49th ASECAP DAYS

Decarbonizing Road Infrastructure : Challenges, Perspectives and Actions in Tough Economy

ASECAP DAYS
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APP solution to pay Tolls using Bluetooth technology

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01.

What's AWAI?

01. What's AWAI?

AWAI is a disruptive and innovative product, designed to pay tolls.

Unique in the market, this system can be used in ecosystems **with or without barriers**. Using an active application on your smartphone, the user goes through the single lane or gantry (free-flow) without stopping the car.

The technology used to complete the transaction is the **smartphone Bluetooth** in low energy (BLE) mode. The **user experience** is the same as with the DSRC/RFID since the smartphone functions as the OBU.

- Works on toll barriers and with Free-Flow gantries.
- Non-stop.
- Integrated with Autopista's tolling system and
- RedSys service.
- Compatible with IOS & Android OS.
- Alpha-tested with Autopistas team & employees.
- Beta-testing with 100 clients.
- In operation since 15 October 2021.

01. What's AWAI?

Similarities to RFID/DSRC:

- Seamless electronic tollcollection system.
- Requires additional roadside equipment (low cost).
- Works in tolling stations.

Advantages over RFID/DSRC:

- Phone-based (vehicle independent).
- No line-of-sight needed for communication.
- No additional costs for customers (e.g. tag).

Advantages over CB/Cash payment:

- New customer channel (phone app).
- Increase number of registered customers (reduce market share of CB/Cash payments).

Bluetooth SMART

1. Smartphone with enabled BLE communication.
2. App needs to be running before toll point.
3. Data connectivity for Smartphone requested only to renew security certificates.

02.

Where can we use it?

02. Where we can use it?

24 single Lanes (HOV, ECO)
Non-stop 40 km/h
With barrier

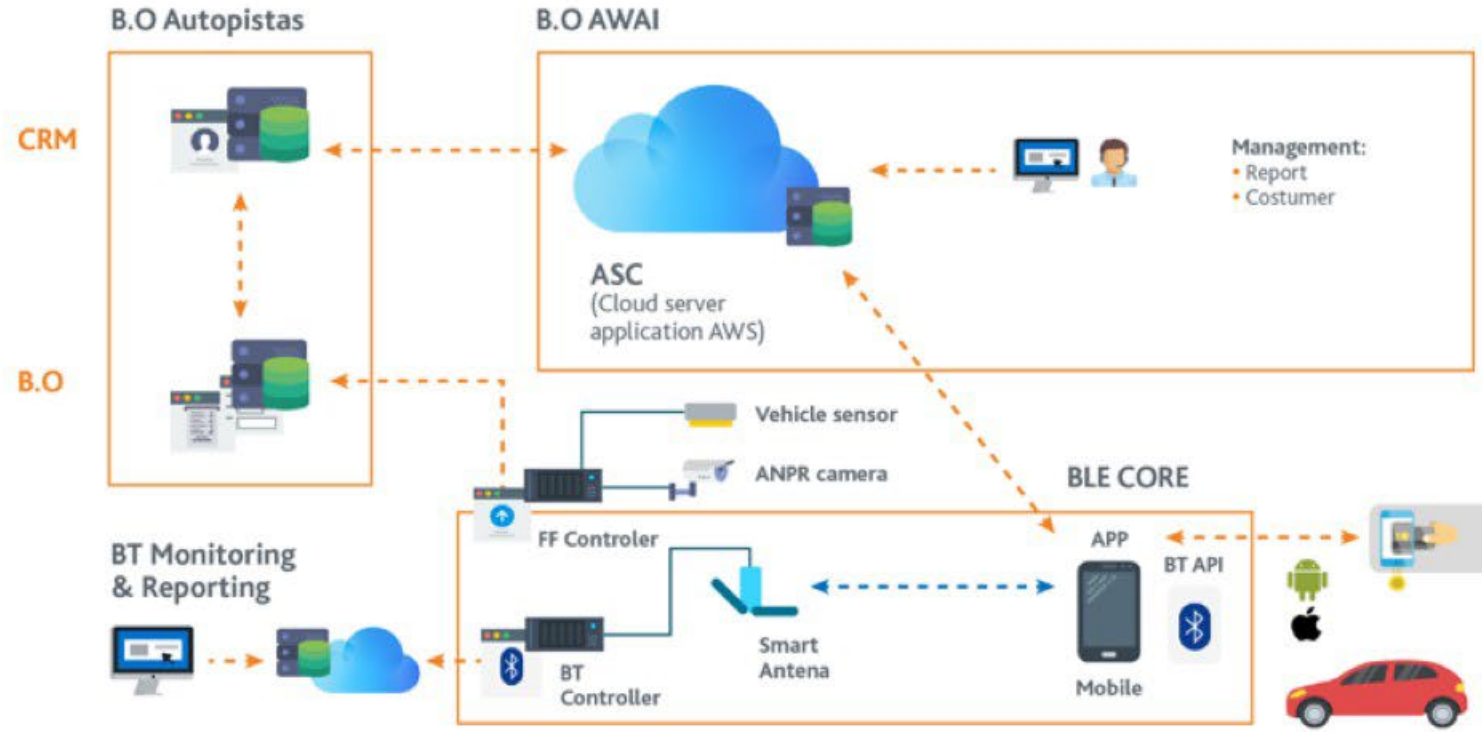
12 single gantries
Non-stop 120 km/h
Without barrier

2 dual gantries
Non-stop 120 km/h
Without barrier

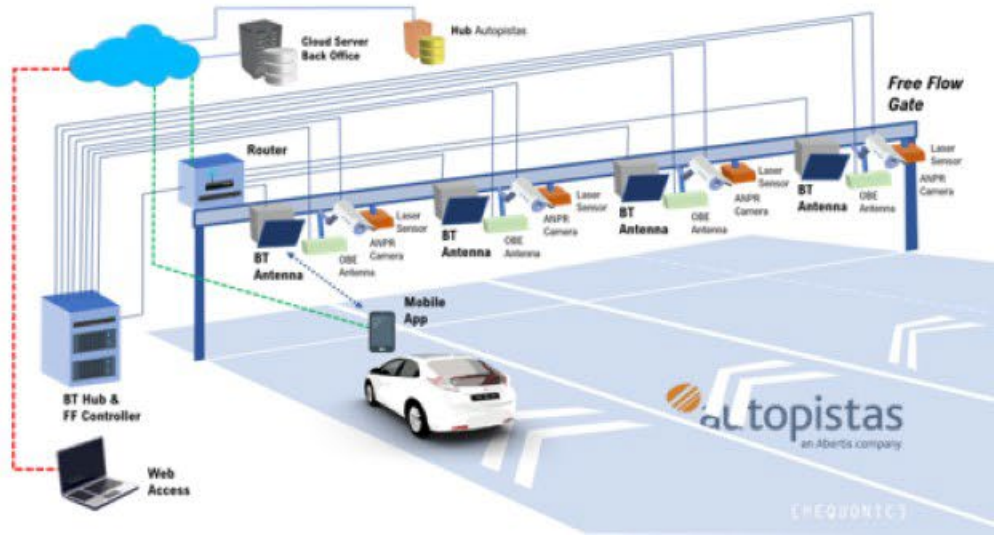
03.

System description

Architecture



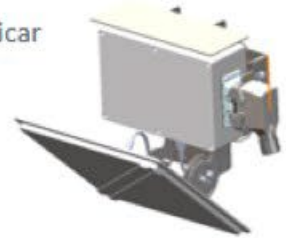
Authorizing Center



Bluetooth smart antenna

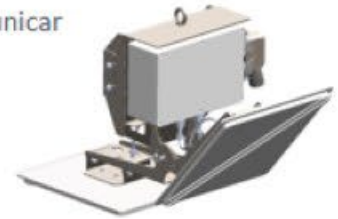
Toll barrier system: Single antena

- Antena Single para detectar y comunicar
- HW Industrial (PC+placa BLE)
- Sistema antena reguladora



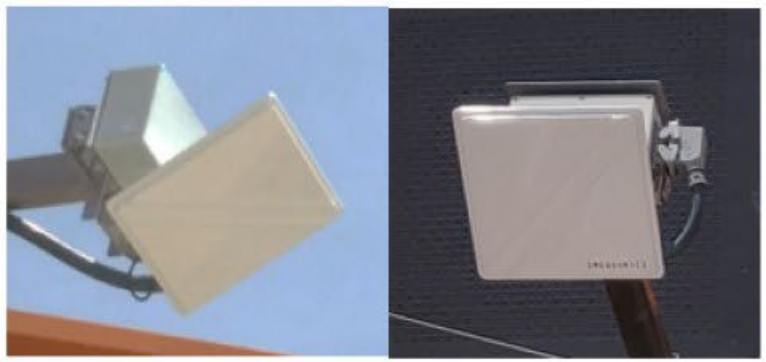
Freeflow system: Dual antena

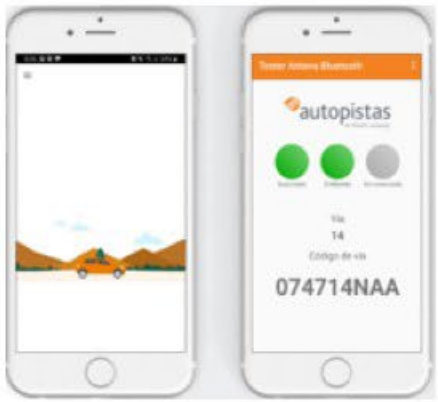
- Antena dual para detectar y comunicar
- HW Industrial (PC + placa BLE)
- Sistema dual antena reguladora



User APP

- API BLE
- APP AWAI
- APP for system calibration





04.

Technical challenges

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General challenges in both ecosystems

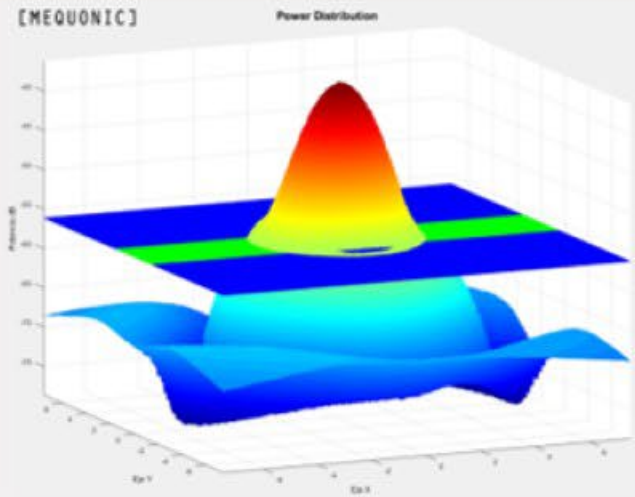
- Mobile detection
- Short transition time
- Manages communication range (about 100m long)
- Multiple Smartphones with different power transition BLE
- Detection and communication reliability
- Uses the same API BLE for both ecosystems

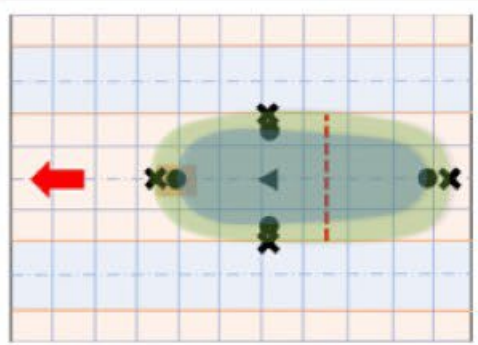
Toll barrier system

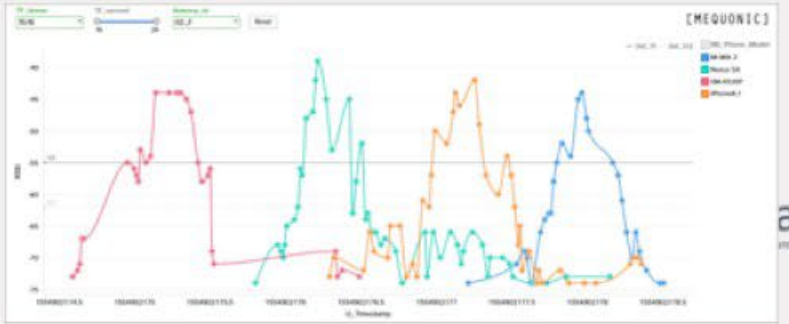
- **Hands-free**
- **Short response time**, similar to DSRC
- Correct mobile to **vehicle matching** in lane queue and parallel lanes
- Use of current DSRC **toll way design** (geometry, vehicle sensors, etc.)
- **Secure communication** avoiding impersonation

Free-flow system

- **Faster and heavier traffic** makes requirements tougher in terms of:
  - Mobile detection
  - Communication range
  - Detection and communication reliability
- **Mobile to vehicle matching** in a multilane way requires:
  - Lane discrimination
  - Mobile space and time detection accuracy

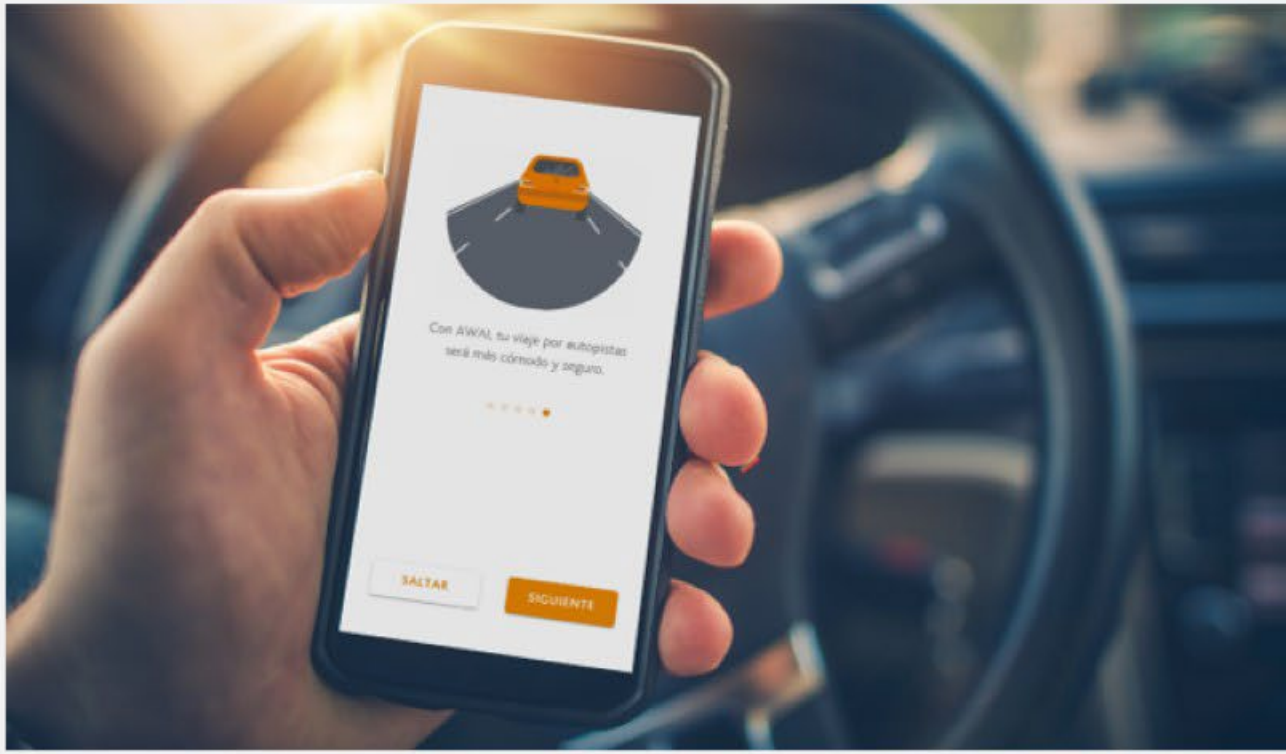






05.

How to use it?



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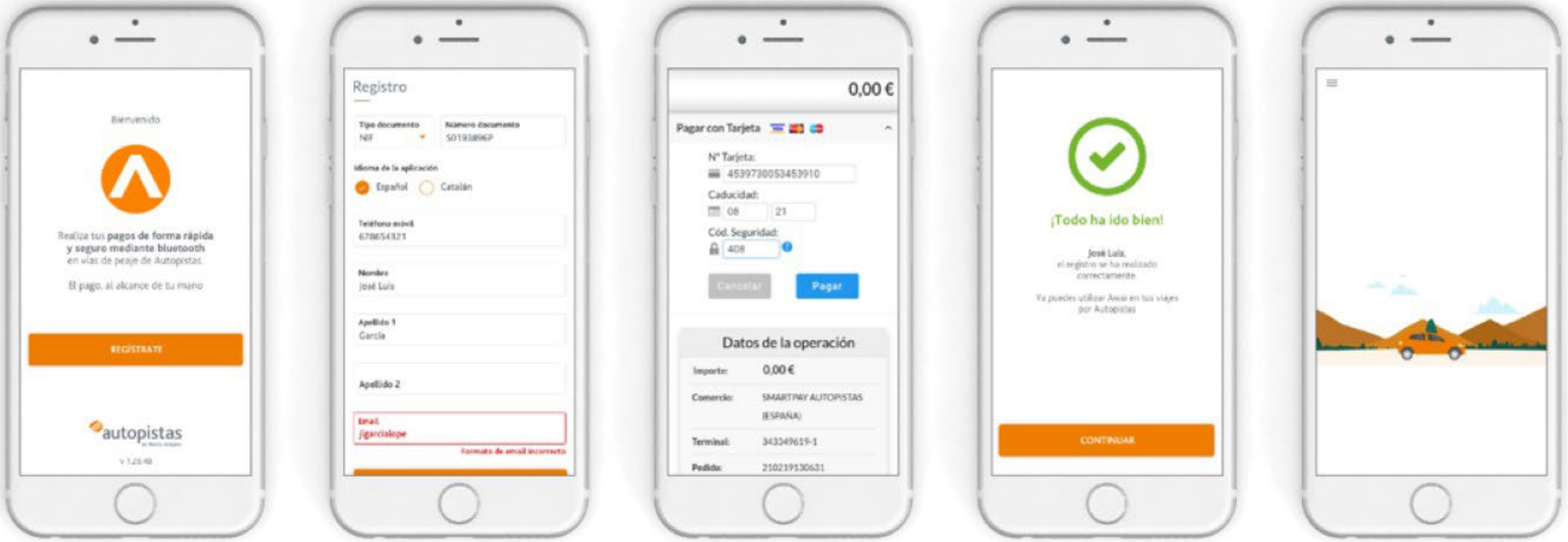
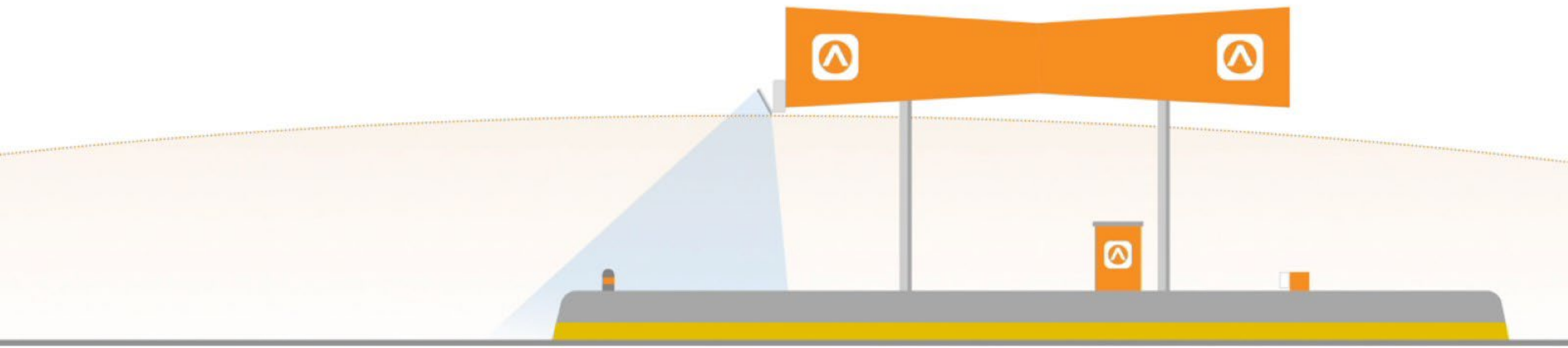


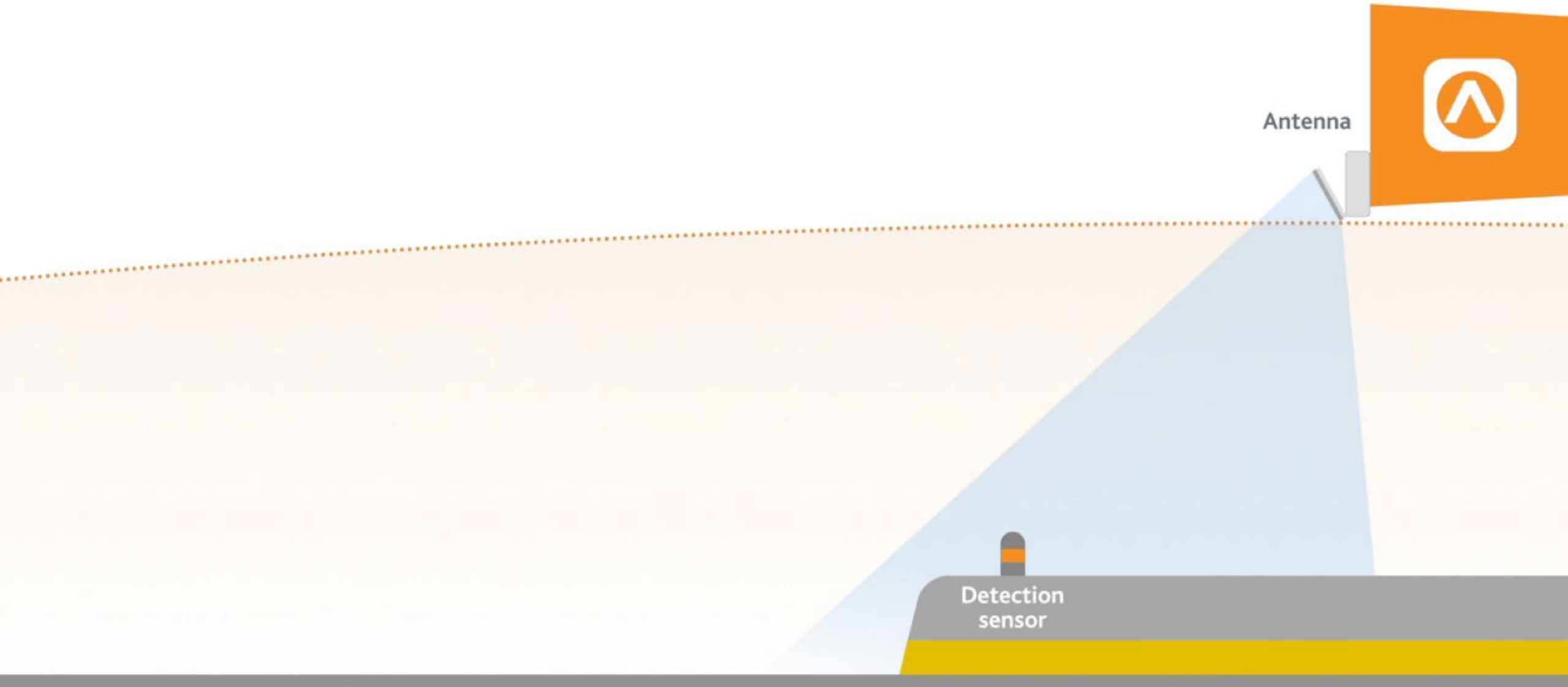
PASSING THROUGH THE SINGLE LANE

INTRODUCTION



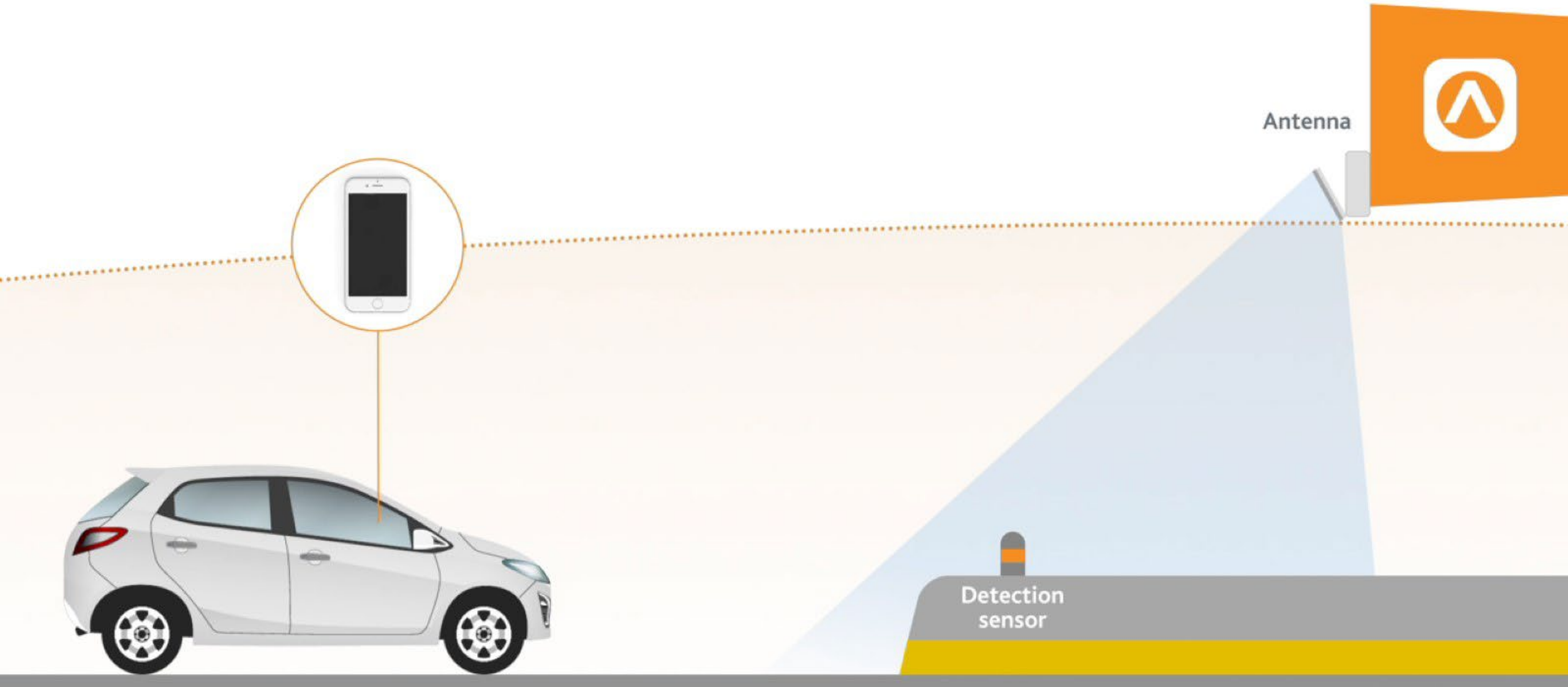
PASSING THROUGH THE SINGLE LANE

STEP 1: OUT OF THE LANE



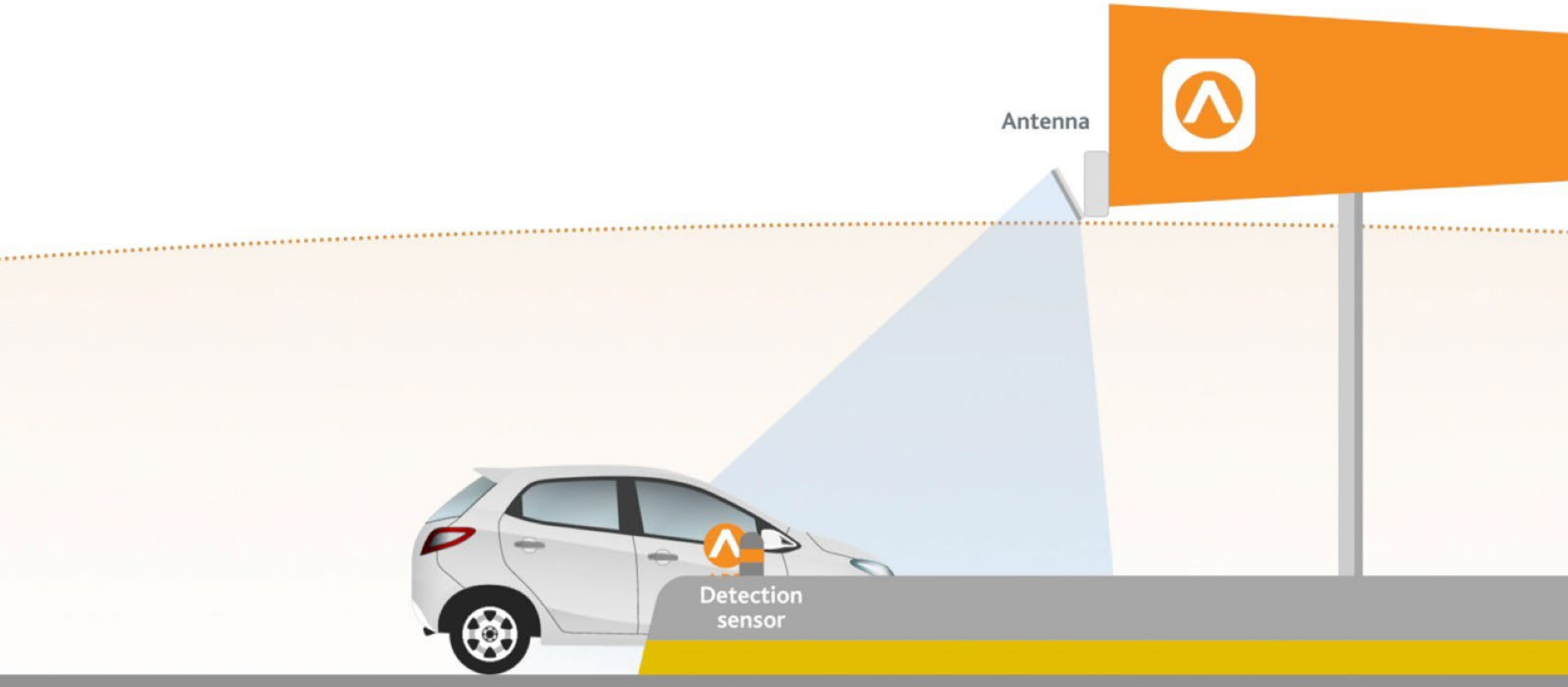
PASSING THROUGH THE SINGLE LANE

STEP 2: INSIDE THE LANE



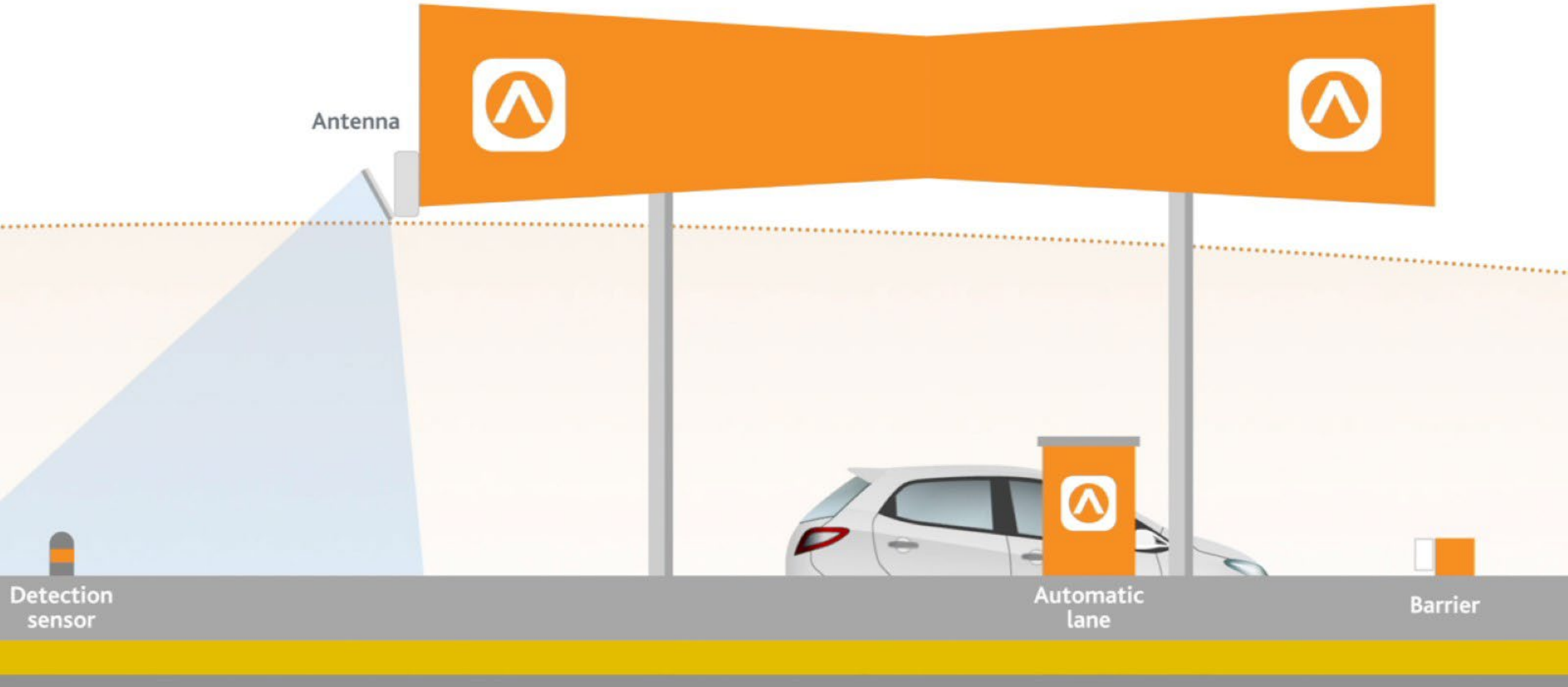
PASSING THROUGH THE SINGLE LANE

STEP 2: INSIDE THE LANE



PASSING THROUGH THE SINGLE LANE

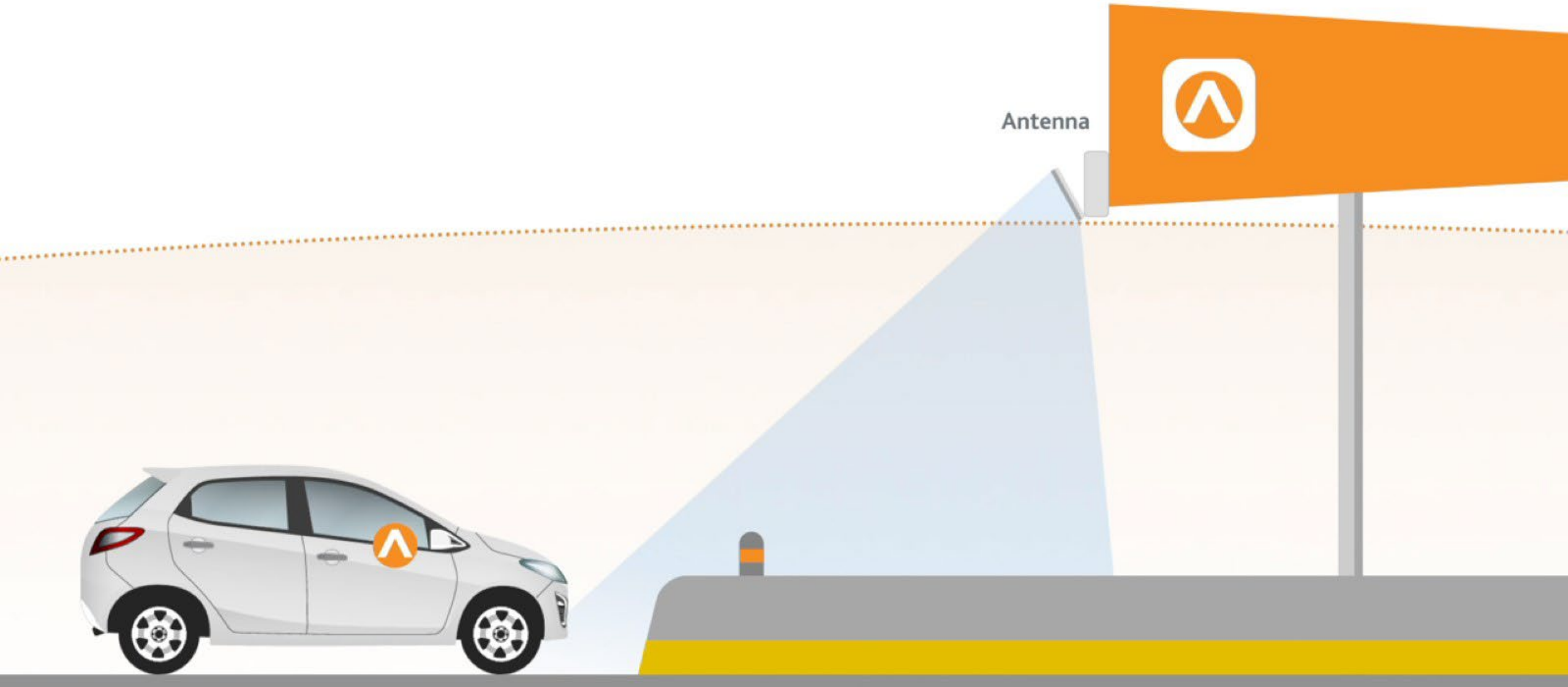
STEP 3: PASSING THE BARRIER



PASSING THROUGH THE SINGLE LANE

SELF RESCUE CASE

No active App / Error transmition



PASSING THROUGH THE SINGLE LANE

SELF RESCUE CASE

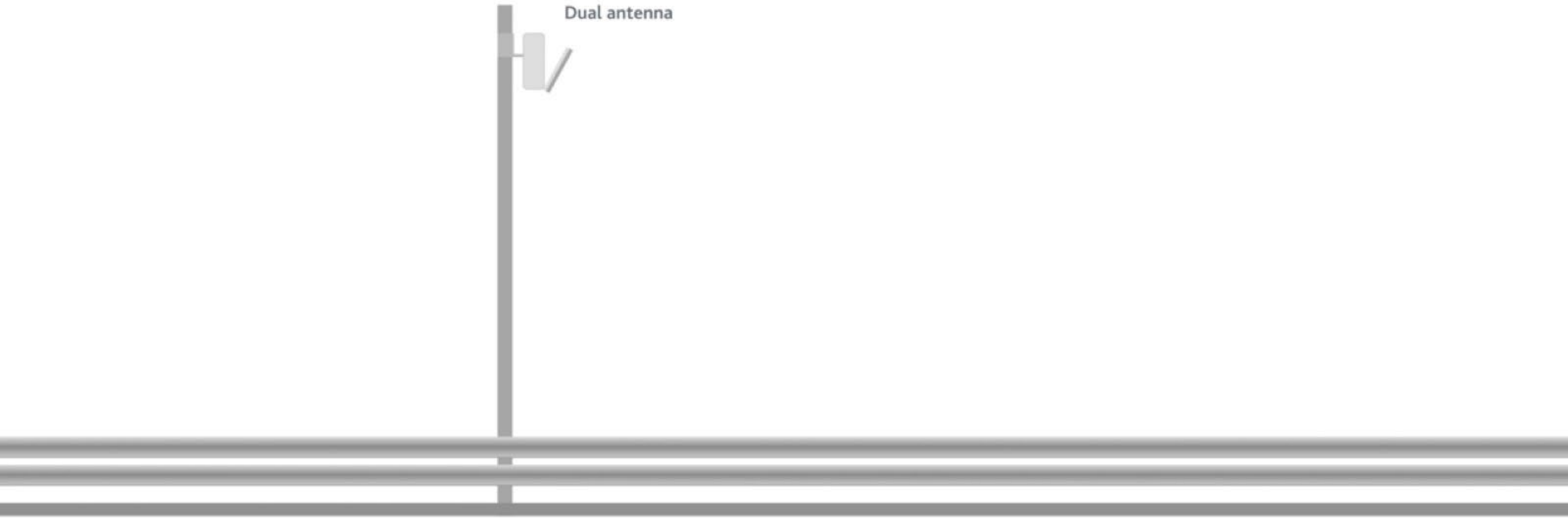
No active App / Error transmition

PASSING THROUGH THE SINGLE LANE

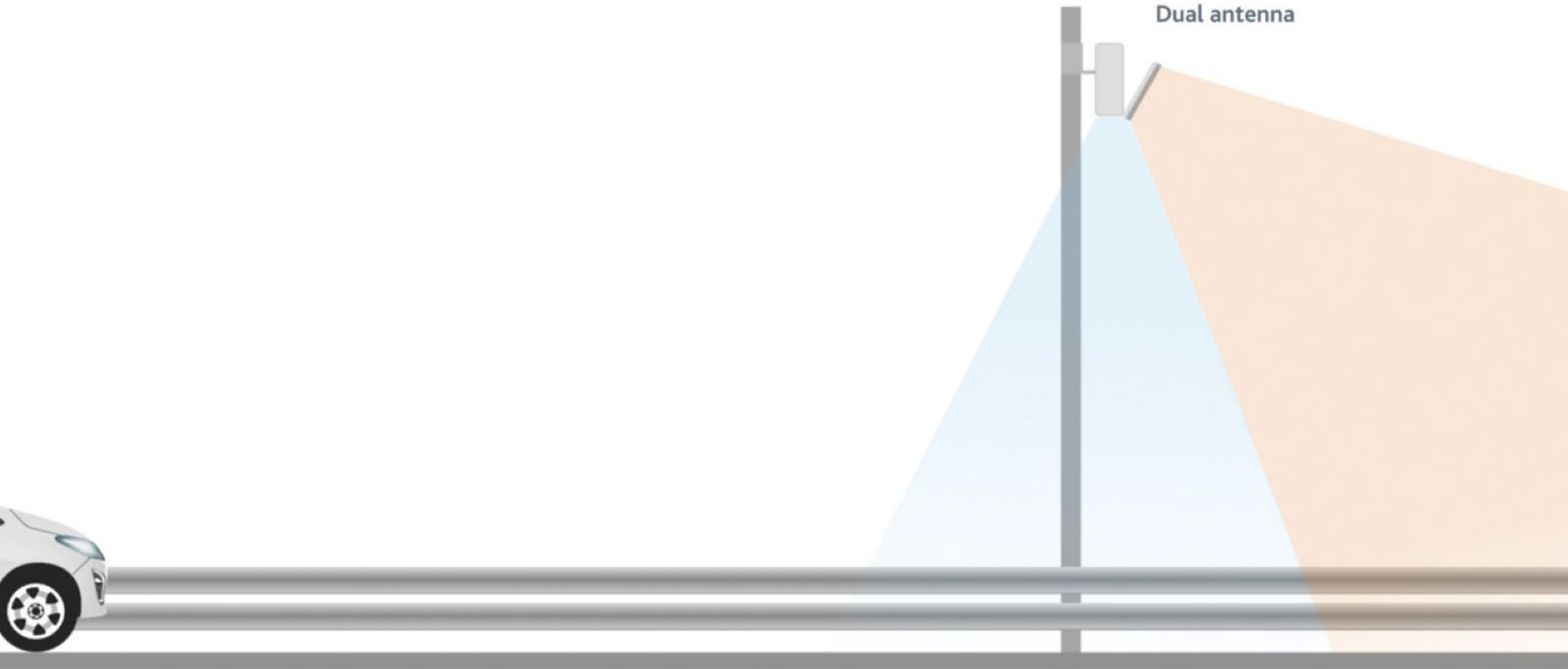
SELF RESCUE CASE

No active App / Error transmition

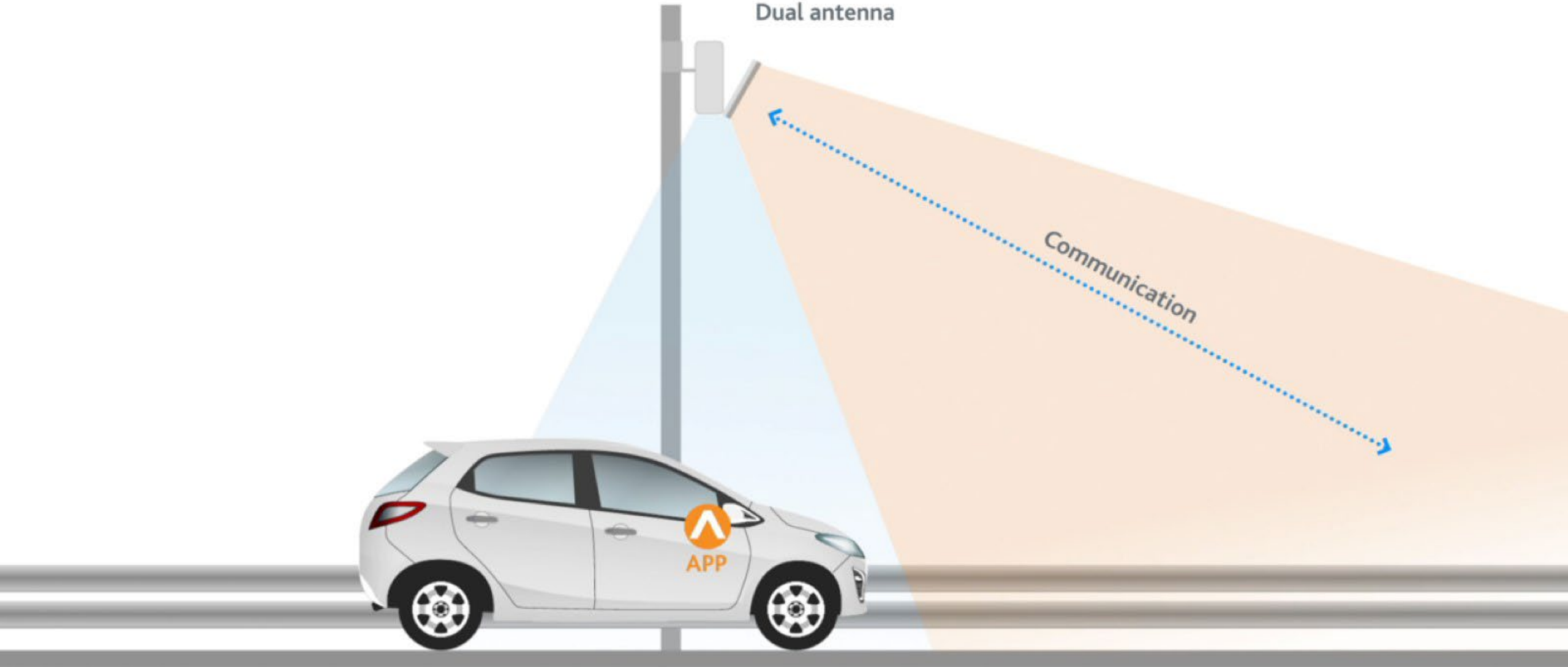
PASSING THROUGH THE FREE FLOW



PASSING THROUGH THE FREE FLOW



PASSING THROUGH THE FREE FLOW



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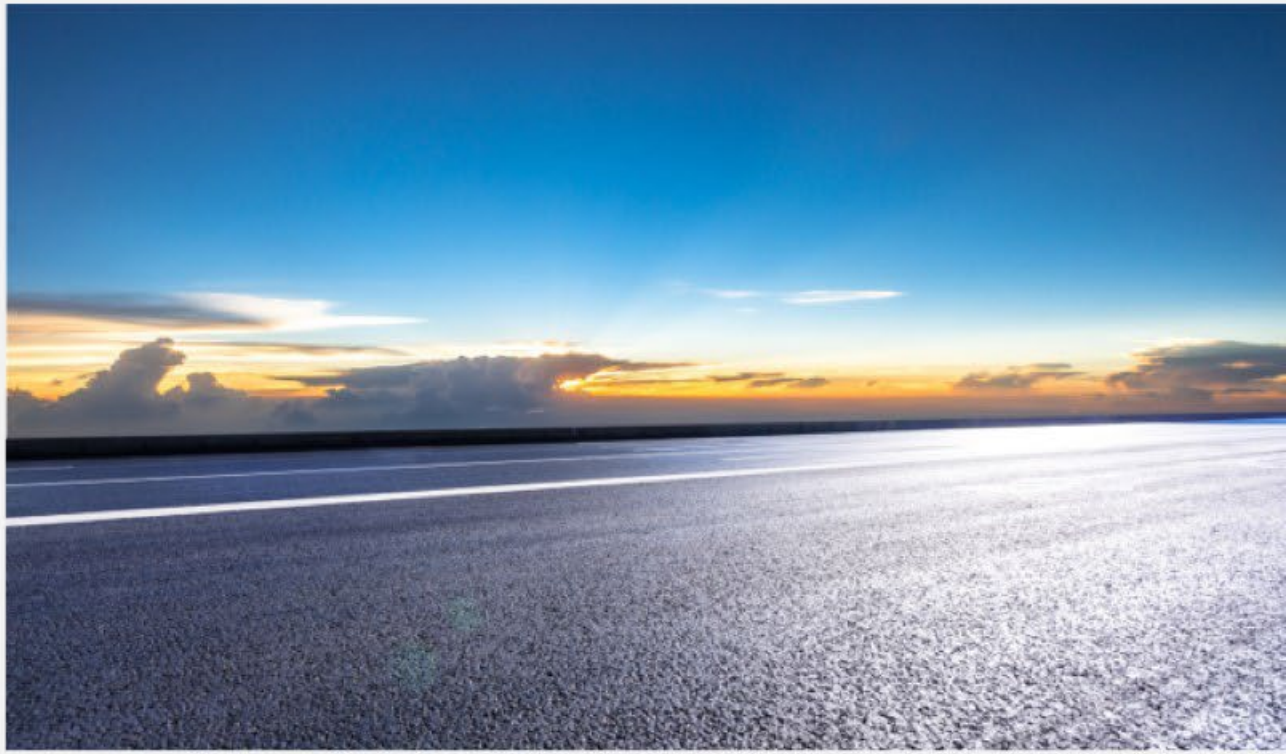
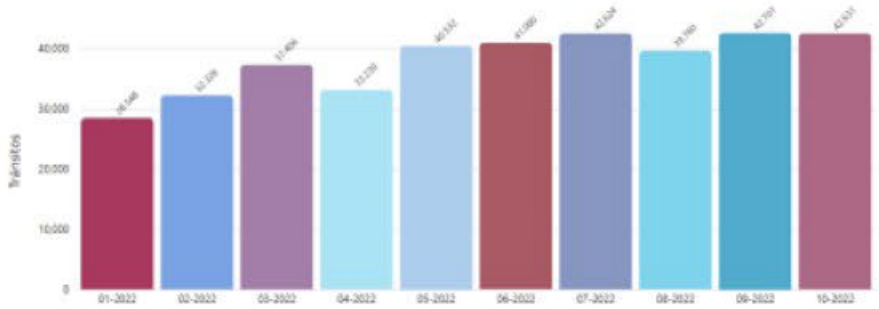
06.
Some figures

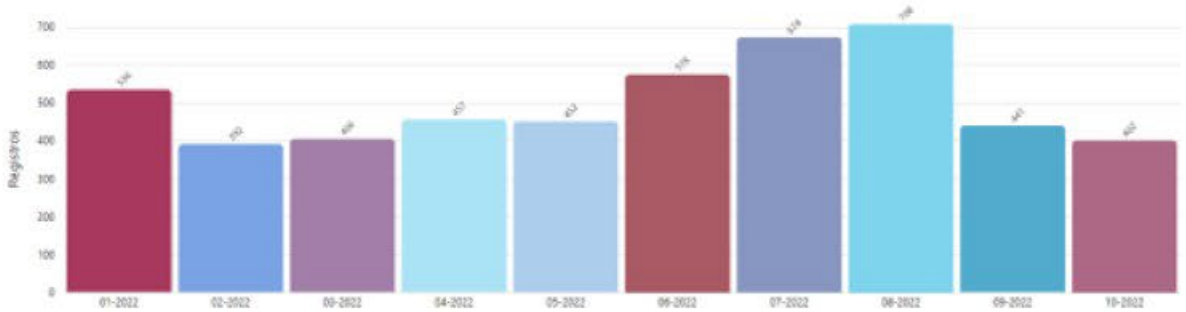


06. Some figures

Total AWAI transactions: 750,000
Every week about 12,000

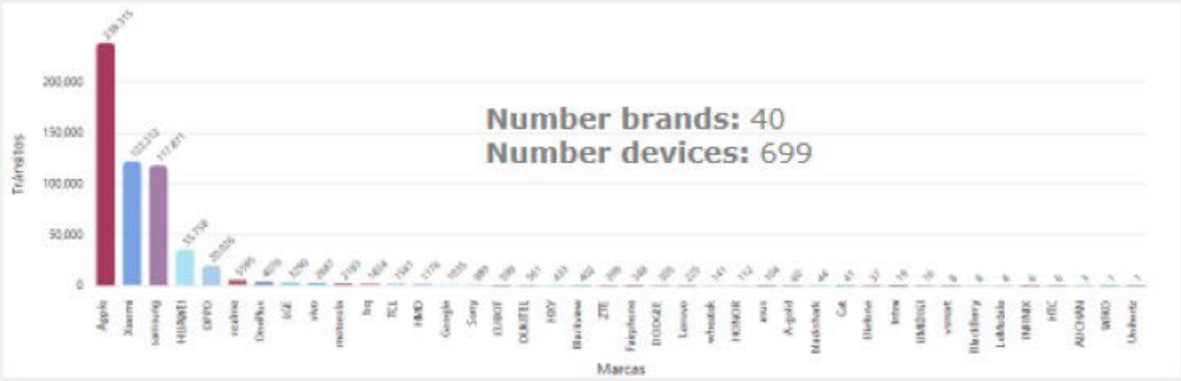


Total registered customers: 14,500
Every week about 100 new costumers



AWAI | APP SOLUTION TO PAY TOLLS USING BLUETOOTH TECHNOLOGY

Data by brand



Statistics 2022

	Devices	Transaction	%
Apple	37	166.337	43,56%
Xiaomi	103	84.077	22,02%
Samsung	135	78.412	20,53%
Huawei	65	21.315	5,58%
OPPO	40	13.495	3,53%
Realme	31	4.102	1,07%
OnePlus	31	2.635	0,69%
VIVO	14	1.957	0,51%
LGE	22	1.872	0,49%
motorola	37	1.687	0,44%
Otros	124	6.001	1,57%
	639	**381.890**	

Number brands: 35
Number devices: 639

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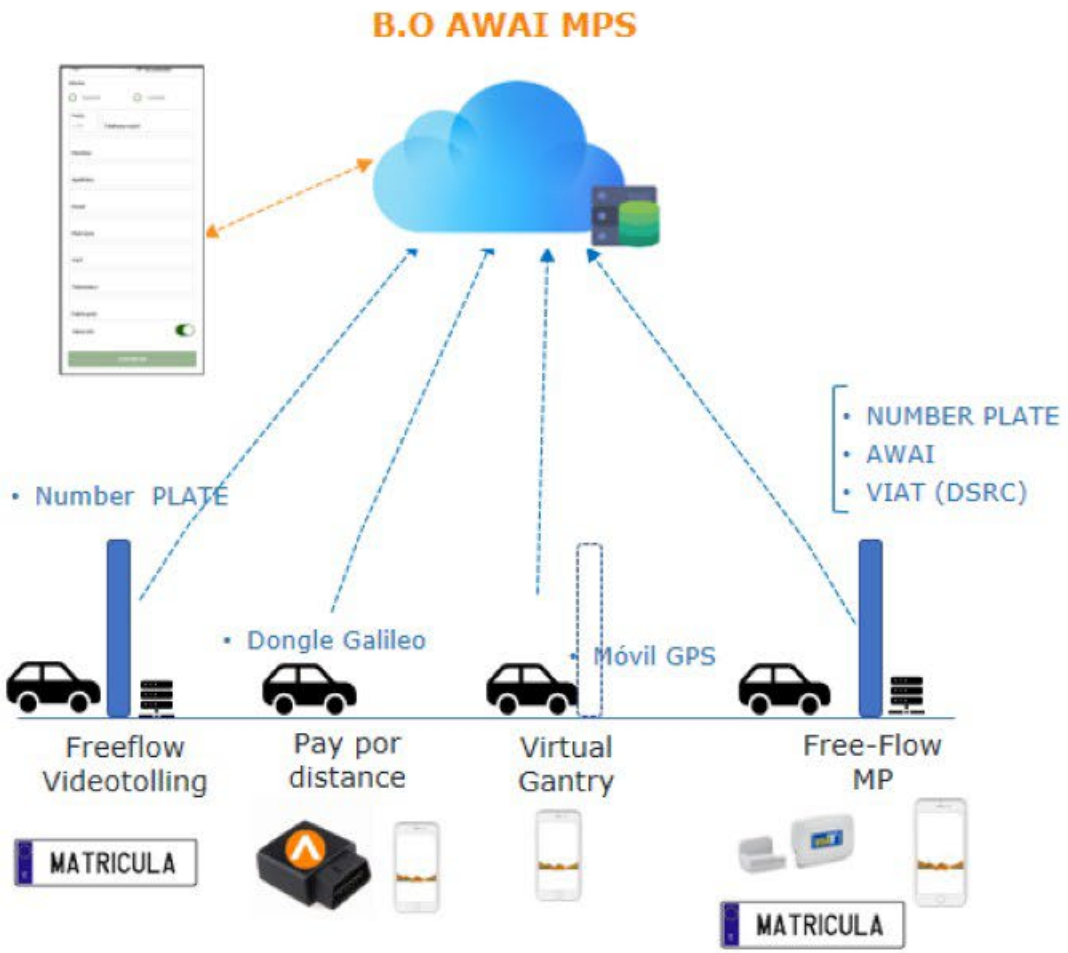
07.
Next steps

07. AWAI MPS (multi payment system)



Payment systems

Ecosystems

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THANK YOU FOR YOUR ATTENTION

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