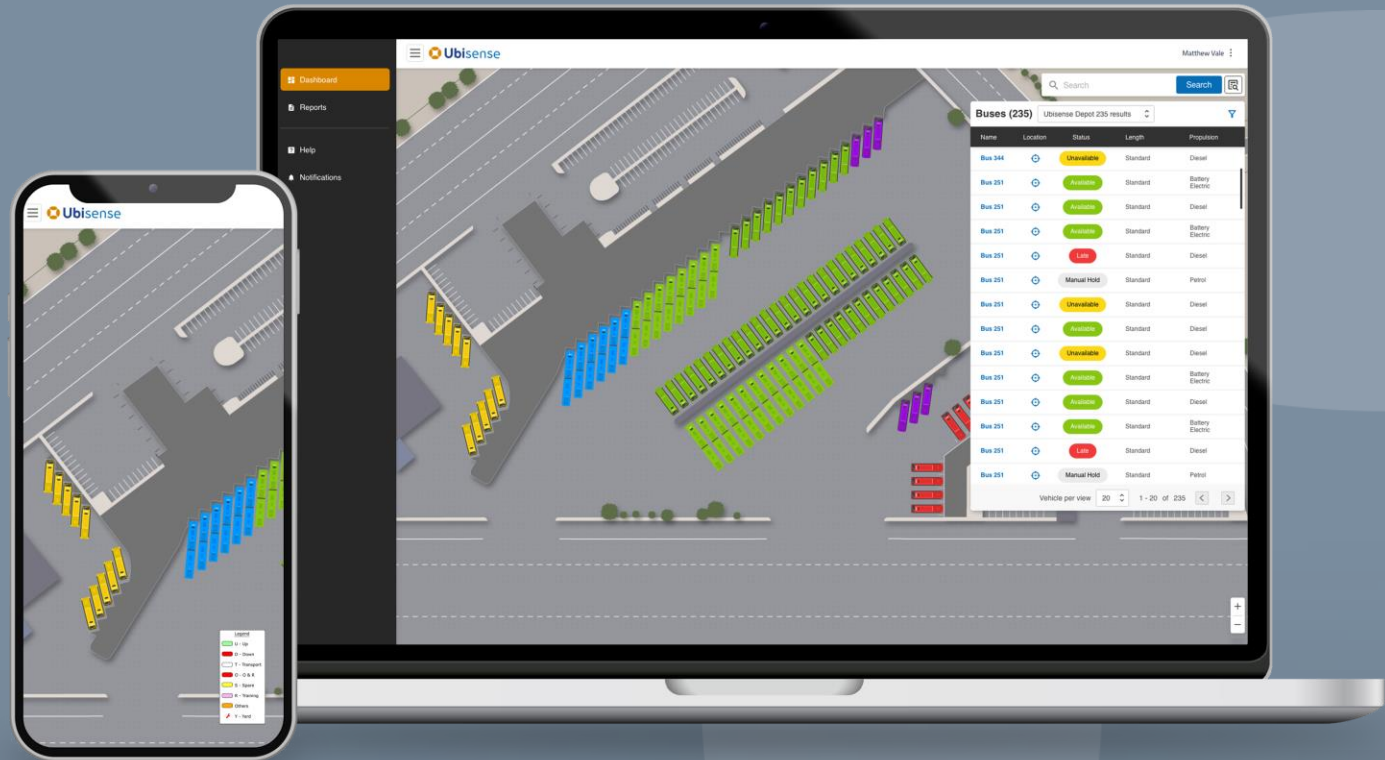


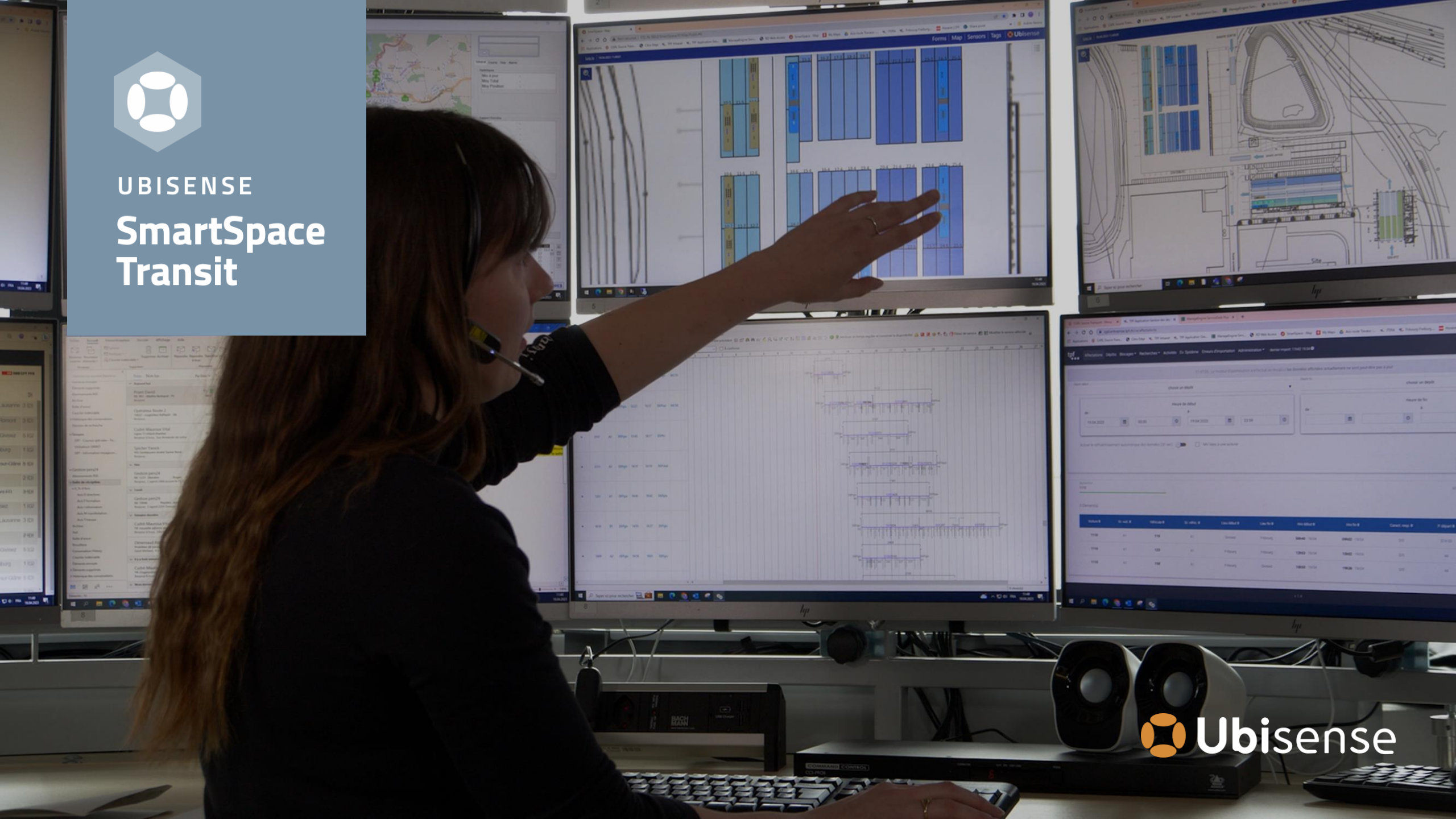


UBISENSE SmartSpace Transit

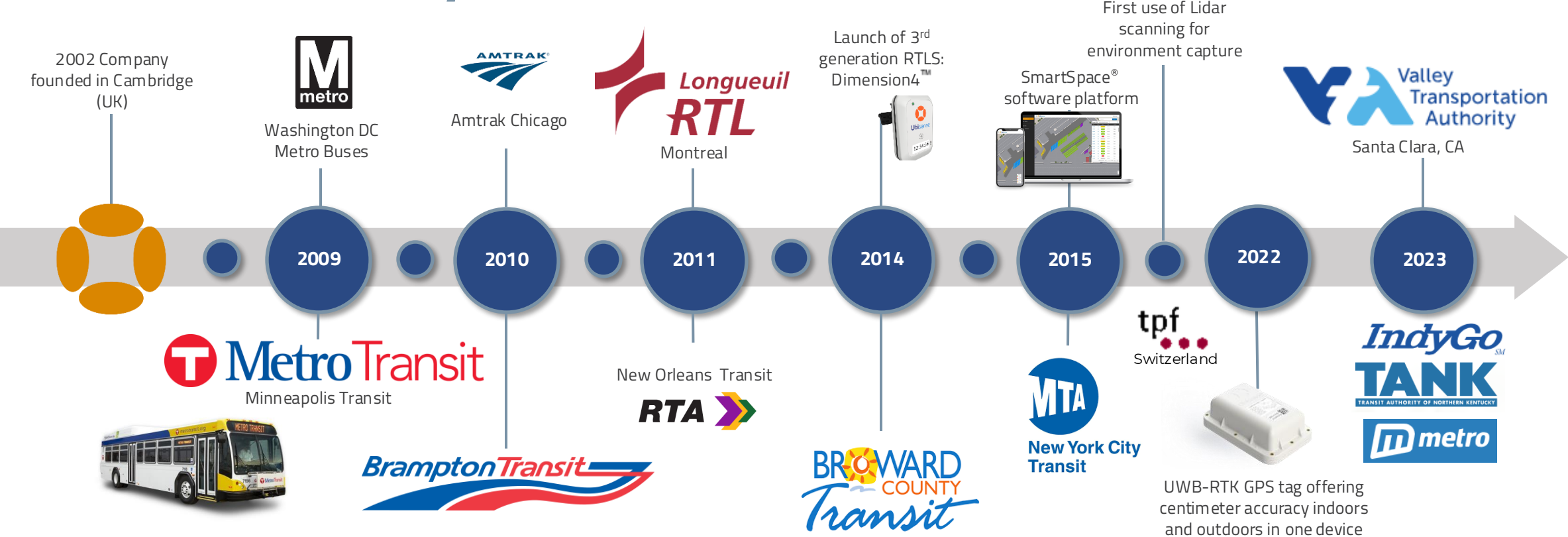




UBISENSE
**SmartSpace
Transit**



Ubisense History in Transit



Transit Operation

Fleet Electrification

Introduction of electric and hybrid vehicles add complexity, making optimisation of parking, charging and routing of buses more difficult

Limited Infrastructure

Space is a premium, especially in colder climates or where cleaning, fuelling, and maintenance occurs onsite, with vehicles often tightly packed in indoor garages causing delayed pull-out

People Availability

Insufficient people available to complete all day-to-day tasks across the depot, or are occupied with low-value tasks such as manual vehicle parking mark-ups

Managing Complexity

Variability of route assignments, weather, events, and vehicle availability and types mean existing dispatch and routing applications are often out-of-date

Opportunities for improvement



Eliminate Manual Mark-Ups

Having real-time visibility of the location and movement of all vehicles in the depot removes the need to manually mark-up location and status information which is quickly out of date



Connect Existing Systems

Enable scheduling, maintenance, charging, and dispatch systems to share real-time data and improve overall visibility and control of depot operations



Automate Everyday Operations

Automatically capture the status of vehicles that have been charged, fuelled, cleaned, and fixed and route to the optimal parking bay for on-time dispatch.





IMPROVE OPERATIONS WITH UBISENSE TECHNOLOGY

Transit Management

Micro-Positioning

The Ubisense **Dimension4™** sensor system tracks the precise, real-time location and movement of vehicles across indoor and outdoor transit yards

Open Integrations

The Ubisense **SmartSpace®** platform captures vehicle location as structured data and synchronizes status and plan information from existing dispatch, scheduling and maintenance systems

Yard Visibility

Web-based maps and dashboards give users complete real-time visibility across multiple transit yard operations

Real Time Location Data

Dimension4™ Sensors

Ultra-Wideband (UWB) sensing system reliably locates tagged vehicles across indoor areas with sub-meter, bay-level accuracy.



UWB Indoor / Outdoor
High-performance sensor network

Ubisense Transit Tag

The Ubisense DIMENSION4 RTK Tag is a multi-mode device designed for indoor and outdoor location of vehicles.



Hyper-accurate Location
capable of positioning within 3cm.

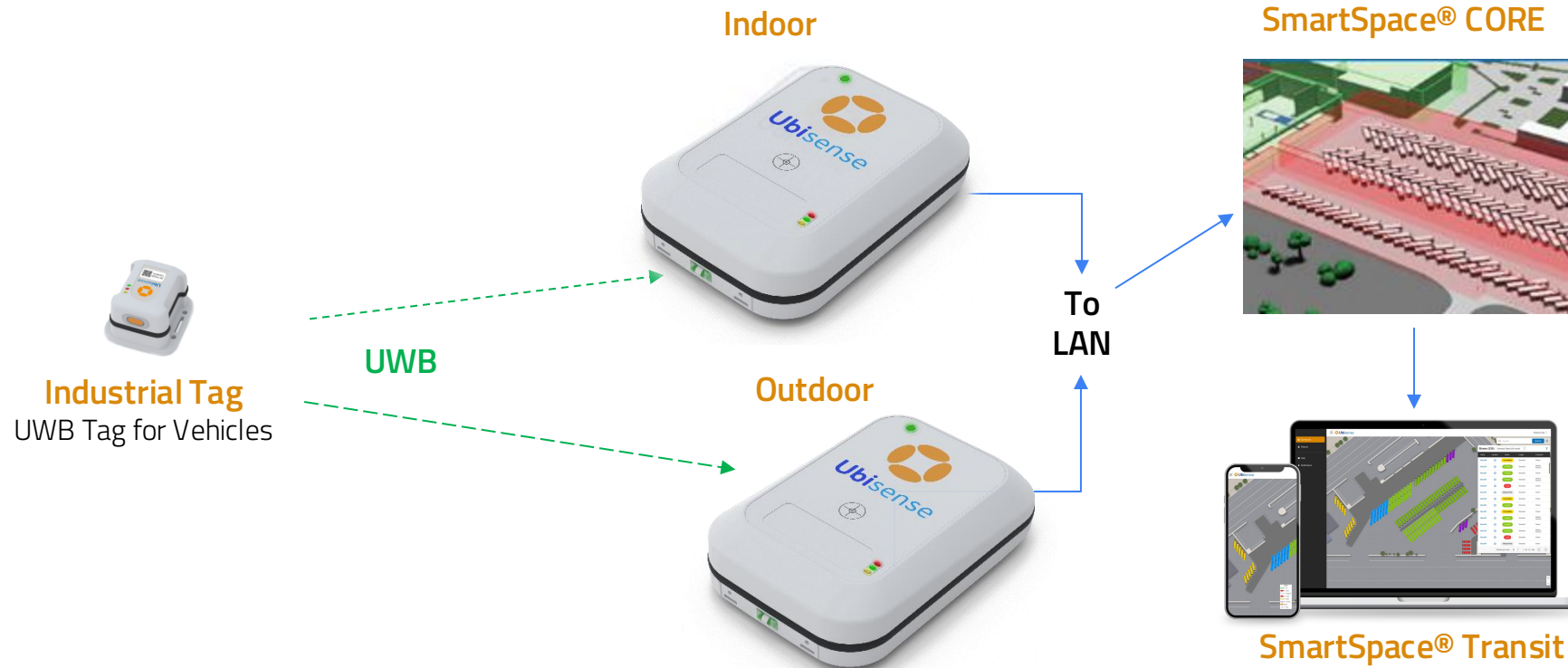
RTK Base Unit

Improves location accuracy by wirelessly sending location corrections to moving vehicles in the outdoor environment.

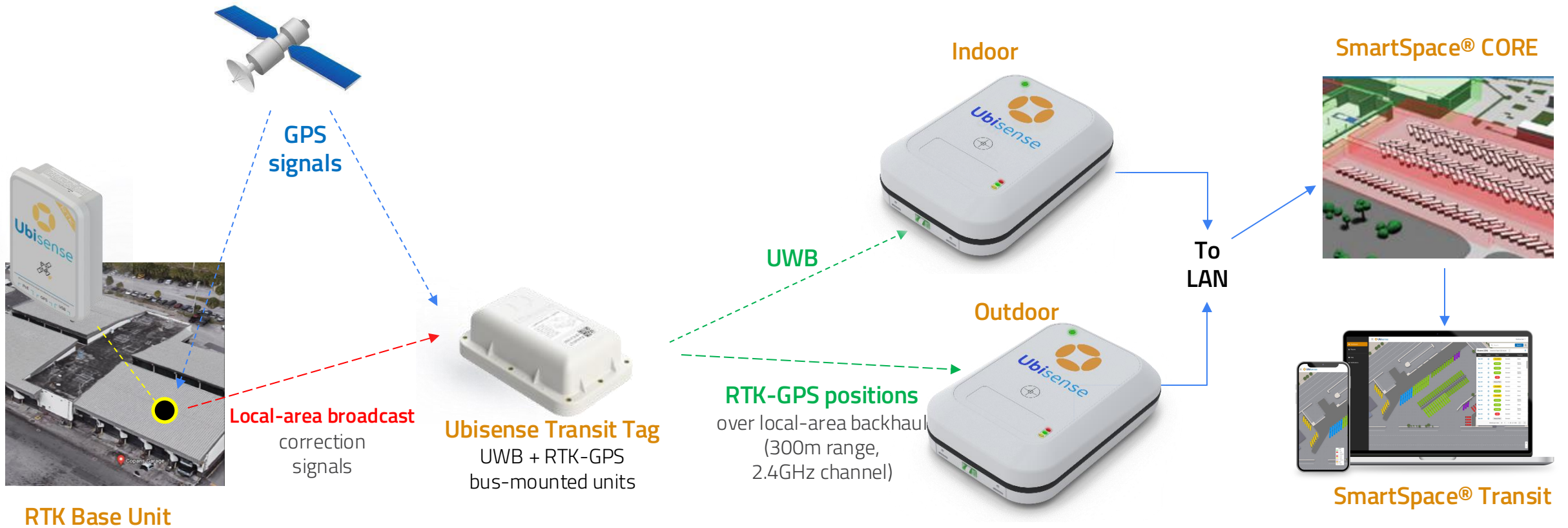


UWB

Data Flow - Indoor & Outdoor



Data Flow - Indoor & Outdoor





IMPROVE OPERATIONS WITH UBISENSE TECHNOLOGY

Tagged Vehicles

Robust long lifetimes

Ubisense **Dimension4™** tags are rated IP69K for ingress protection, operate to -40°C and come with 15+ year battery lifetime

Indoor / Outdoor

Tags can provide simultaneous UWB and GPS for seamless tracking across indoor and outdoor spaces where required



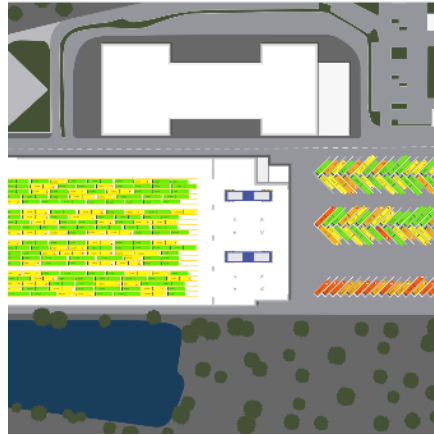
CONVERT STREAMS OF REAL-TIME LOCATION DATA INTO ACTIONABLE DEPOT INFORMATION

SmartSpace® For Transit Management



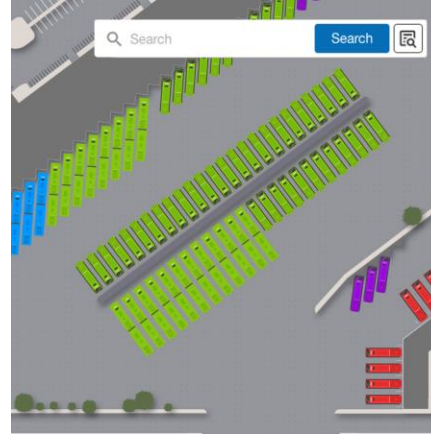
3D Spatial Model

An accurate three dimensional model of the entire depot is created in SmartSpace® software



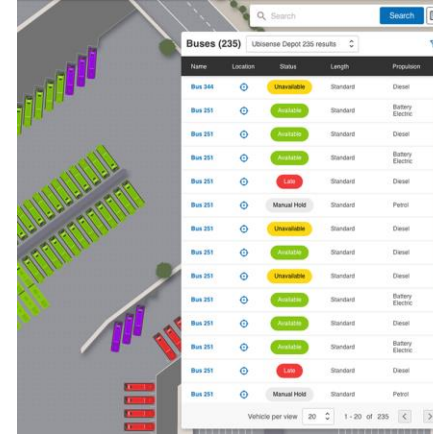
Digital-Twin

Real-time vehicle location and movements accurately represented on an interactive, searchable map



Contextual Data

Up-to-date information of vehicle status (incl. fueling, cleaning, charging and maintenance)



Integrate Systems

Dynamically assign vehicles to routes and automatically update existing dispatch and maintenance systems



User Dashboards

Give relevant information, such as parking guidance and maintenance to users via connected devices



Total Visibility

Ubisense Transit Management provides depot operations, maintenance, and dispatch teams complete visibility across all depots in real-time

Total Control

Ubisense Transit Management provides confidence in the assignment of drivers and dispatch of vehicles for on-time pull-out

Optimising Routing

Guide Drivers to specific spaces

- Parking lanes or bays
- Cleaning, fueling, or charging areas
- Maintenance bays

Based on vehicle or space status

- Optimized parking bay for next scheduled pull-out
- Charging point based on state-of-charge or availability
- Maintenance required by vehicle

Using most appropriate device

- In-cab displays or tablets
- On-site screens and display boards
- Notifications to mobile devices

Automated Everyday Tasks

Cleaning

Automatically mark vehicles as cleaned when they pass through washing stations with sufficient dwell time

Fuelling

Record vehicles as fuelled once passed through the pit-stop area and update status as 'ready for dispatch'

Charging

Optimise electric vehicle charging stations by combining state of charge (SoC) information with charging bay availability

Secure Barrier Entry

Automatically raise secure gates and barriers when authorised vehicles return to the yard

Maintenance

Direct vehicles requiring maintenance to the correct bay or parking location and update status when exiting the inspection area.

Driver Assignment

Assign the drivers to the optimal vehicle and routes based on parking location and status to ensure on-time pull out





INCREASES VALUE OF EXISTING INVESTMENTS

Integration to CAD/AVL

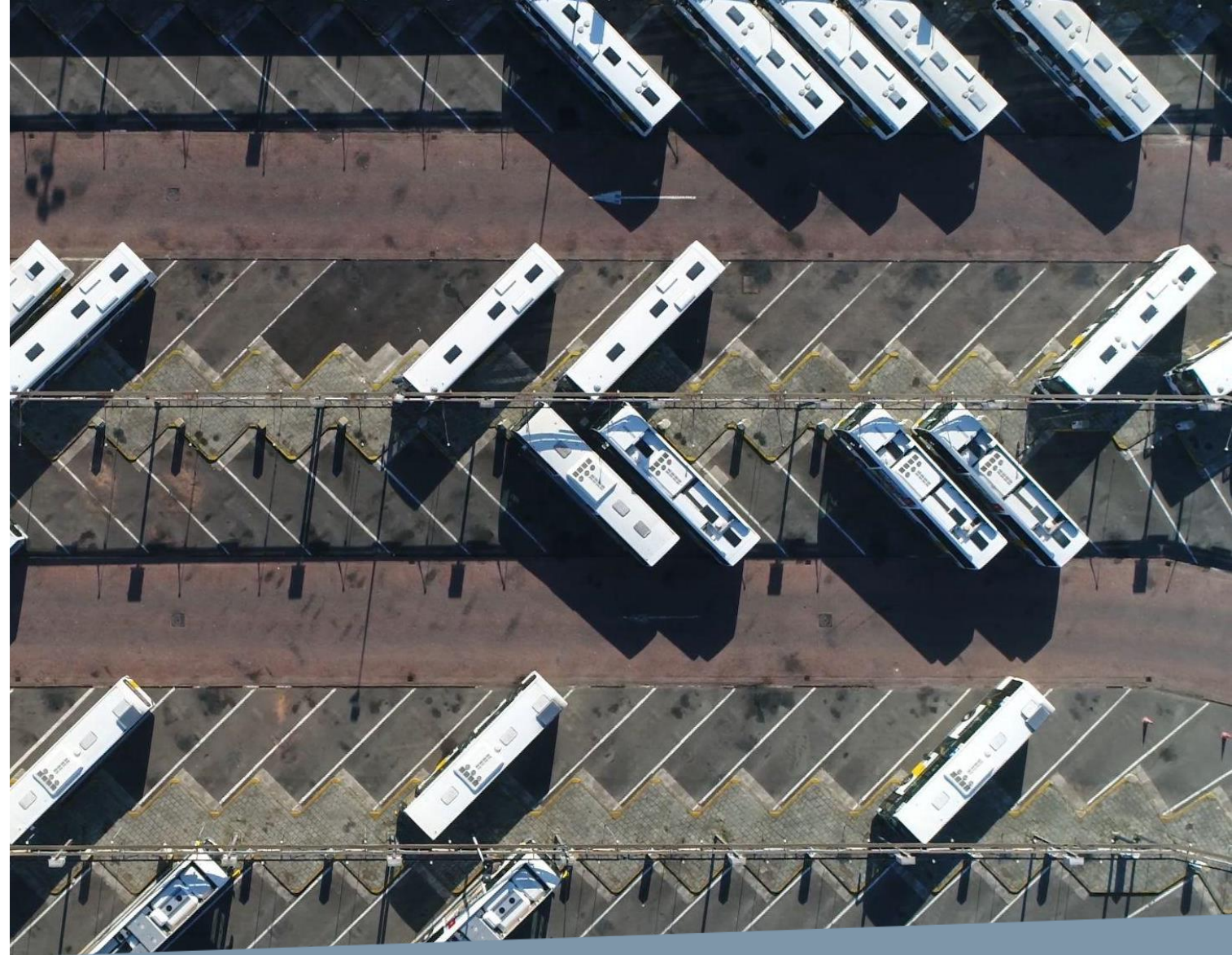


Typical ROI 66%-81% Per Year

Payback within 12-18 months

- Eliminate manual mark up
- Reduction of shuffle time through correct vehicle staging
- Elimination of dispatch errors & delays
- Time saving from streamlined operations
- Significant reduction of idling time and fuel costs

Estimated ROI between 66% and 81%
Based on a 400 bus depot saving \$295-\$360k per annum



SmartSpace® Options

	SmartSpace® Core	SmartSpace® Transit (Full Solution)
Spatial Definition Of Vehicles And Depot Spaces (Lanes, Bays, Buildings, Etc)	✓	✓
Vehicle Data Management	✓	✓
Connection to Real-Time Location System Data Streams	✓	✓
Software Defined Location Rules (Lane Snapping, Object Dampening, Parking Bay Snapping)	✓	✓
Manage Vehicle Tag Associations (Via Web Form)	✓	✓
Integration To Customers Active Directory for user authentication, access, role, feature control, and administration	✓	✓
Core Location API	✓	✓
Advanced IT Support For High Availability And Health Monitor	✓	✓
Failover Control, Test And Dev Environments	✓	✓
Pre-configured Realtime Alerts And Notifications For Process Issues	✗	✓
Pre-configured Searches to Quickly Find Vehicles Of Interest With Drill Down	✗	✓
Standard Reports And Dashboards (Web Reports) On Performance And Location History	✗	✓
KPI Dashboards For On Time Performance, Maintenance Efficiency	✗	✓
Business System API	✗	✓
Automated Status Changes Based On Location Or Process Completion	✗	✓
Driver Guidance Based On Vehicle State, Available Parking	✗	✓
Digital Browser Based Web Map Of Your Facility (web Map) To Search And Locate Vehicles	✗	✓
Colour Coded Status And Icons Indicative Of Vehicle Status	✗	✓

Case Study – Process Change Management

Transforming transit yard operations with location technology for operational efficiency and strategic management.

A Public Transit Authority (PTA) in the United States undertook a project to enhance their transit yard operations using the SmartSpace platform by Ubisense.

The PTA's existing processes were largely manual, involving disparate systems and time-consuming tasks such as manual mark ups, dispatch and creating parking sheets by hand.

Ubisense proposed and implemented the SmartSpace platform to streamline operations, providing real-time data and automating several functions and processes.

Staff Training and Adoption

Comprehensive training programs were tailored for different user groups (end users, admins, etc.) to ensure effective use of SmartSpace. A 24/7 support portal was also established for continuous assistance and troubleshooting.

This case study outlines the recommended changes and the impact of implementing SmartSpace on transit business processes



- + Dispatching
- + Yard Inventory Management
- + Resource Allocation
- + Maintenance and Servicing

Key Process Transformations with SmartSpace

+ Dispatching

Old Process: Dispatchers used hand-made parking sheets, which were static and quickly outdated.

New Process: SmartSpace provides a dynamic, real-time map showing bus locations and statuses. It simplifies identifying vehicles scheduled for pullout and managing "ready" statuses, enhancing dispatch efficiency.

Yard Inventory Management:

+ Yard Inventory Management

Old Process: Manual checks and multiple systems (ERP, CAD/AVL etc.) for managing yard inventory.

New Process: SmartSpace integrates these systems, offering automated, up-to-date inventory management. The platform logs vehicle locations and provides historical data, reducing manual effort and errors. For safety; reducing unauthorized movements and improving emergency response, historical data helps in compliance and process improvement.

+ Resource Allocation

Old Process: Maintenance staff manually located vehicles needing service, leading to inefficiencies.

New Process: Integration with existing systems allows SmartSpace to flag vehicles for maintenance automatically. It provides answers to logistical questions, improving maintenance planning and execution.

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SmartSpace Transit Process Change Management

Impact and Benefits:

The implementation of SmartSpace significantly improved the transit authority's operational efficiency. Real-time data and automation reduced manual tasks, errors, and response times. Strategic resource allocation and better maintenance scheduling enhanced the overall service quality. Improved safety measures and compliance tracking ensured a secure transit environment. Staff training ensured smooth adoption and effective use of the new system.

Conclusion:

The transition to SmartSpace by Ubisense transformed their transit yard operations, showcasing the benefits of leveraging advanced technology for operational efficiency and strategic management. This case study highlights the successful integration and the substantial improvements in their business processes



Global Deployments

+ US

METRO TRANSIT

Five garages and 1000+ buses since 2009 with automated dispatch and maintenance support



+ US

BROWARD CO.

Fast bus locating and automated parking, dispatch and nightly maintenance across indoor and outdoor



+ CANADA

RTL

Fast bus locating and automated parking, dispatch and nightly maintenance since 2011



+ EUROPE

VBL

Fast bus locating and automated driver assignment and dispatch across multiple sites



+ EUROPE

TPF

Automated parking guidance, driver assignment and dispatch since 2018 across multiple sites



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