



**49<sup>th</sup> ASECAP Days**  
**Decarbonising Road Infrastructure: Challenges, Perspectives,  
and Actions in Tough Economy**

Hôtel Marriott Grand Place , Brussels  
November 24-25 th, 2022

# Integration of new toll technologies on motorways in Morocco, generalisation of ETC and perspectives towards free flow tolling

**EL MELLOUKI ANAS**  
Head of Toll Technologies Division  
[elmellouki.anas@adm.co.ma](mailto:elmellouki.anas@adm.co.ma)



# Roadmap

**ETC**

JAWAZ : ETC Product

**AP**

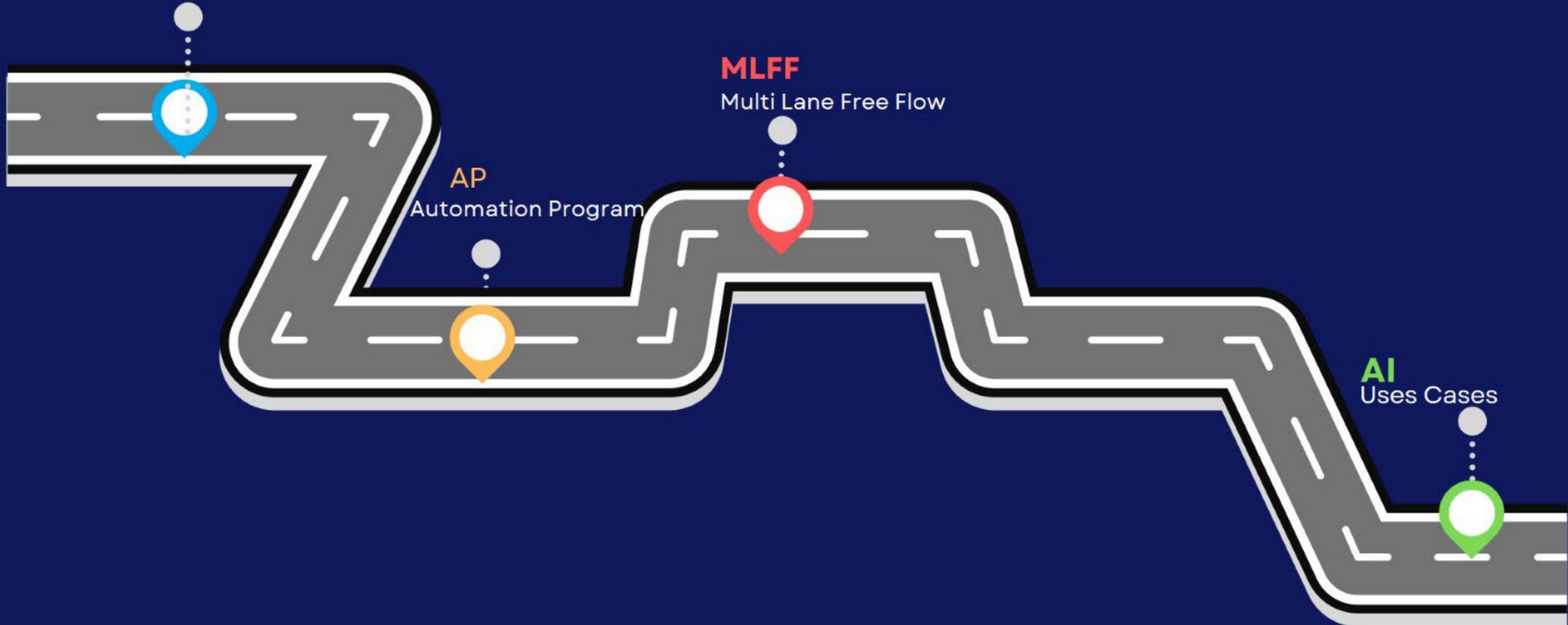
Automation Program

**MLFF**

Multi Lane Free Flow

**AI**

Uses Cases



# JAWAZ: Moroccan Electronic Toll



electronic toll lane passage speed  
: 20km/h



**DSRC technology** for antenna-tag  
communication and the **EN 15509**  
standard for tag encoding

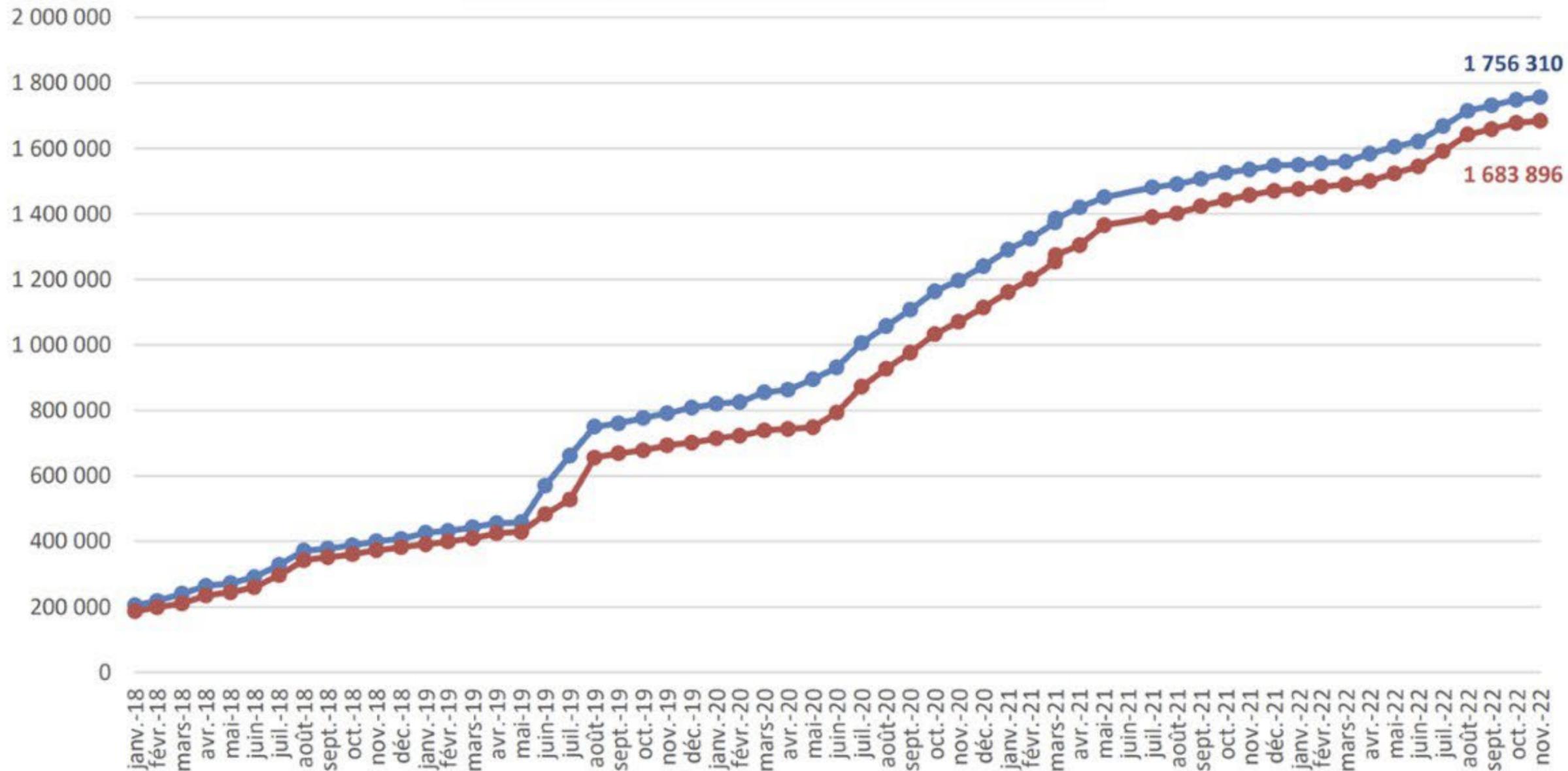


Prepaid Mode with centralized  
balance

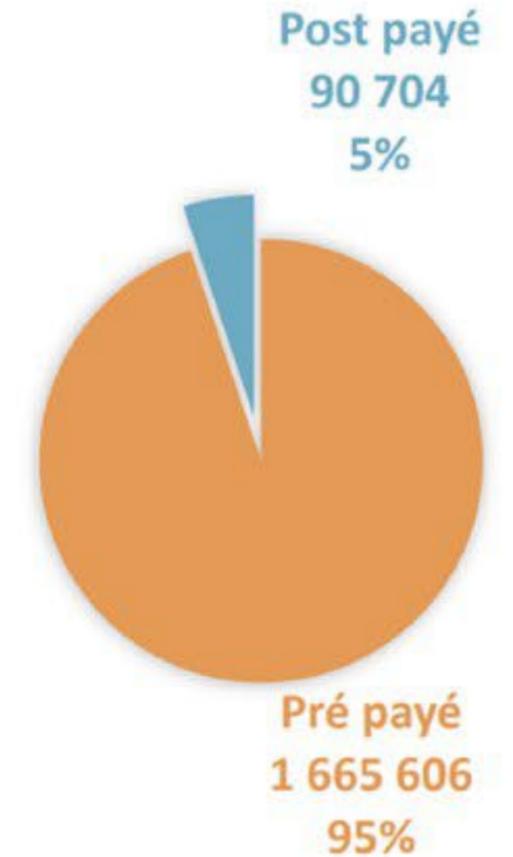


# Jawaz: A success story

Sold and Active Jawaz Passes



Sold Jawaz Passes





Since 2017, the strategy pursued by ADM has convinced more than 1M additional users to use Jawaz



Compared to the target initially set in 2017 which provided for reaching the emblematic threshold of one million between 2023 & 2025,



Jawaz is therefore at least 3 years ahead of the original schedule. The impact of this acceleration is very important on the organization of toll stations.

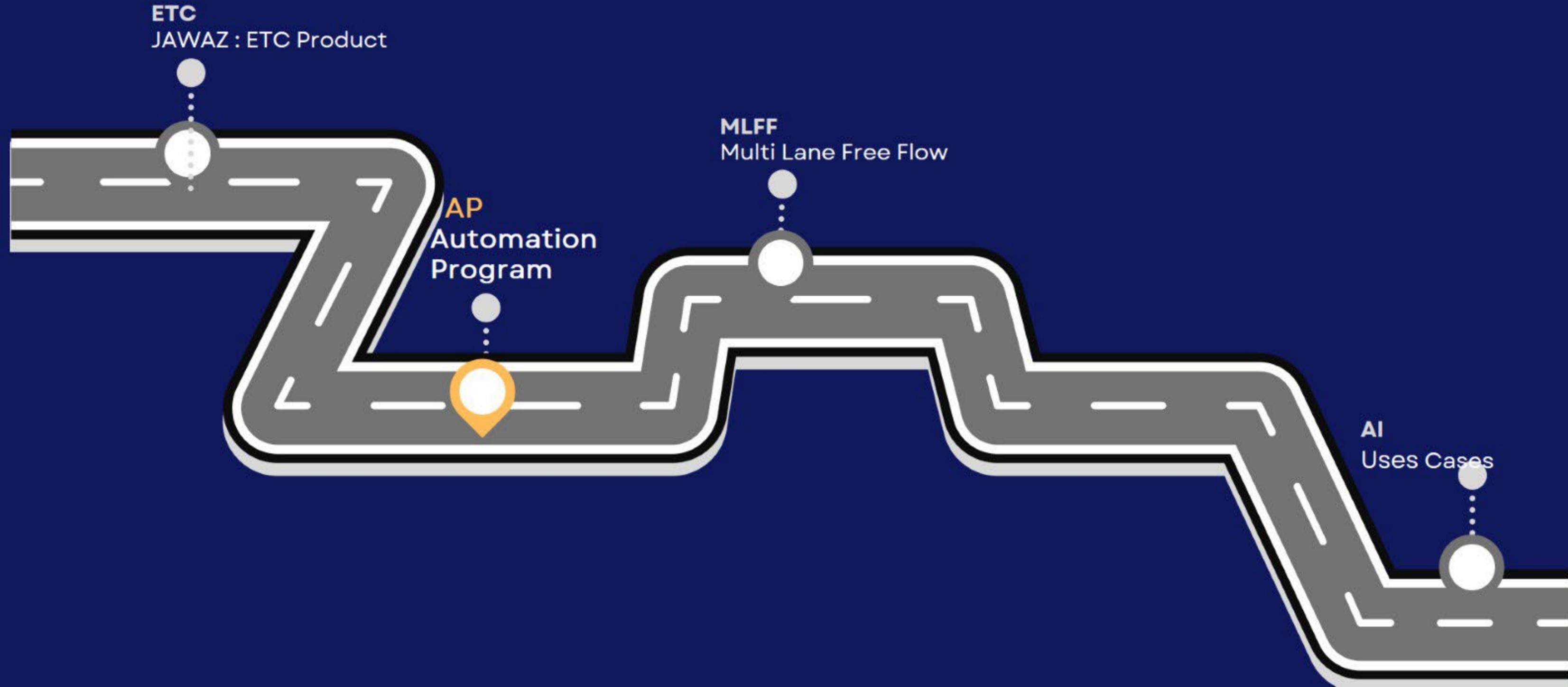
# Automation Program

ETC  
JAWAZ : ETC Product

AP  
Automation  
Program

MLFF  
Multi Lane Free Flow

AI  
Uses Cases



# ADM Launch in 2018 a TRANSFORMATION Project of his motorway network, THE AUTOMATION Program is the backbone :



Customer satisfaction oriented project



Jawaz is main mean of payment, 80% of digital revenue



Deployment of remote jobs including Tele-Assistance



Primary role of Video Surveillance for Communication / Supervision / backoffice of remote jobs, etc

# ADM has signed an investment agreement on the Automation Program of 1 billion dirhams (100 Million Usd)

## This program is structured in 5 parts

Toll automation: Automation and digitalization of the processing of toll transactions

Supervision development: Implementation of a traffic supervision and network monitoring solutions

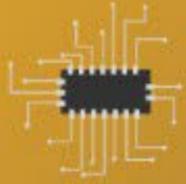
Service  
Digitization of customer relations and deployment of front and back office strengthening solutions

Digitization of the maintenance sector

Network & Telecommunication Reinforcement

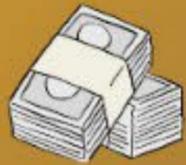
# Automation Program: Achievements





65% increase in electronic toll lanes

---



72% of digital revenue

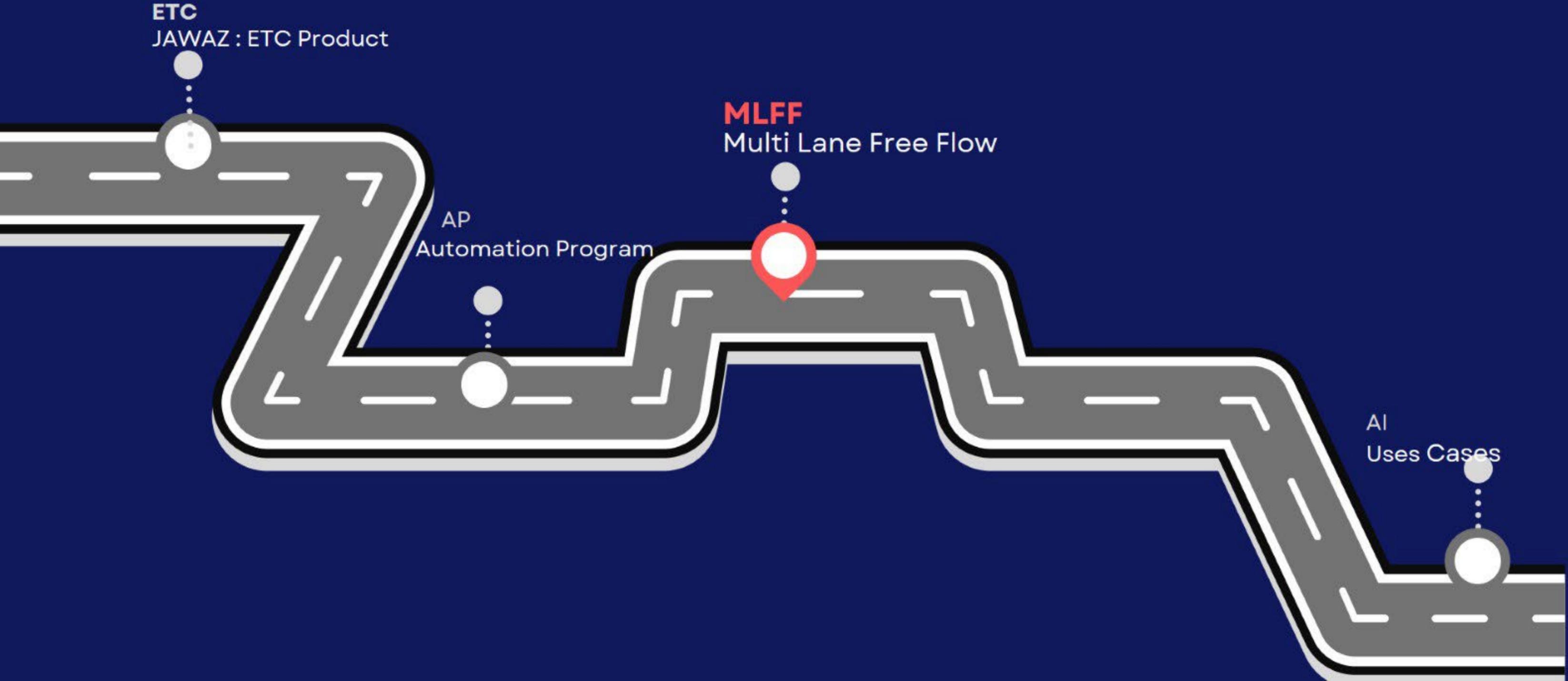
---



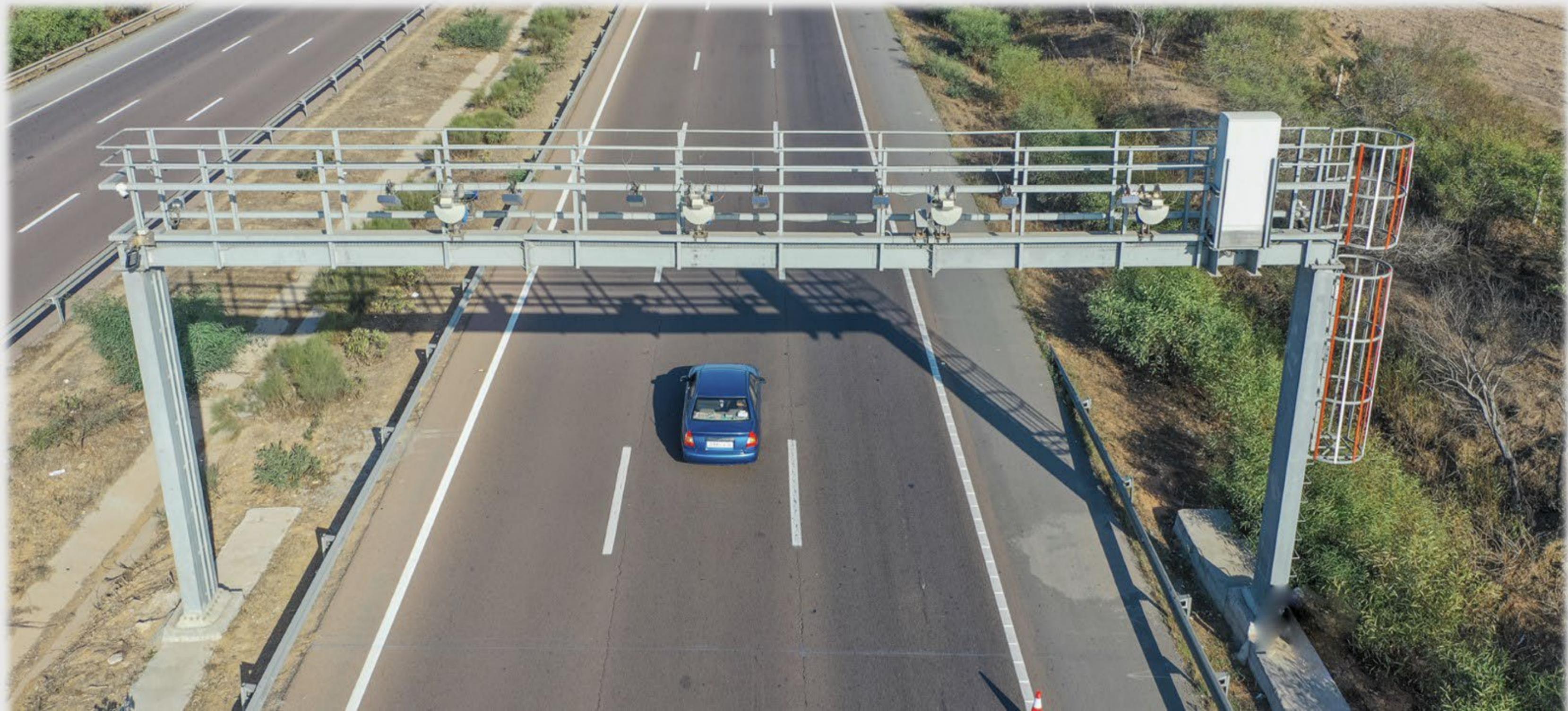
Installation of new generation equipment:

- Automation rebond barriers
  - Assignment lights
  - Tolls cameras
  - Intercom Equipments
-

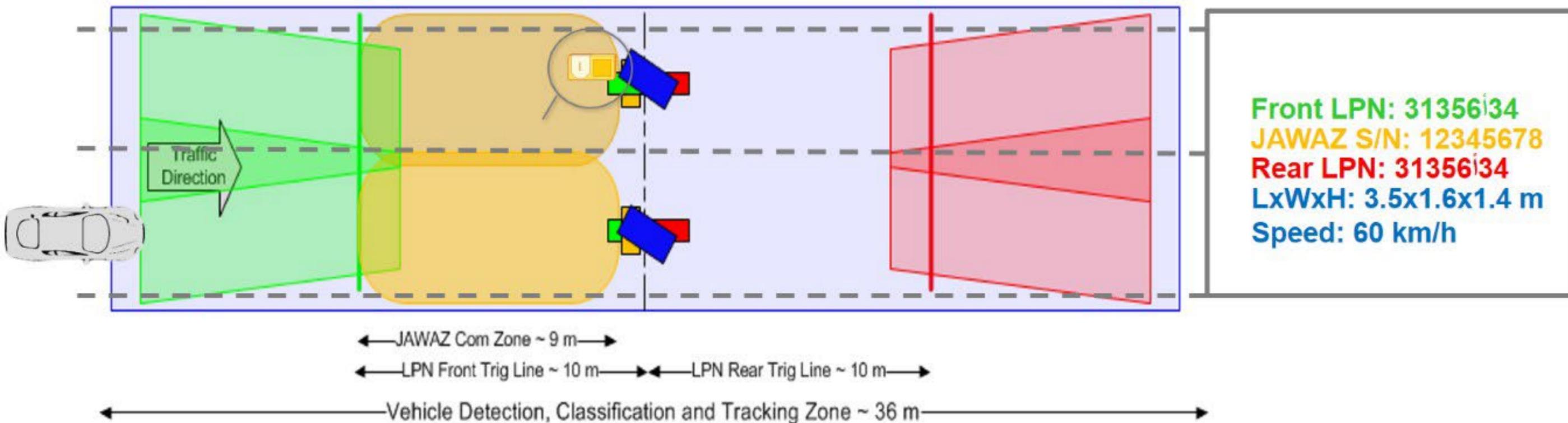
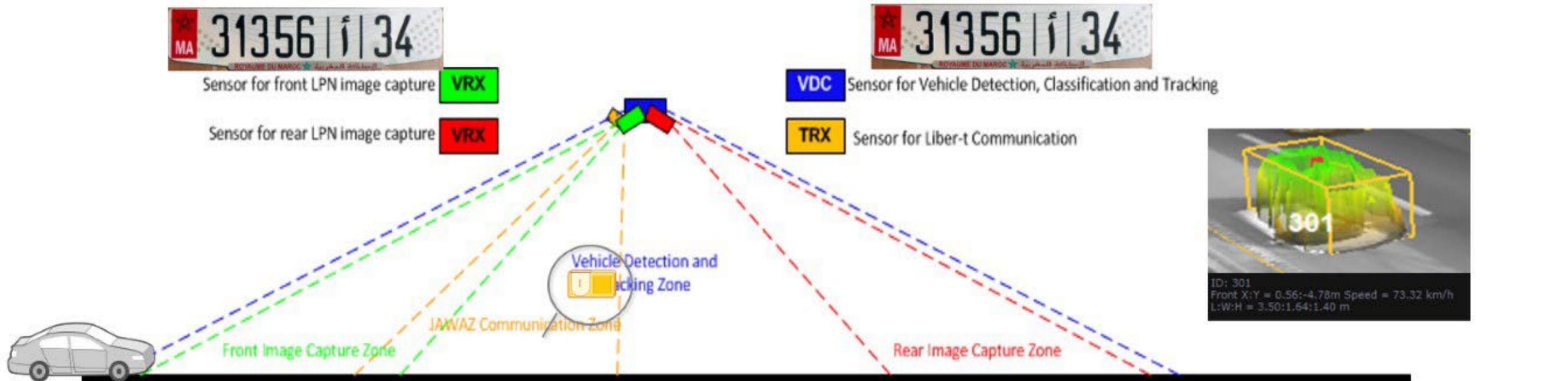
# Multi Lane Free Flow



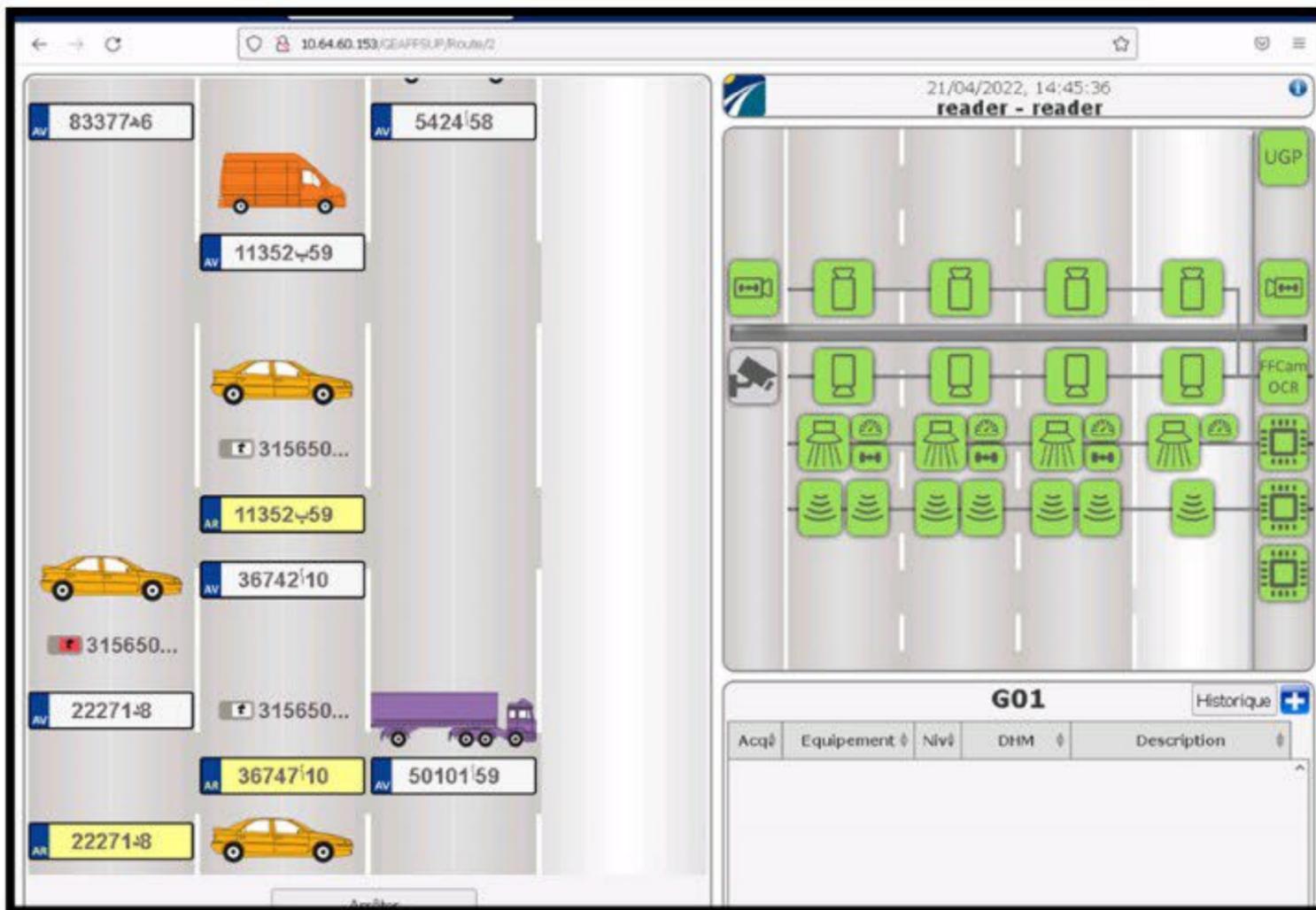
# Multi Lane Free Flow



# Multi Lane Free Flow



# Multi Lane Free Flow



WATCH THE VIDEO

# AI-Machine Learning

**ETC**

JAWAZ : ETC Product

**MLFF**

Multi Lane Free Flow

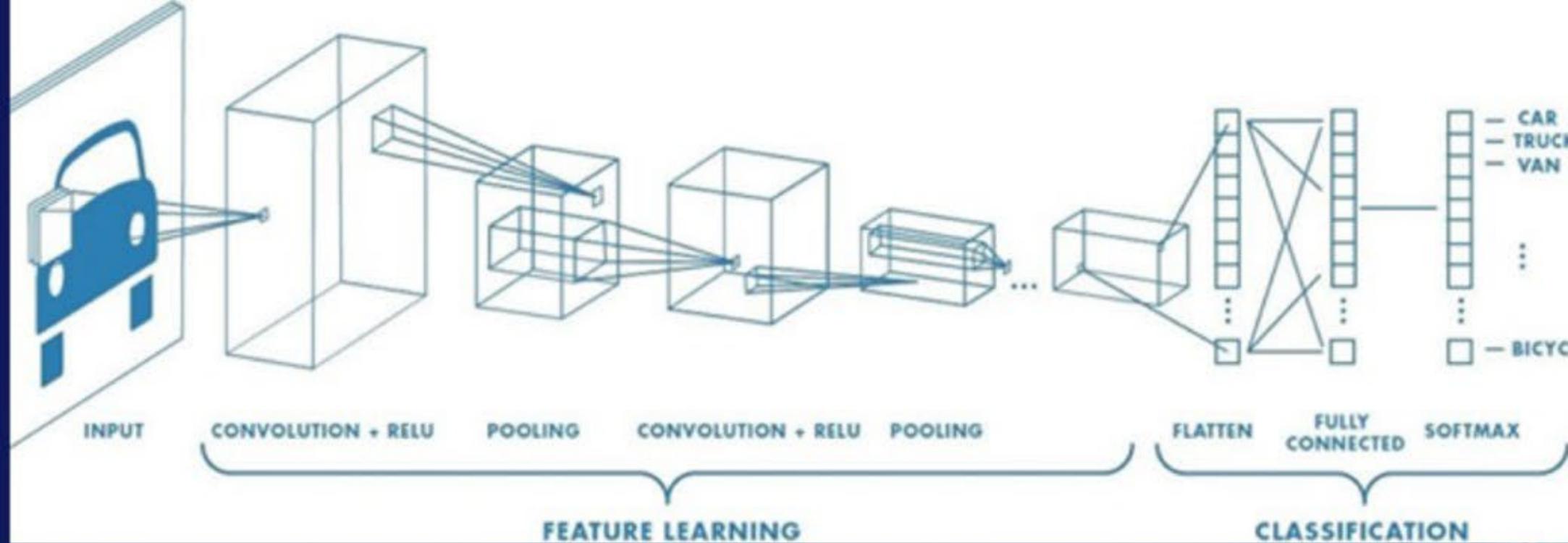
AP  
Automation  
Program

**AI**

Uses Cases of AI



# IA Classification Based only on vehicule image



13	Aéroport Mohammed V	807	4	302883	24	9	05	2	13 Aéroport Mohammed V	01	77	RAS	RAS	Echec classe passage (Classe Tarif - PostDAC)	RAS	
13	Aéroport Mohammed V	807	4	302883	110	9	05	2	13 Aéroport Mohammed V	01	77	RAS	RAS	Echec classe passage (Classe Tarif - PostDAC)	certificat de passage	
13	Aéroport Mohammed V	807	4	302883	189	9								PostDAC	RAS	
13	Aéroport Mohammed V	807	4	302883	290	9								PostDAC	certificat de passage	
13	Aéroport Mohammed V	807	4	302883	306	9								PostDAC	certificat de passage	
13	Aéroport Mohammed V	807	5	300983	26	9								PostDAC	certificat de passage	
13	Aéroport Mohammed V	807	5	300983	42	9								PostDAC	certificat de passage	
13	Aéroport Mohammed V	807	5	300983	61	9								PostDAC	RAS	
13	Aéroport Mohammed V	808	1	300983	305	9								PostDAC	certificat de passage	
13	Aéroport Mohammed V	808	2	300276	22	9								PostDAC	certificat de passage	
13	Aéroport Mohammed V	506	2	300267	302	9								PostDAC	certificat de passage	
13	Aéroport Mohammed V	506	2	300267	125	9								PostDAC	certificat de passage	
13	Aéroport Mohammed V	506	3	300267	136	9								PostDAC	certificat de passage	
13	Aéroport Mohammed V	506	3	300267	151	9								PostDAC	certificat de passage	

### Qualification Classe Voies Manuelles

Gare: 31      DHM: 2020-06-16 09:08:38  
Voie: 506      Classe: 01

**Classe Détectée ( Machine Learning / IA )**  
Classe 1 : 0.992826223      Classe 2 : 0.00716032228      Classe 3 : 1.34551619e-05

# IA Classification Based only on vehicule image



QUALIFICATION EN TEMPS REEL

HISTORIQUES

ENTRÉE  
89 - 891 - 202211121817

DISCORDANCE PLAQUE

SORTIE  
32 - 504 - 20221113130842

Nombre qualification

00 : 01

PAUSE

5636126

5770226

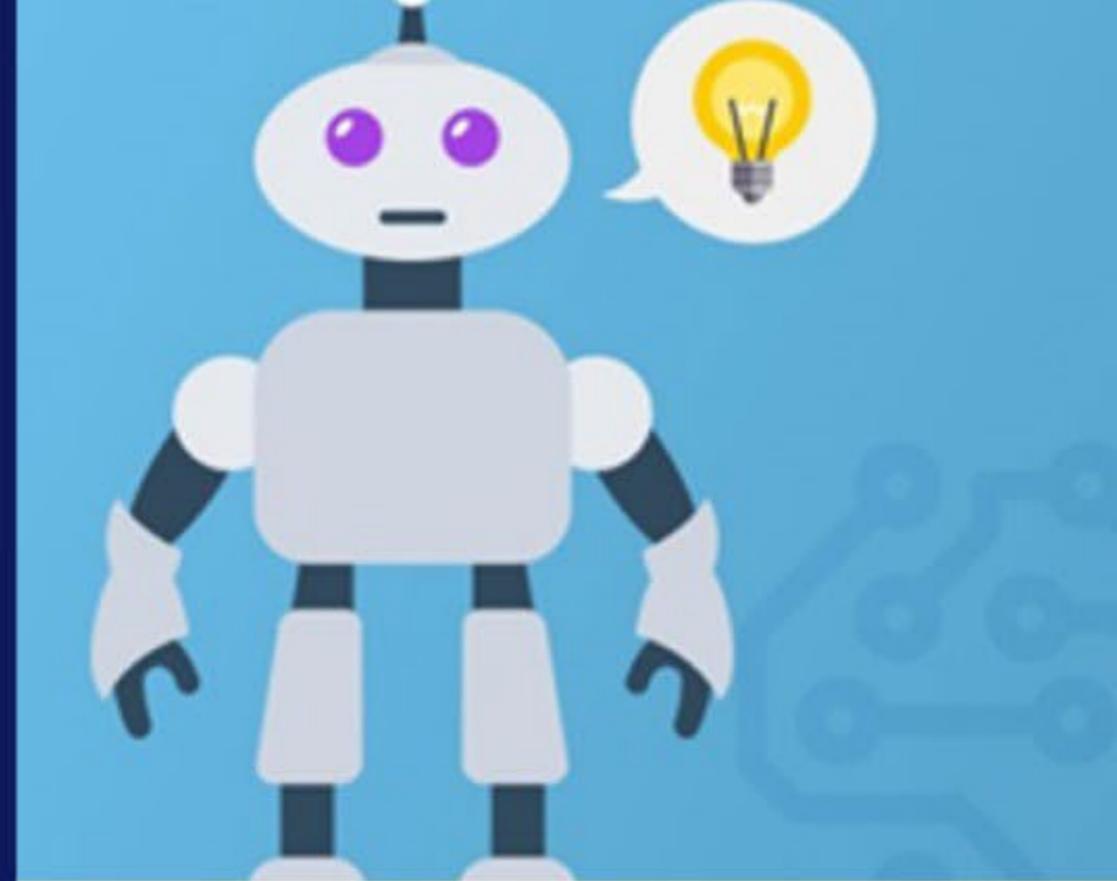
PLAQUES E/S DIFFERENTES 2212120061

OK

ERRAIDE

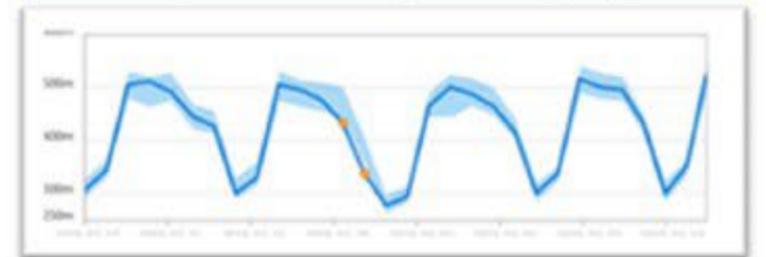
A screenshot of a software interface for real-time license plate recognition. The interface is divided into several sections. On the left, there is a vertical list of historical images under the heading "HISTORIQUES". The main area is titled "QUALIFICATION EN TEMPS REEL" and "DISCORDANCE PLAQUE". It shows two large video feeds: "ENTRÉE" (Entry) and "SORTIE" (Exit). Below these are two smaller images showing the license plates of the vehicle at entry (5636126) and exit (5770226). A message at the bottom states "PLAQUES E/S DIFFERENTES 2212120061". On the right side, there is a "Nombre qualification" section with a timer showing "00 : 01" and a "PAUSE" button. At the bottom, there are "OK" and "ERRAIDE" buttons.

# Unsupervised anomaly detection

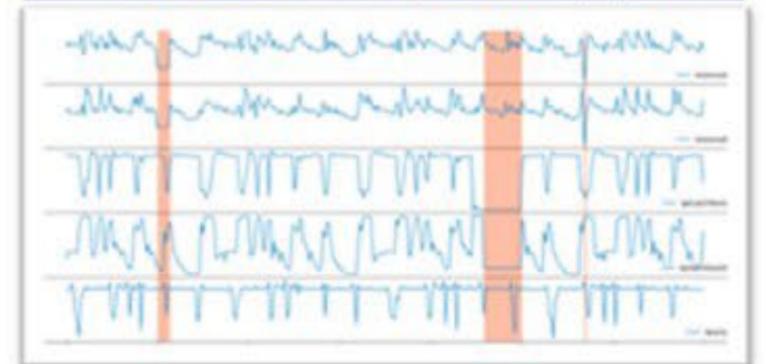


## Anomaly Detector

Univariate Anomaly Detection (GA)



Multivariate Anomaly Detection (GA)



# Toll Collection by Licence Plate

LPR caméras



Reading and recognition License Plate



Toll Lane



- Receipt of LP information
- Verification of the information received with the whitelist
- Checking the balance
- Passage authorization if verification is OK

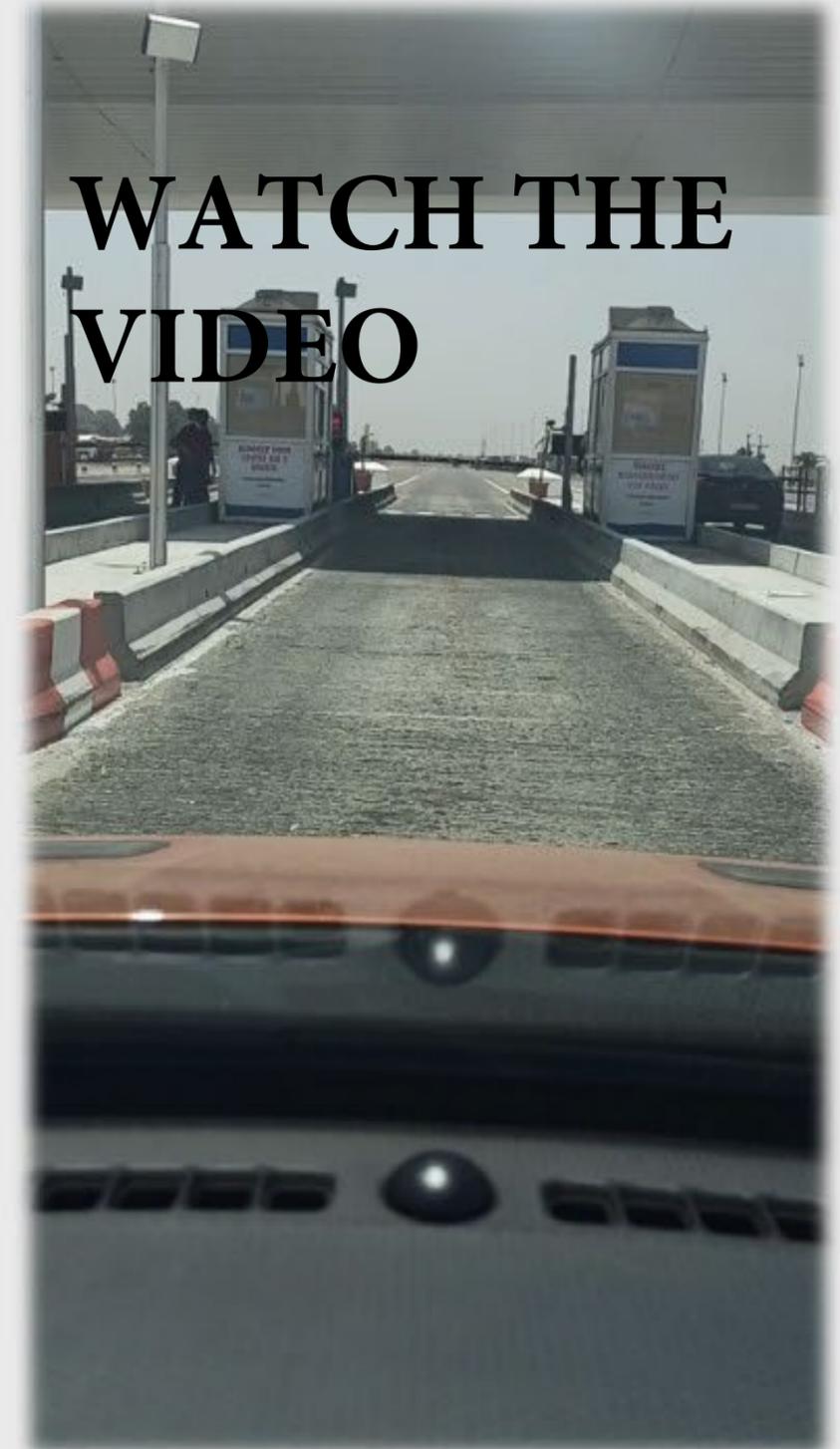
Central system



- Preparation and generation of the plate whitelist
- Sending the LBP to the entire network
- Retrieving transactions and updating the balance

3390 201922770005  
8690 20192277390999010  
20914H1 0999010

WATCH THE VIDEO





**THANK YOU FOR YOUR ATTENTION**

**EL MELLOUKI ANAS**  
Head of Toll Technologies Division  
elmellouki.anas@adm.co.ma

