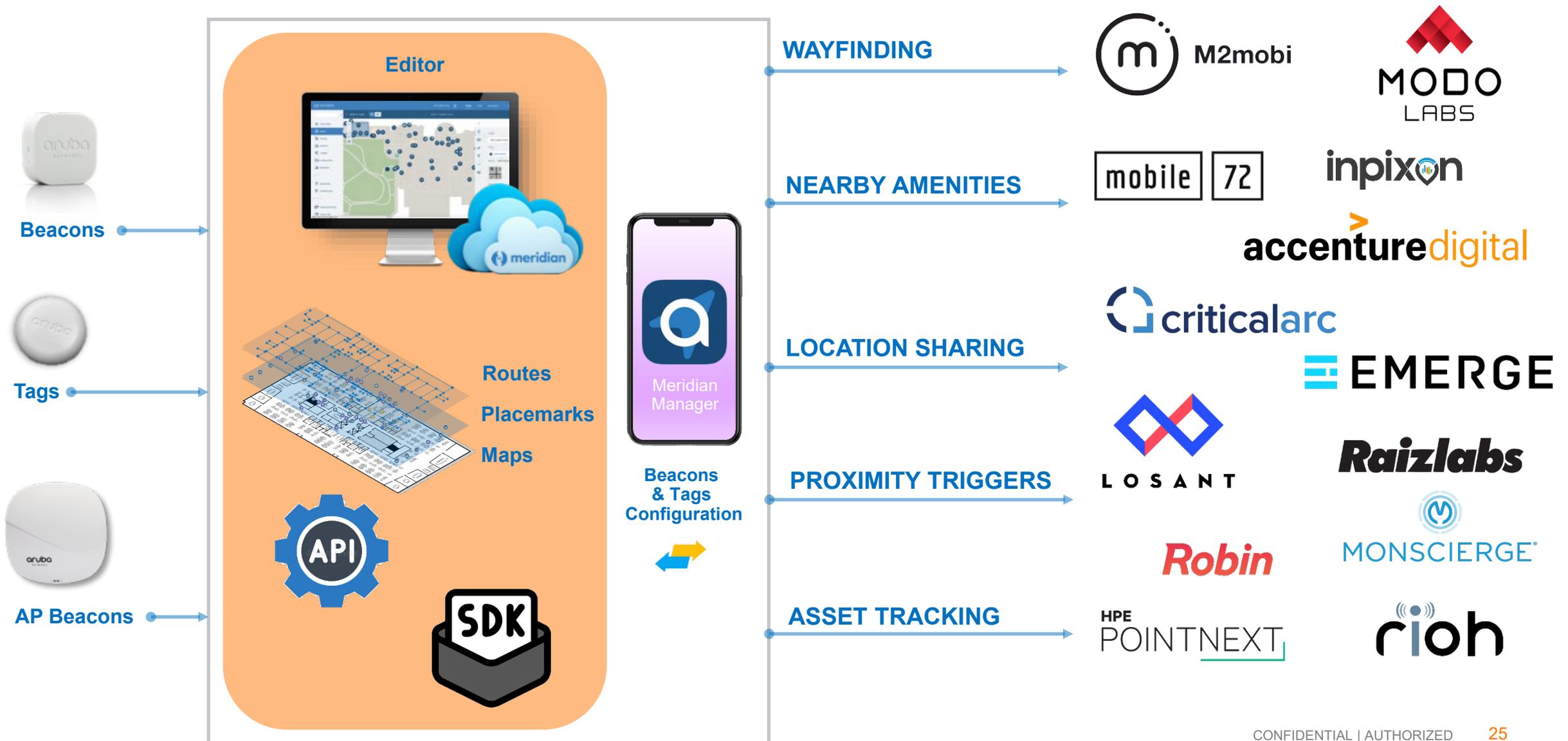
**Extensive custom App development as location data is not based on lat/long**

**The ease of outdoor GPS-based location has not been replicated indoors**



# A Little History

# Last 10 Years: Bluetooth Low Energy (BLE) based Mobile Engagement



10:49

80%



MAPS

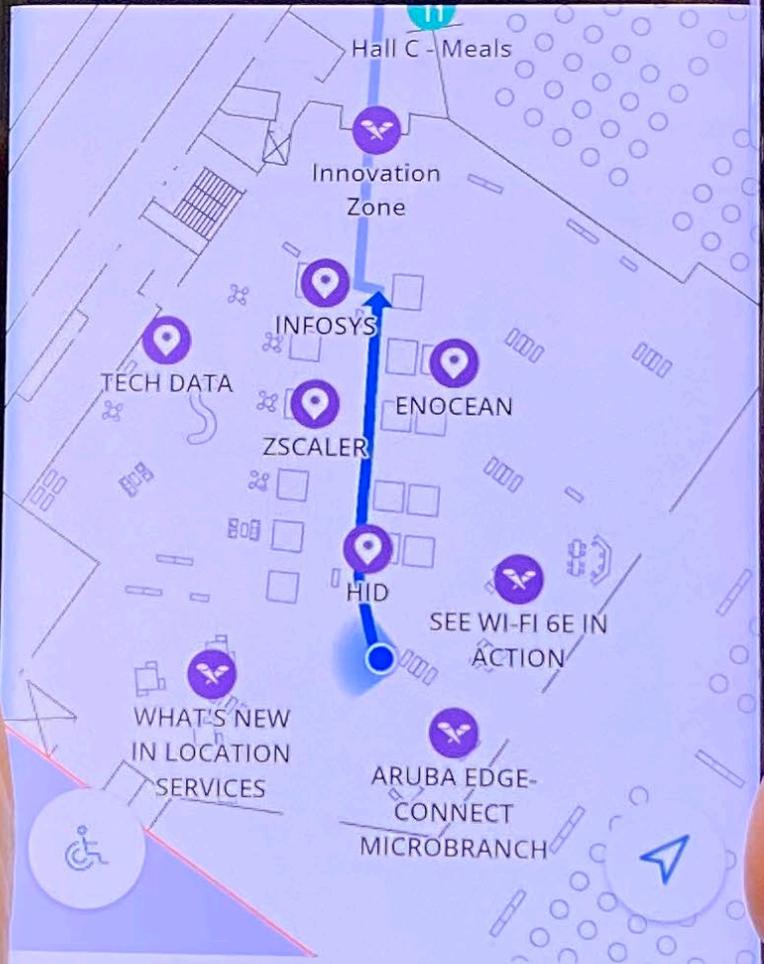


Aruba Atmosphere 2022



In 129 feet

Turn Left



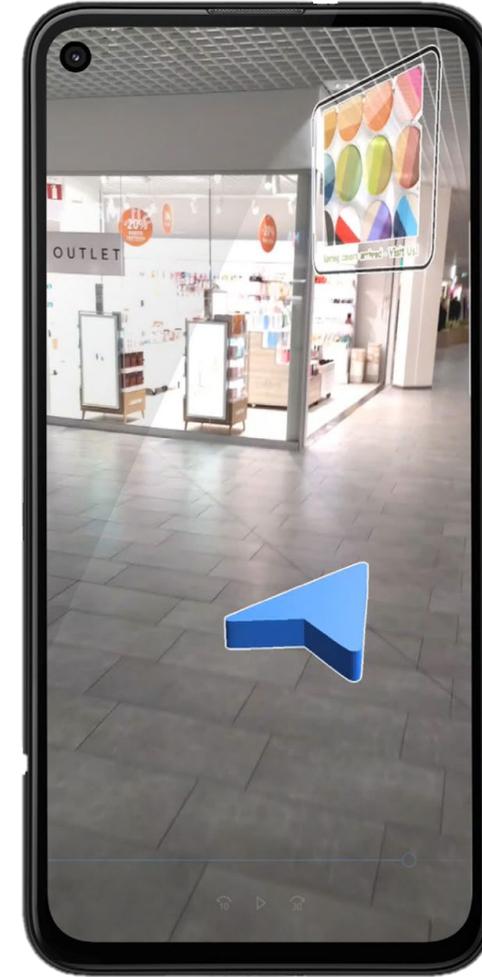
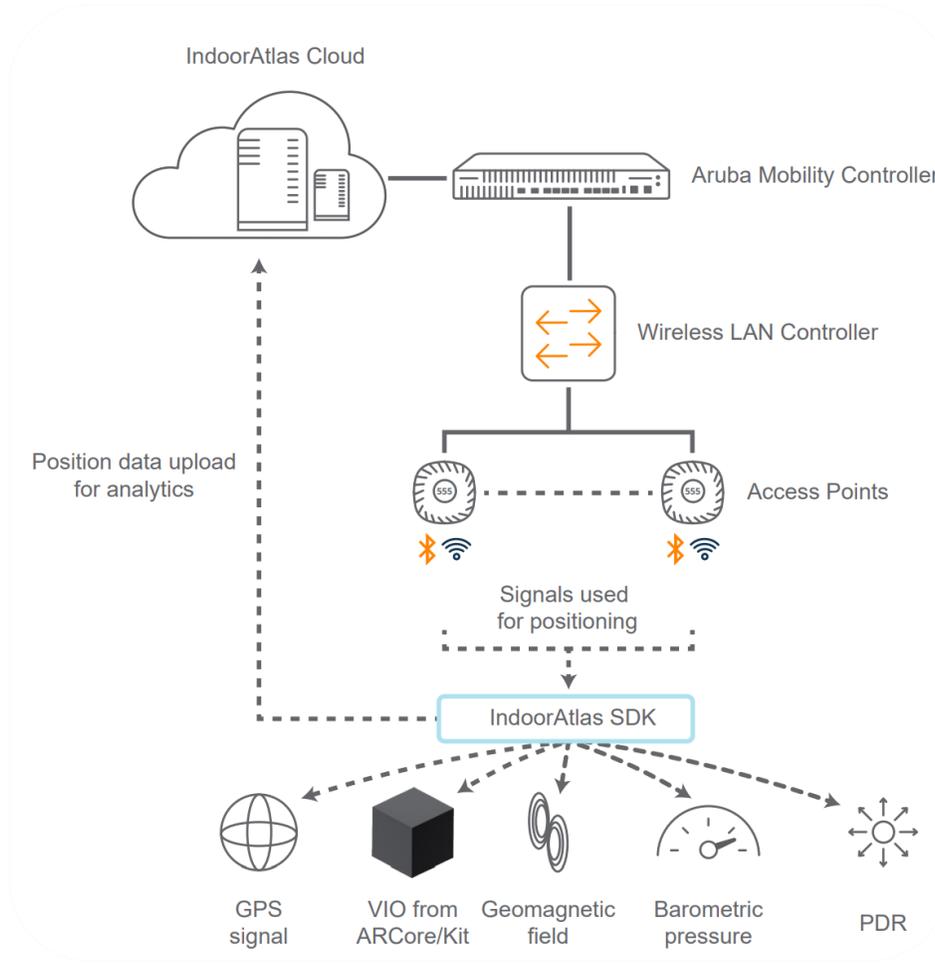
OVERVIEW

END ROUTE



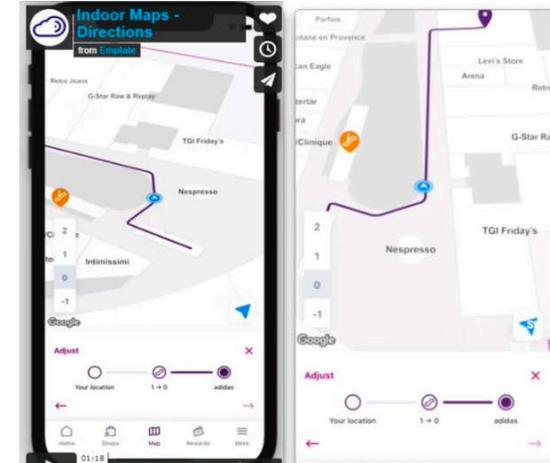
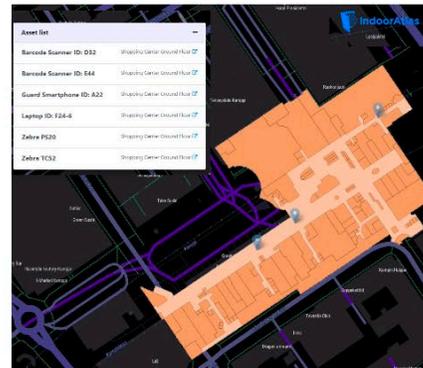
**What Can We  
Offer NOW?**

# Sensor fusion for Location Services with

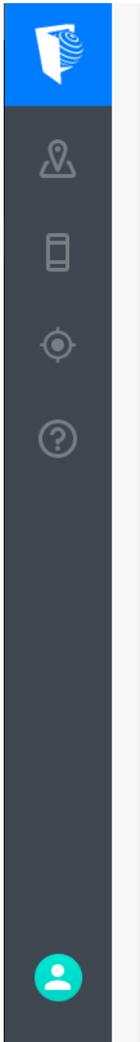


# Indoor Atlas Use Cases:

- **Navigate to the current location of an asset**
  - These use cases assume the asset location is tracked with a separate asset tracking tech
  - Available **infusion pump** in a **hospital**
  - Available ***forklift*** in a **warehouse**
  - Family member (e.g. child) at a resort
  
- **Navigate to a static POI**
  - Room in a holiday resort
  - Available **room/desk** in a **Hybrid workplace**
  - **Gate** at an **airport**
  - **Brand store** in a large shopping mall
  
- **Geofence-triggered hyper local advertising**
  - At **airports** for travellers
  - **Expo centers** for visitors
  - In **supermarkets** on phone or **cart displays**
  
- **Airport carts and shopping carts with tablets**
  - **Navigate** to products, gates, shops, eateries
  - For system operator: **monitor cart locations** and **collect** them with ease



# Combining Indoor Navigation and Location Tracking



Positioning session: 4b44a9be-3a43-11ed-9599-a3a12392fea1.1663846575398.16953666

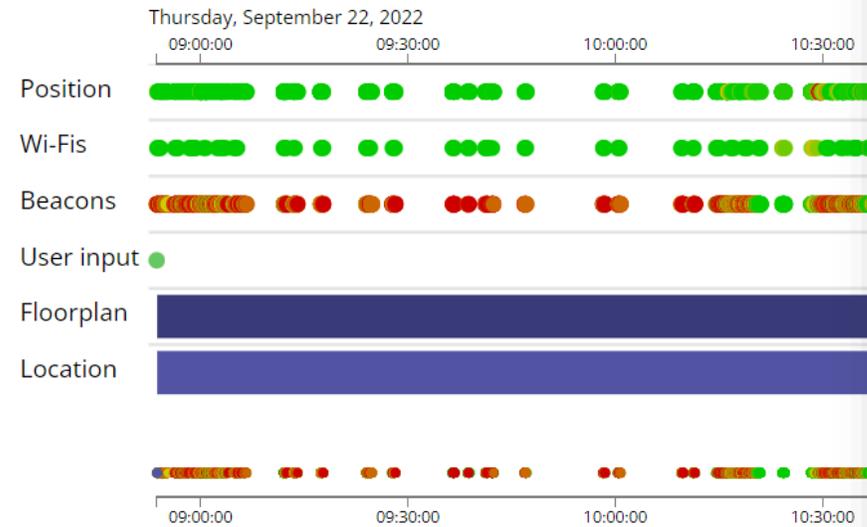
## Summary

Start time	22/09/2022, 8:53:42 CEST	Bundle ID	com.indooratlas.androidagent 1.0
Session duration	4 h 48 min 579 ms	Operating system	ANDROID 11
IndoorAtlas SDK version	3.5.5		

## Identified issues

No issues detected!

## Timeline



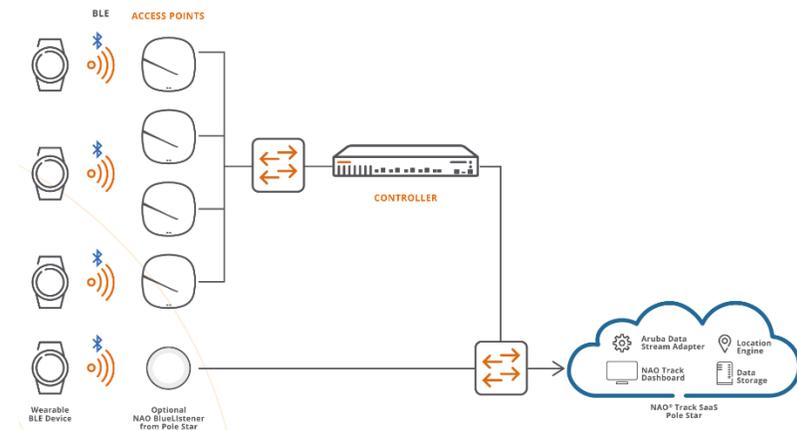


# **Asset Tracking & Localisation**

# Polestar Integration



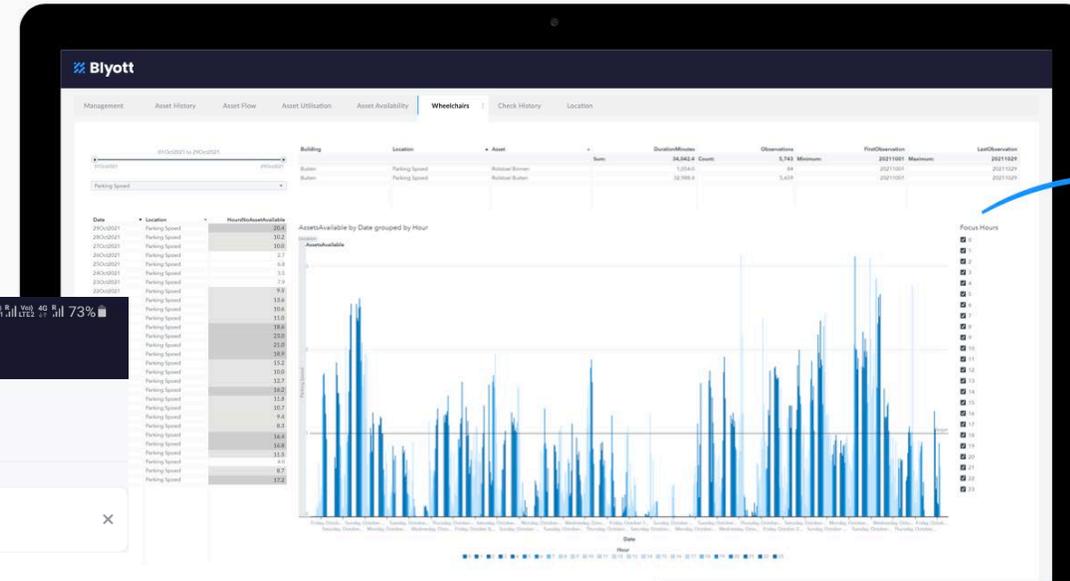
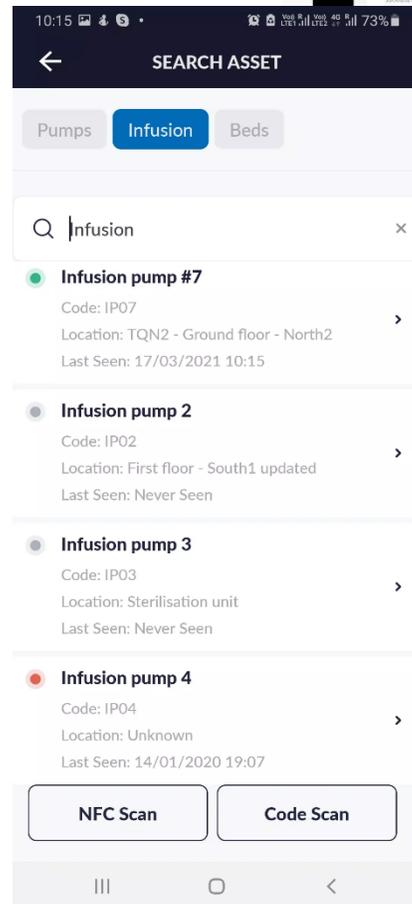
The tags communicate with Aruba Wi-Fi 5 and Wi-Fi 6 Access Points via their built-in Bluetooth radios which forward unique tag identification data to Pole Star's NAO® Cloud service



# Asset Tracking - Blyott

## Simple Aruba Based Data Visualization

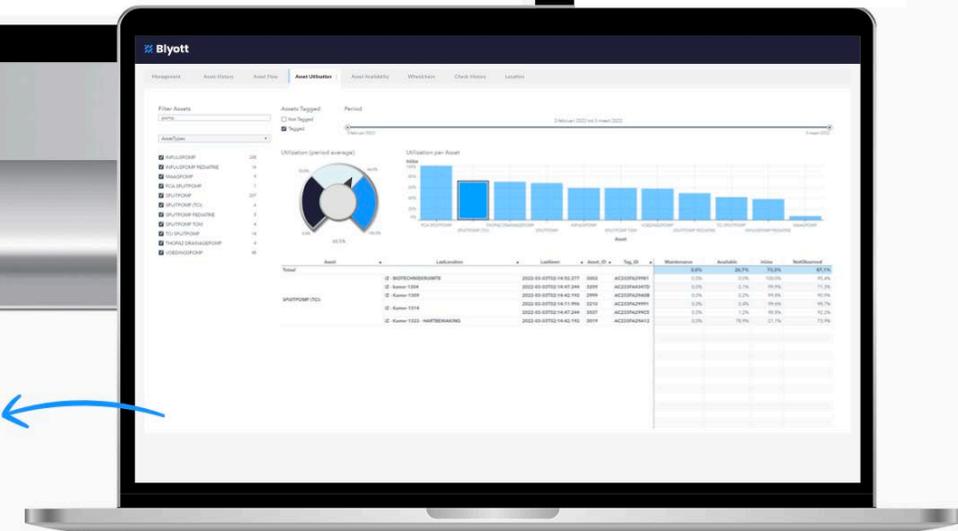
## HQ & Warehouse/Logistics tracking solutions.



Insights into wheelchair parking occupancy.



Calculate asset utilisation based on location and movement, e.g., pumps.



# Technology Partners for location services (today)



BASKING



Wi-Fi BLE

Securitas  
Healthcare



<https://www.arubanetworks.com/partners/technology-partners/>

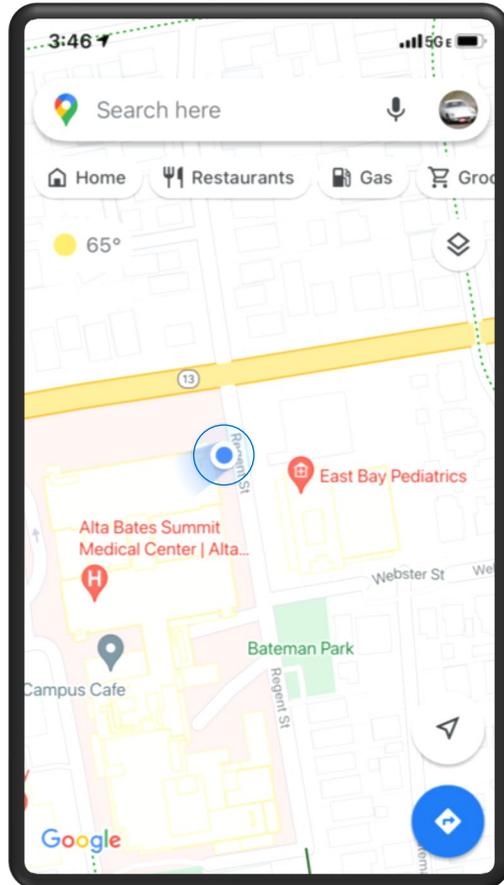
The background features a vibrant, abstract design. It consists of overlapping, semi-transparent shapes in shades of purple, red, and white. Some areas have a fine grid pattern, while others are solid or have a dotted texture. The overall effect is modern and dynamic.

# Next Gen Locations Services

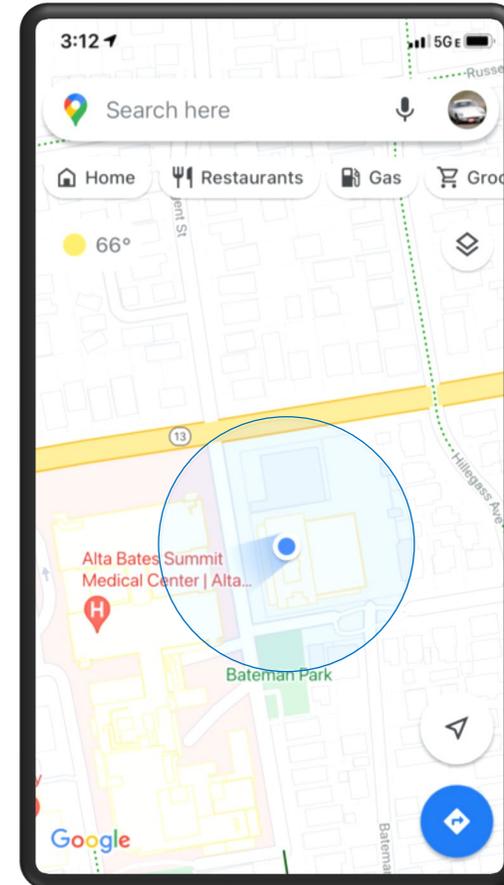
# INDOOR LOCATION – Been a challenge for decades.

## What do customers ask for?

Outdoor Location 😊



Indoor Location 😞



# OPEN LOCATE: NETWORK LOCATION UNIVERSALLY ACCESSIBLE



2

## INTEGRATED GPS RECEIVERS

Every Aruba Wi-Fi 6E platform includes a high-sensitivity GPS receiver for precise, **absolute** geolocation

1

## WI-FI CERTIFIED LOCATION

Aruba brings 802.11mc Fine Timing Measurement (FTM) to **all AP-500 and AP-600** platforms to construct **automated**, high-precision **relative** AP maps in 3D (WiFi Alliance Certification Program)



## FTM FOR CLIENTS

Aruba APs interoperate with **all FTM-capable clients**



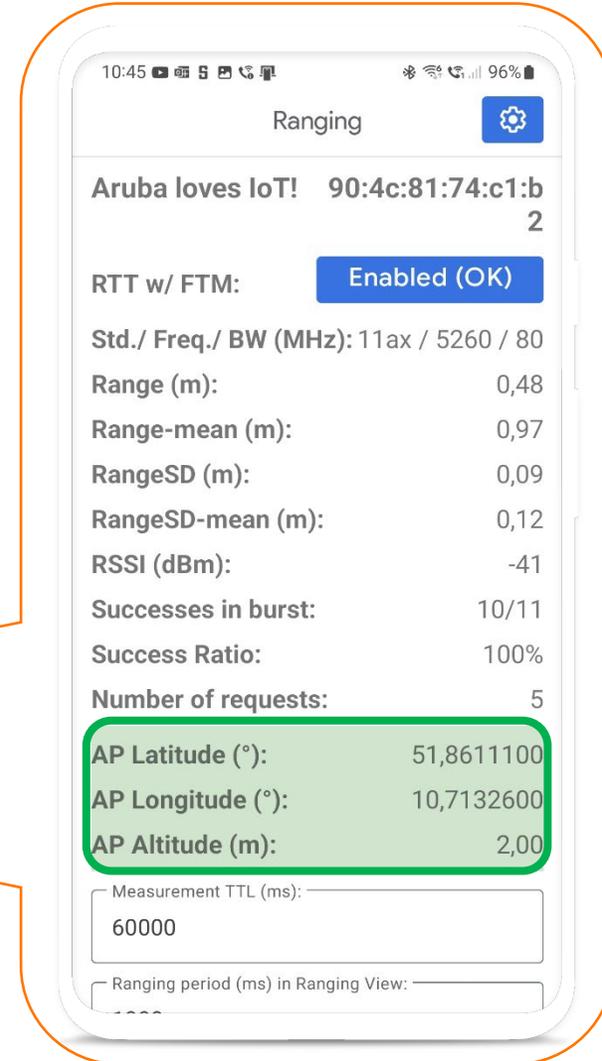
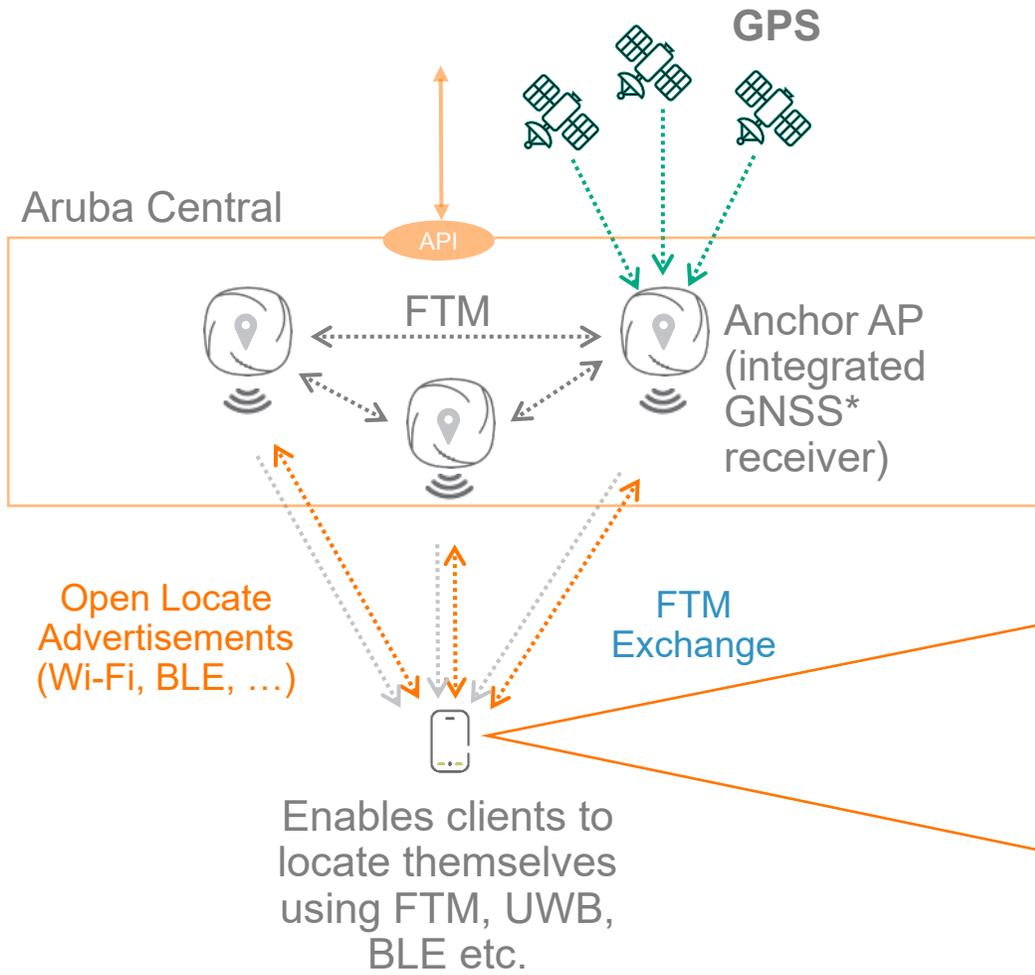
## LOCATION BROADCAST

Aruba APs **share their own location** over **Wi-Fi and BLE** radios using standards compliant methods (Proposals in WiFi Alliance and Wireless Broadband Alliance)



# OPEN LOCATE – API/ Poll Data

Location information – **universally** accessible for all



\*GNSS L1 (1575.42 MHz) receiver supporting GPS, Galileo, GLONASS, and BeiDou

# HPE Aruba Networking's OPEN LOCATE initiative

for the future of indoor location

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Accurate and Automatic AP location discovery, no manual placements anymore



Standardized and freely accessible location information (WGS84)

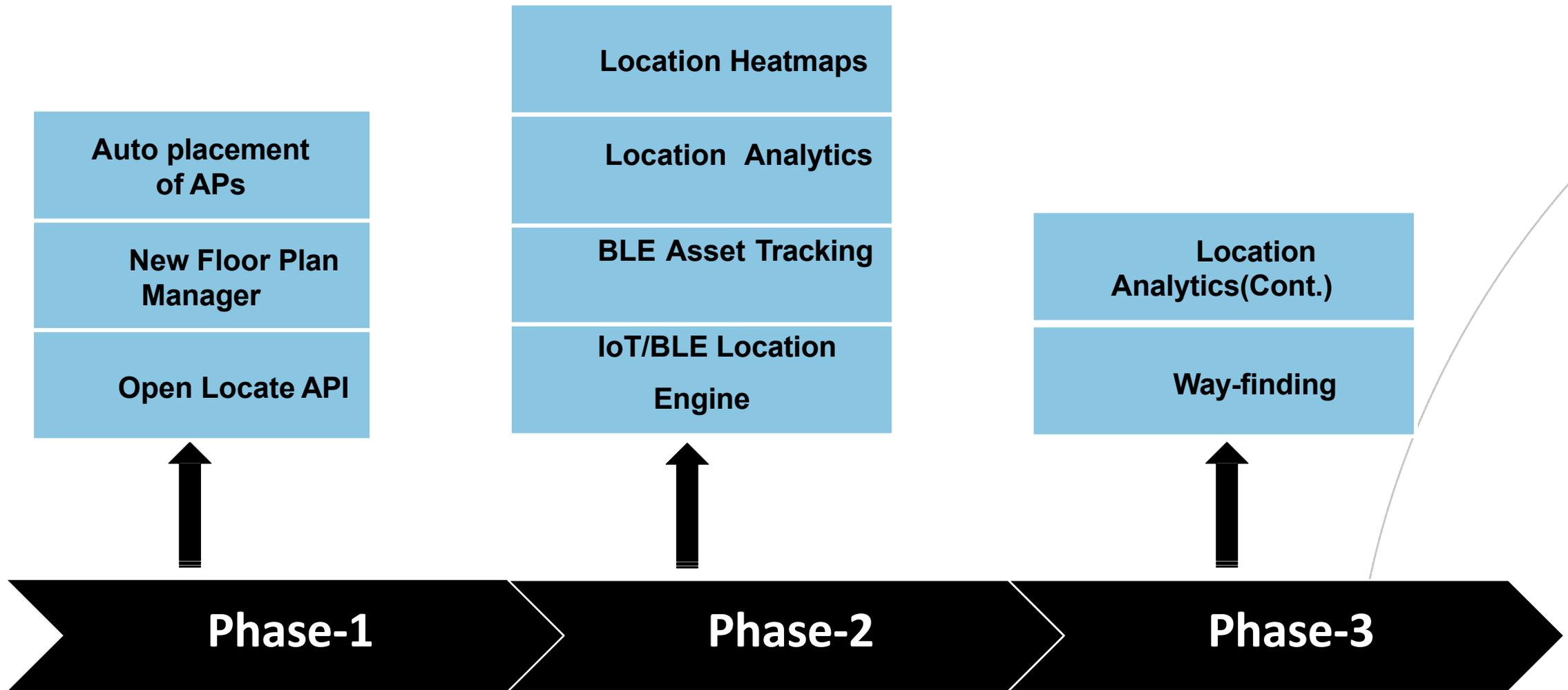


Location information use without local managed floorplans



Enabling app developers and technology partners

# Central location services: Roadmap



# Phase 1: Self-locating APs and Floor Plan Manager

**Floor Plan Manager**

New “geo-referenced” map service in Central

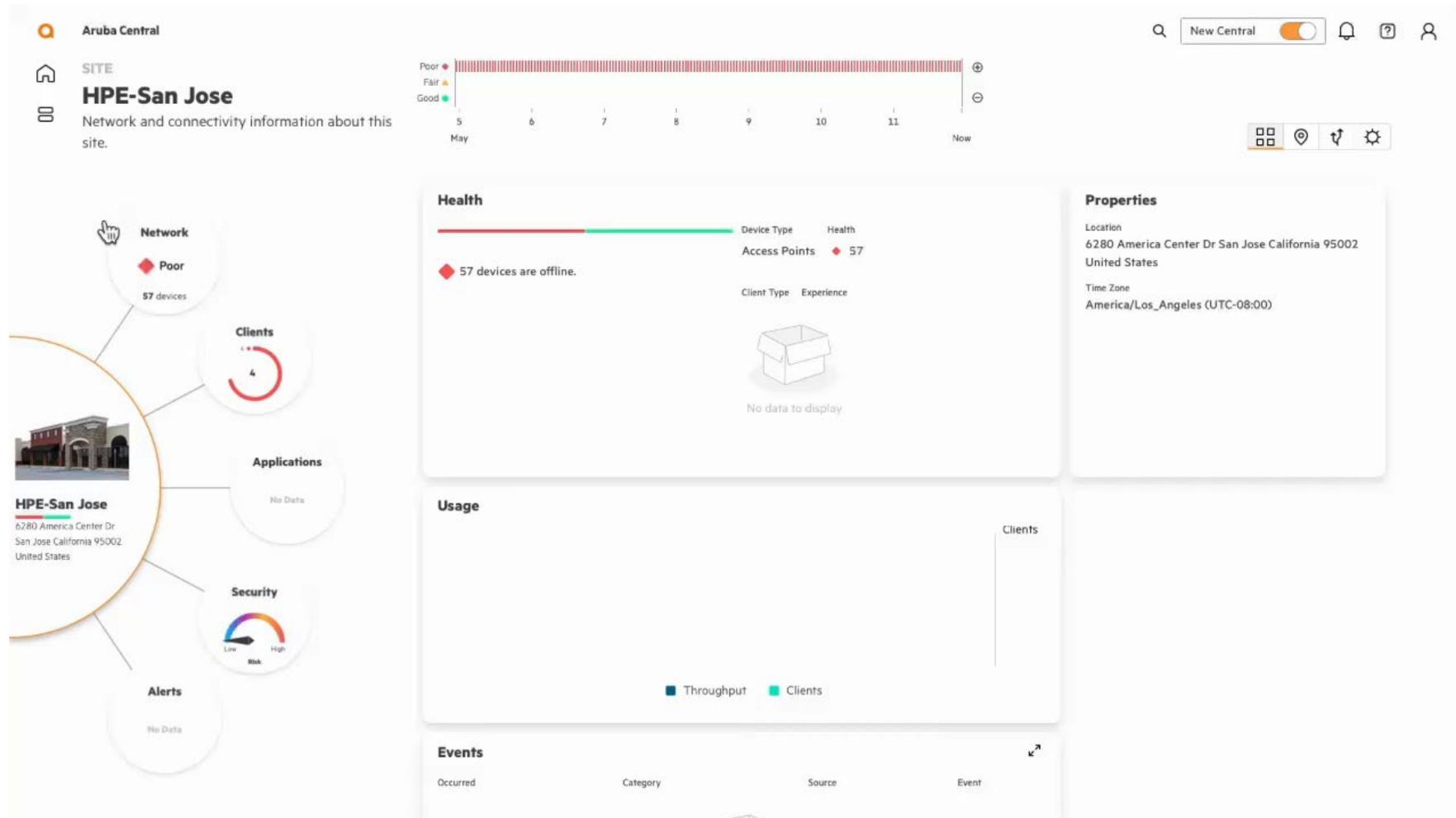
**Auto-placement**

Automatically locate and place APs on the map

**Open Locate API**

Rest API for geo coordinates for APs  
Over the air broadcast of LCI to enable client locations

# Auto AP Placement in action with Aruba Central (CNX)



## Phase 2 - Location Analytics

### Zones/ Geo-fencing

- Locate client devices in different zones on the map
- Trigger events – Enter, Exit, Density and Dwell to enable proximity services

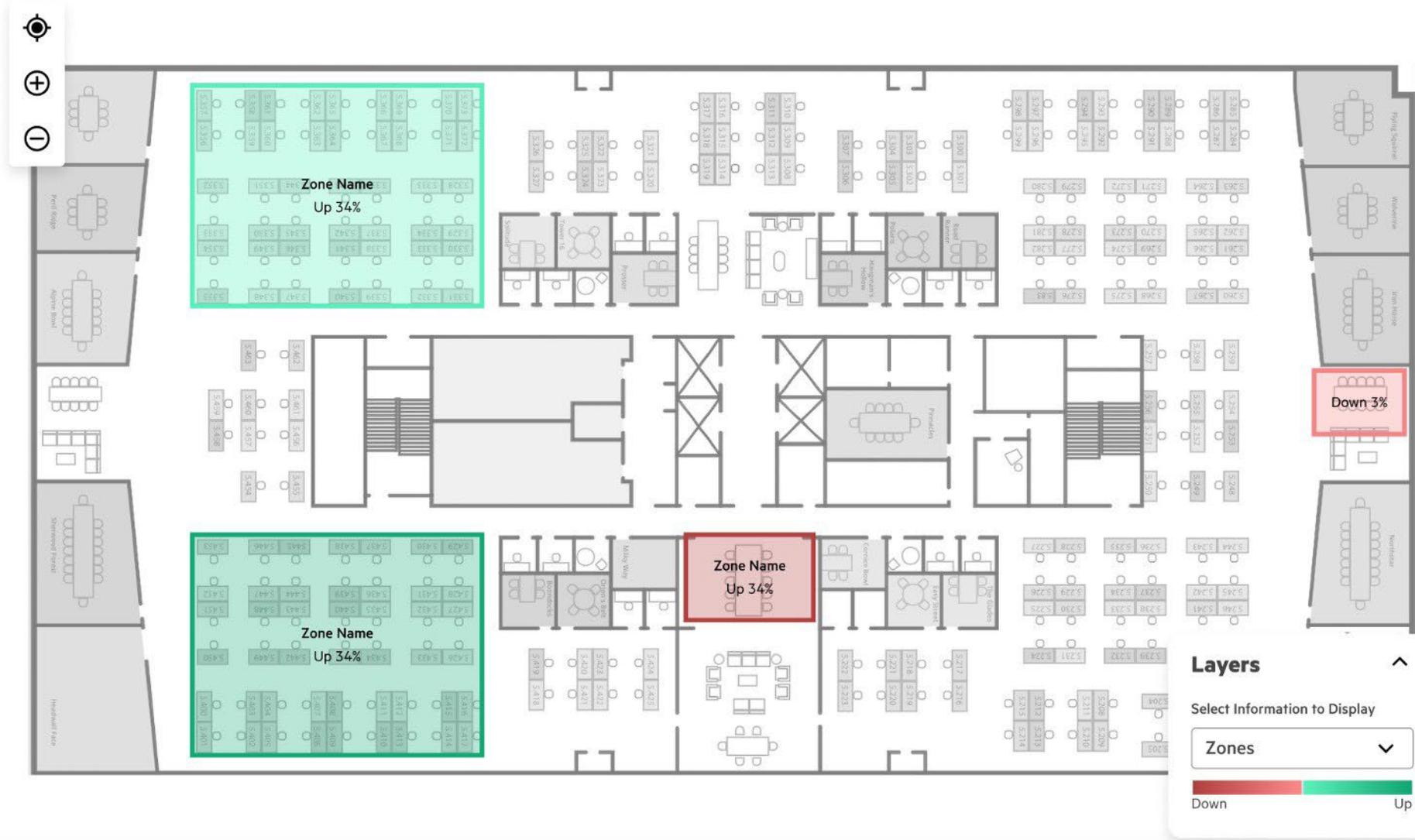
### Location/Space Analytics

- Most popular zones by foot traffic.
- Least popular zones by foot traffic.
- How is foot traffic trending compared to yesterday?
- Cross-site foot traffic trends
- Peak traffic hours

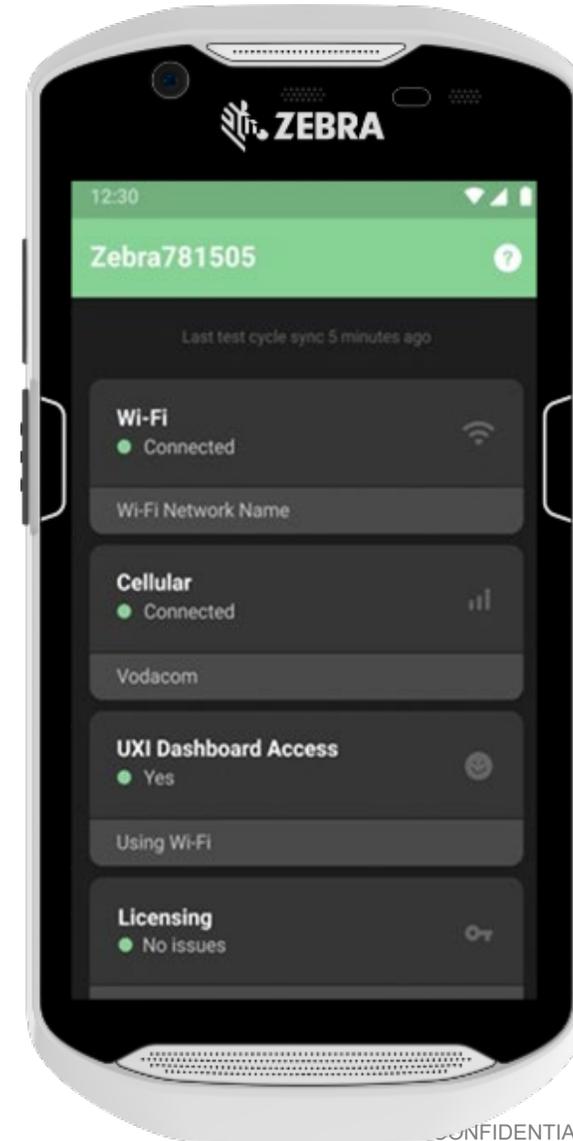
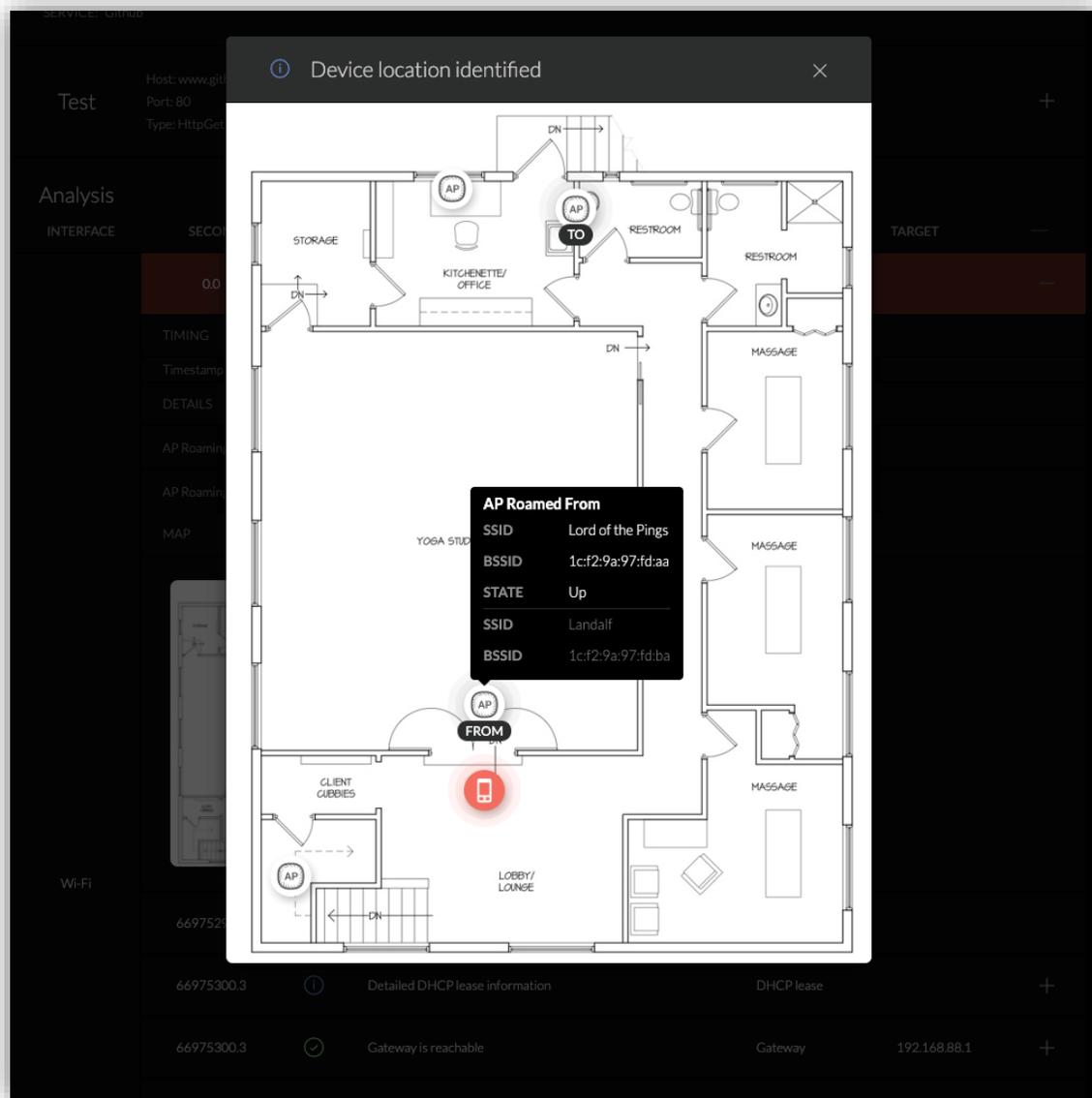
### Location Heatmaps

- Visitor density heatmaps (Congestion zones)
- Visitor engagement heatmaps( where visitors spend most time)

# Location Analytics: Zonal Analytics

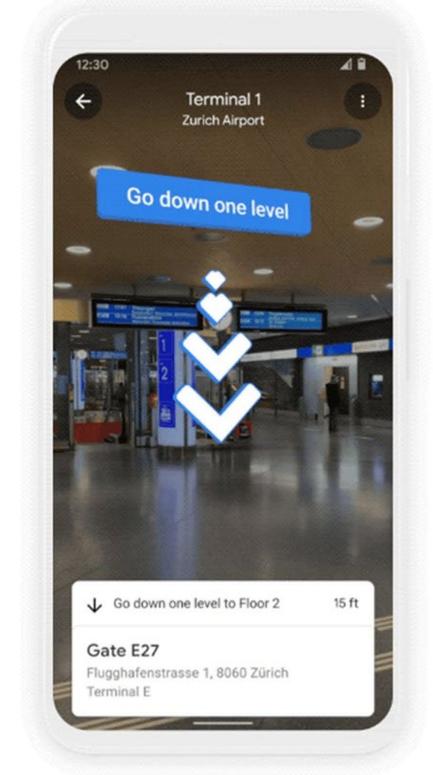
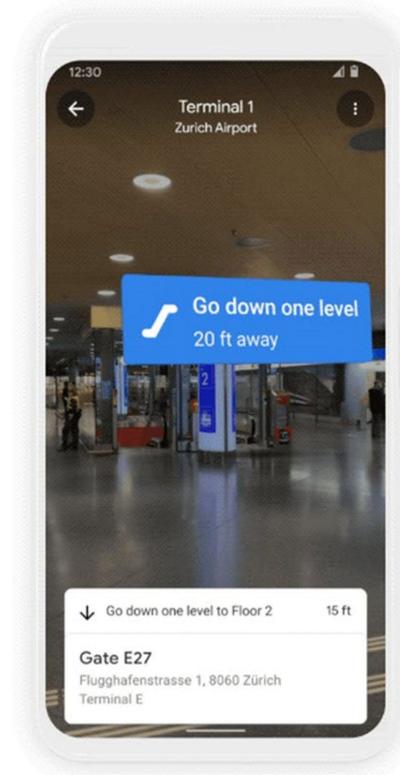
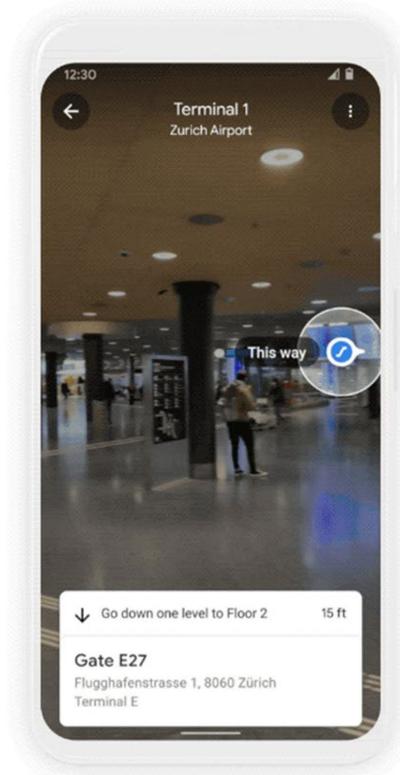


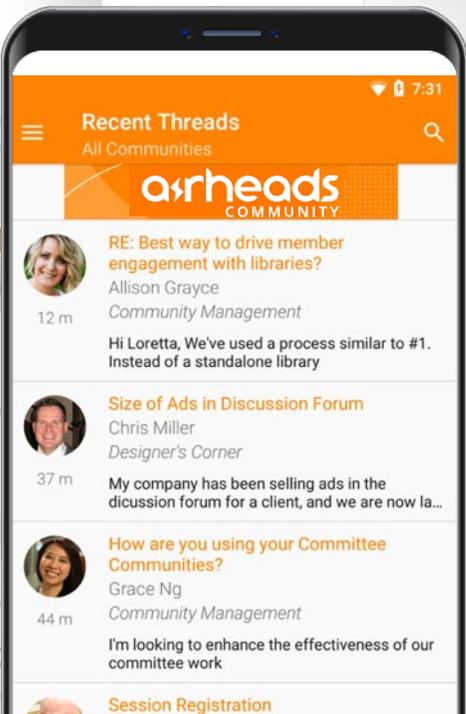
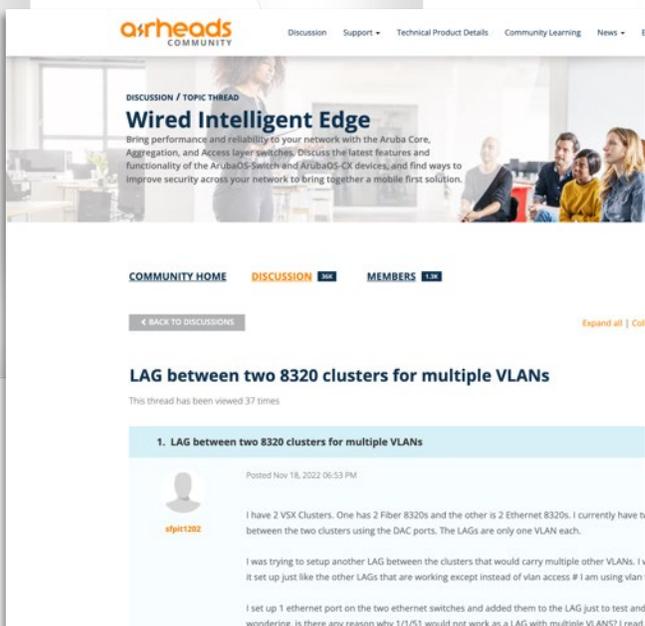
# Locating issues using FTM with the Aruba UXI Agent for



## Phase 3 – Wayfinding

- Customers deploying 600 series with Central Advanced license.
- Outdoor like indoor experience in 2D/3D or AR
- Android only for now!





# arheads

## COMMUNITY

# Join Today!

[www.community.arubanetworks.com](http://www.community.arubanetworks.com)