FRONTIER
FUTURE MOBILITY

FACTS & FIGURES

Factsheet #2, March-April 2024

FRONTIER provides new integrated network and traffic management strategies that consider new types and modes of transport such as Connected & Automated Vehicles (CAVs) to minimise pollution, traffic, accidents, and transport costs. It strengthens resilient multimodal autonomous mobility by facilitating collaboration among stakeholders and developing business models that ensure commercial viability.

FRONTIER ANTME PLATFORM

The **Autonomous Network and Traffic Management Engine (ANTME)** revolutionises corridor-level operations, enabling collaborative strategies for handling planned and unplanned events. With heightened situational awareness, seamless communication, and actionable intelligence, ANTME streamlines and speeds-up decision-making for efficient event response and management. ANTME is composed of several key technical components which are featured below.

ANTME Platform main components

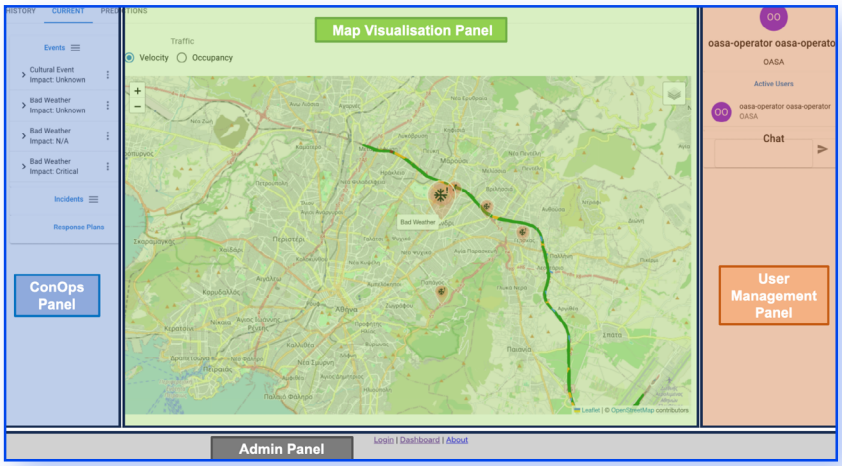
OPERATOR'S DASHBOARD

The operators' dashboard for the ANTME platform focuses on effective multi-stakeholder collaboration and network management. Its features are tailored to meet user needs and include:

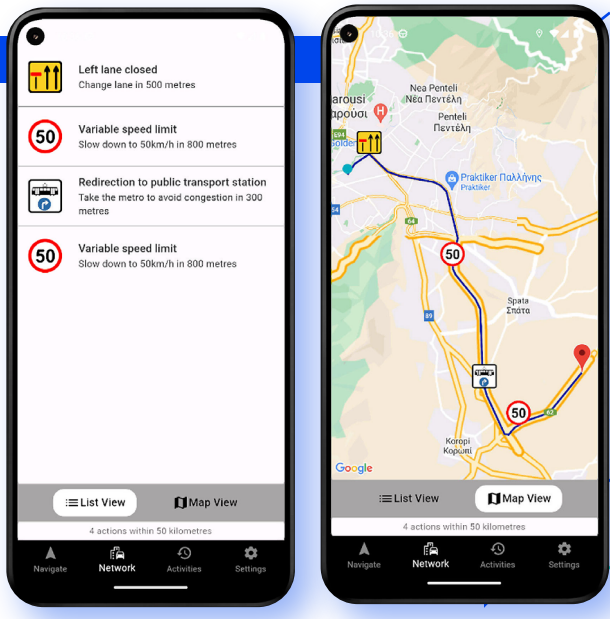
- **Incident Verification:** Users can identify and escalate incidents using inputs from various sources, including the platform's detection component, the FRONTIER mobile app, and dashboard operations. This enables a quick transition from event detection to action.
- **Response Plan Selection and Monitoring:** Stakeholders collaboratively select the most effective response plan from recommendations, then monitor and adjust the plan based on its effectiveness.

The Map Visualisation Panel ensures that users have instant access to essential information, simplifying navigation. Additional functionalities enable users to engage in real-time communication, create manual events, verify incidents, and maintain a comprehensive overview of the network. This setup unifies diverse stakeholders, fostering effective communication through the platform and enhancing collaboration in network management.

Find more information on the FRONTIER blog: https://www.frontier-project.eu/blog/frontier-network-and-traffic-management-dashboard-revolutionising-traffic-management-through



END USER'S MOBILE PHONE APPLICATION



The Citynaut mobile app is a key component of the FRONTIER platform, designed to enhance urban navigation and network management for its users. It offers a range of services including a journey planner and updates from the network's response plan generator. The app's design focuses on simplicity and user engagement, featuring a User Management functionality which allows users to create an account with the FRONTIER platform.

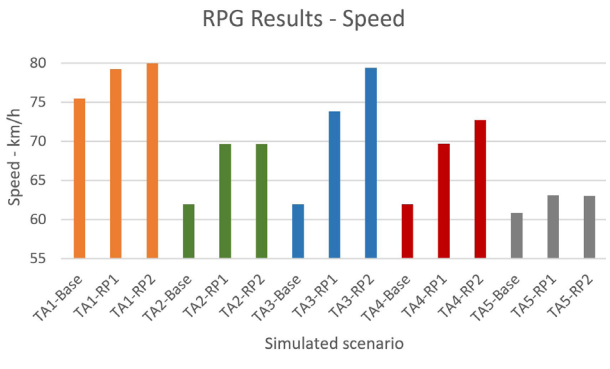
Route Planning interfaces allow users to plan their journeys through different screens which visualise routes on the map and display relevant information. An Activity History screen offers users a summary of their most recent trips, together with information about the impact of network management actions on their trips, while Network Management Notifications screens informs users about active response plans generated by the ANTME platform. A Settings screen helps users personalise their preferences for journey planning and notification types.

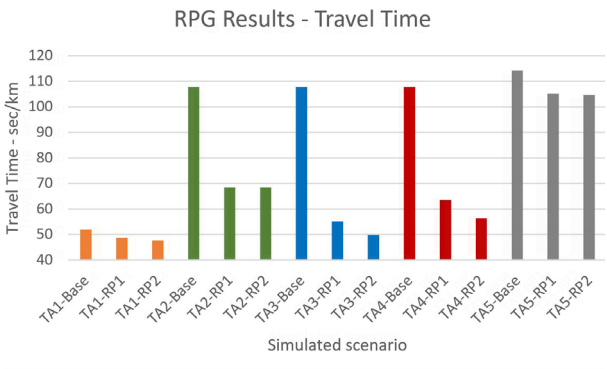
Find more information on the FRONTIER blog:
https://www.frontier-project.eu/blog/embarking-path-smarter-user-centric-traffic-management-frontier-app

RESPONSE PLAN GENERATOR (RPG)

The Response Plan Generator (RPG) represents one of the main ANTME services for network-wide traffic optimisation. It takes as input the characteristics of traffic incidents detected in the traffic network and automatically generates a list of response plans (RPs). Each RP contains multiple response actions such as traffic diversion, speed reduction and lane closure. The RPG uses a predefined library of response action templates according to the characteristics of the traffic network and the response logic of the network operators. The real-time generation of the appropriate list of traffic incident response plans mainly depends on the type, subtype and severity of the traffic incident. The RPG also estimates the expected impact of each response plan on transport network performance (RP scoring) to help network operators decide which response plan to adopt. This assessment of RPs depends on a simulation framework (Aimsun Next software) and a simulation model developed for the traffic network of a specific geographical area.

Find more information on the FRONTIER blog:
https://www.frontier-project.eu/blog/traffic-incidents-and-automated-response-plans-generator





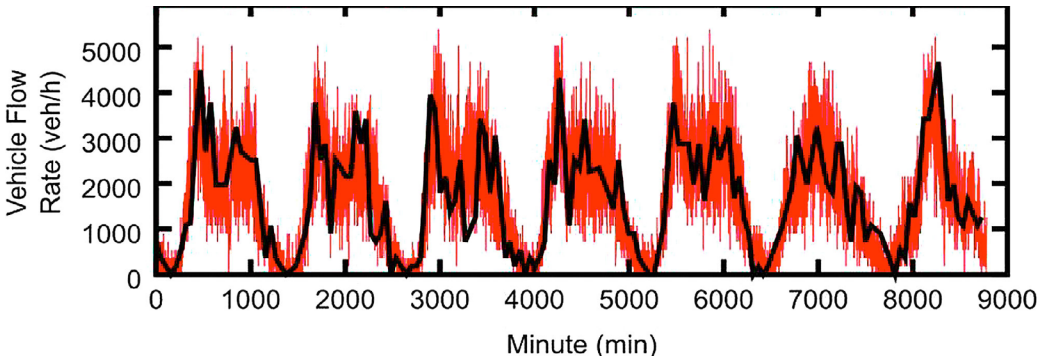
The RPG Results - five traffic incidents (TA1-TA5): Base (no-RP), RP1 and RP2

INTELLIGENT SERVICES

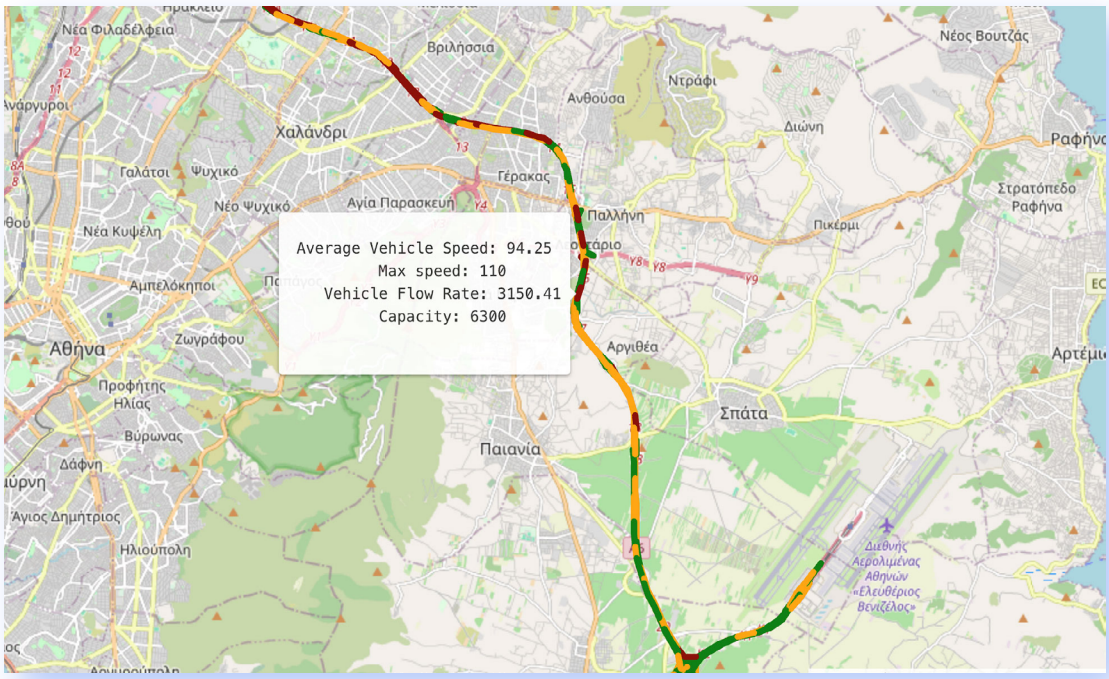
The backend of ANTME incorporates several technical developments to help stakeholders take informed decisions and evaluate outcomes supported by two intelligent services: traffic state predictions and automatic incident detection.

ANTME also provides two types of Machine Learning traffic predictions: short term and long term. Short-term predictions consider the most recent data of the segment to predict traffic in a short time window of one hour. On the other hand, long-term prediction considers calendar information and offers one-day and one-week traffic prediction based on the historical behaviour for each type of day. The short term provides useful information for real-time actions while the long term is designed for planification purposes.

Find more information on the FRONTIER blog:
https://www.frontier-project.eu/blog/traffic-predictions-efficient-network-management



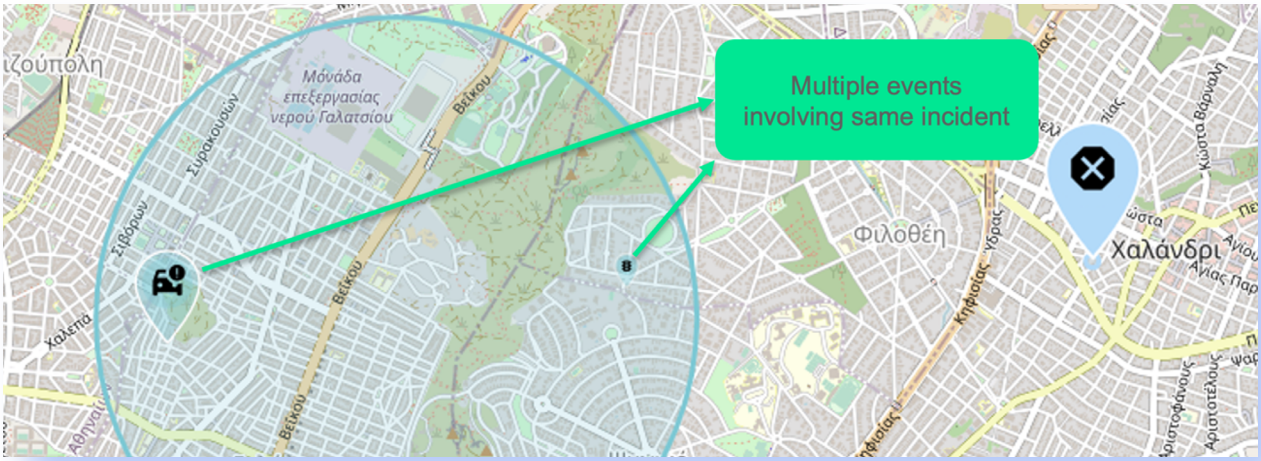
One-week traffic state prediction. Red lines represent real data. Black lines represent predictions



Segment level short-term flow prediction

In intelligent traffic management systems, the ability to automatically detect and respond to planned incidents such as recurring congestion and unplanned incidents such as accidents is critical. This is the role of the Advanced Situation Detection component, operating in offline and online modes for model training and real-time data processing. It utilises advanced Machine Learning and Deep Learning to analyse and predict traffic events, fine-tuned through rigorous preprocessing stages that include cleaning and transformation of data for optimal model performance. The component includes a human-in-the-loop concept, where incident predictions prompt operator review through the dashboard, enabling continuous learning and system improvement. The component also has integrated AutoML capabilities, automating the selection and optimisation of algorithms, as well as explainability features to maintain transparency and build trust among stakeholders.

Find more information on the FRONTIER blog: https://www.frontier-project.eu/blog/tackling-automatic-incident-detection-urban-environments-automl



Incident visualisation

PARTNERS

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