Kapsch TrafficCom

Highways Solutions

Working towards safer Highways and improved Traffic Flow

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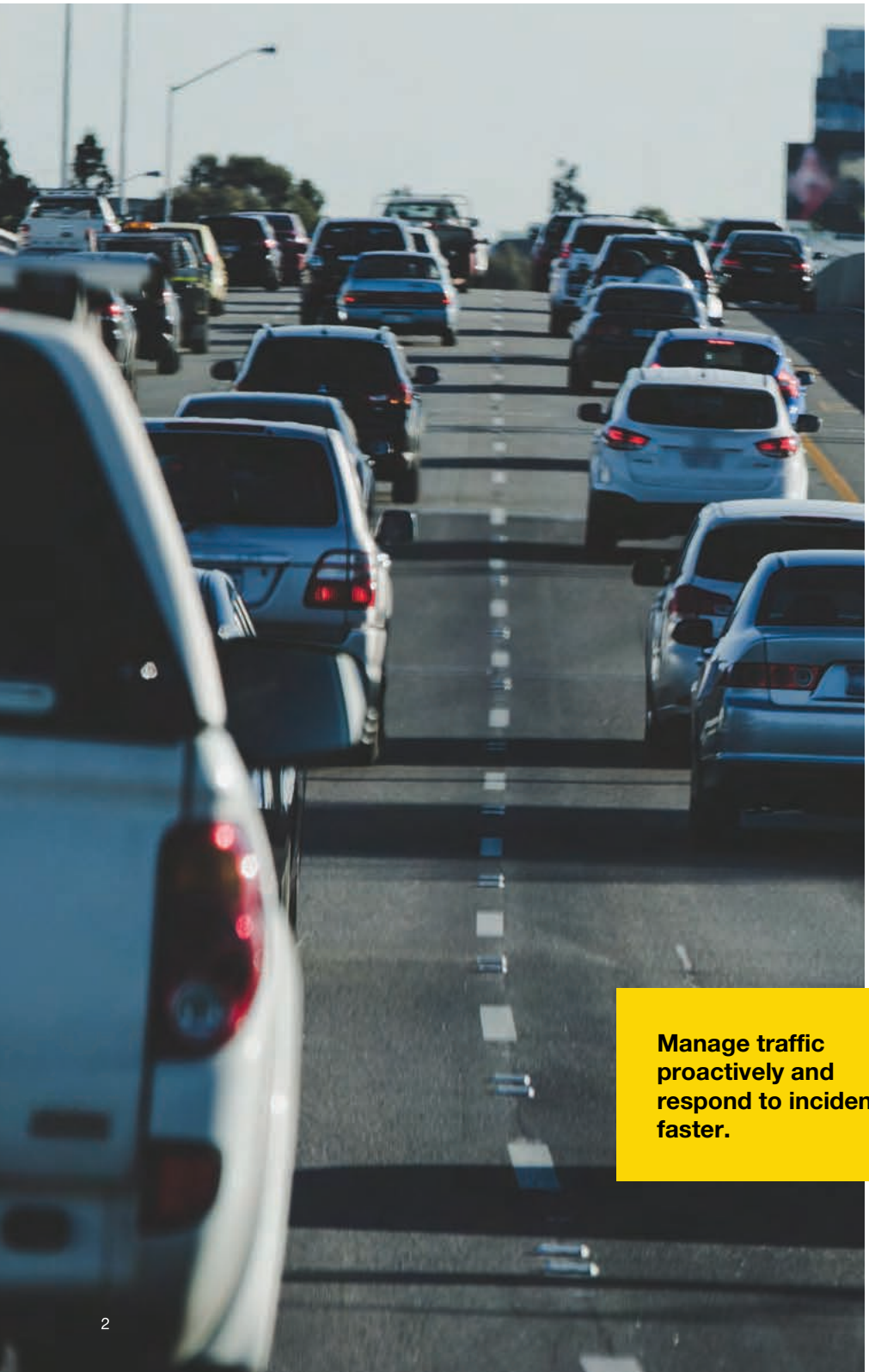
Introduction

Highways Traffic Management

Across the globe, recurring and non-recurring congestion consistently impede vital road traffic efficiency and capacity. Steady population growth, urban sprawl expansion, and limited roadway capacity have significantly worsened congestion over the last decade. Addressing these challenges by adding new road capacity is often prohibitively expensive and ineffective against nonrecurring congestion from aggressive driving, lane closures, incidents, and adverse weather conditions.



Manage traffic proactively and respond to incidents faster.

In an attempt to address congestion challenges, transport agencies have deployed Advanced Traffic Management Systems (ATMS). These central software platforms process data from multiple sources to understand real-time roadway infrastructure performance and effectively manage capacity, flow, safety, and incident responses. Using data analytics, ATMS can recommend mitigation strategies, facilitate command and control of ITS devices, disseminate notifications, dispatch service vehicles, and share data with stakeholders.

Despite ATMS' capability for real-time responses, many agencies still require manual verification of reported events and validation of response plans before activation. Manual decision-making is time-consuming, inefficient, and inconsistent, leading to slow event detection and incident responses that negatively impact traffic flow.

To proactively manage traffic and enhance incident response speed, agencies now require more intelligent and automated decision-making. In the following sections, we explore why forward-thinking agencies aim to transform their ATMS and decision-making capabilities, and how the latest ATMS solutions can improve traffic-flow insights and outcomes.

Background

Setting the Stage: A Highway Infrastructure Overview

Advanced Traffic Management Systems (ATMS) currently in use are built on a variety of architectures and technologies, ranging from large-scale applications centered around a single software platform to modular platforms that integrate multiple systems and subsystems. Regardless of their architectural design, all ATMS collect data from diverse sources—road capacity, traffic, events—to improve decision-making and incident response, ultimately enhancing traffic flow.

Using ATMS for System Assessment

The primary function of ATMS is 'System Assessment.' This involves monitoring the current state of the transportation system, including available capacity (based on road or lane closure information), traffic flow, and any planned or unplanned events. The goal of the system assessment is to detect issues negatively impacting system performance and to aid in making better decisions regarding when and where corrective actions are needed. Examples of events that could adversely affect road performance include congestion, new or unplanned incidents, planned events or work zones, malfunctioning field devices, or adverse weather conditions.

Center operations staff depend on ATMS to acquire and process large amounts of current and historical data, including video data and data from field devices and vehicles. This supports their system assessment activities effectively.

ATMS and Strategy Analysis

The second key function of ATMS is 'Strategy Analysis', aimed at helping agencies mitigate the negative impact of incidents or events on the roadway network. In this scenario, ATMS merges known and predicted information about an event to generate potential response strategies, including:

- Commanding ITS field devices to mitigate event impact (e.g. using ramp meters, signals, lane control measures, or variable speed limits)
- Disseminating traveler information (pushing messages to motorists via field devices, mobile apps, or into the vehicle connected technologies)
- Dispatching and tracking response teams (such as freeway service patrols)
- Sending notifications to partner agencies and stakeholders
- Sharing data with partners and third parties
- Initiating pricing changes

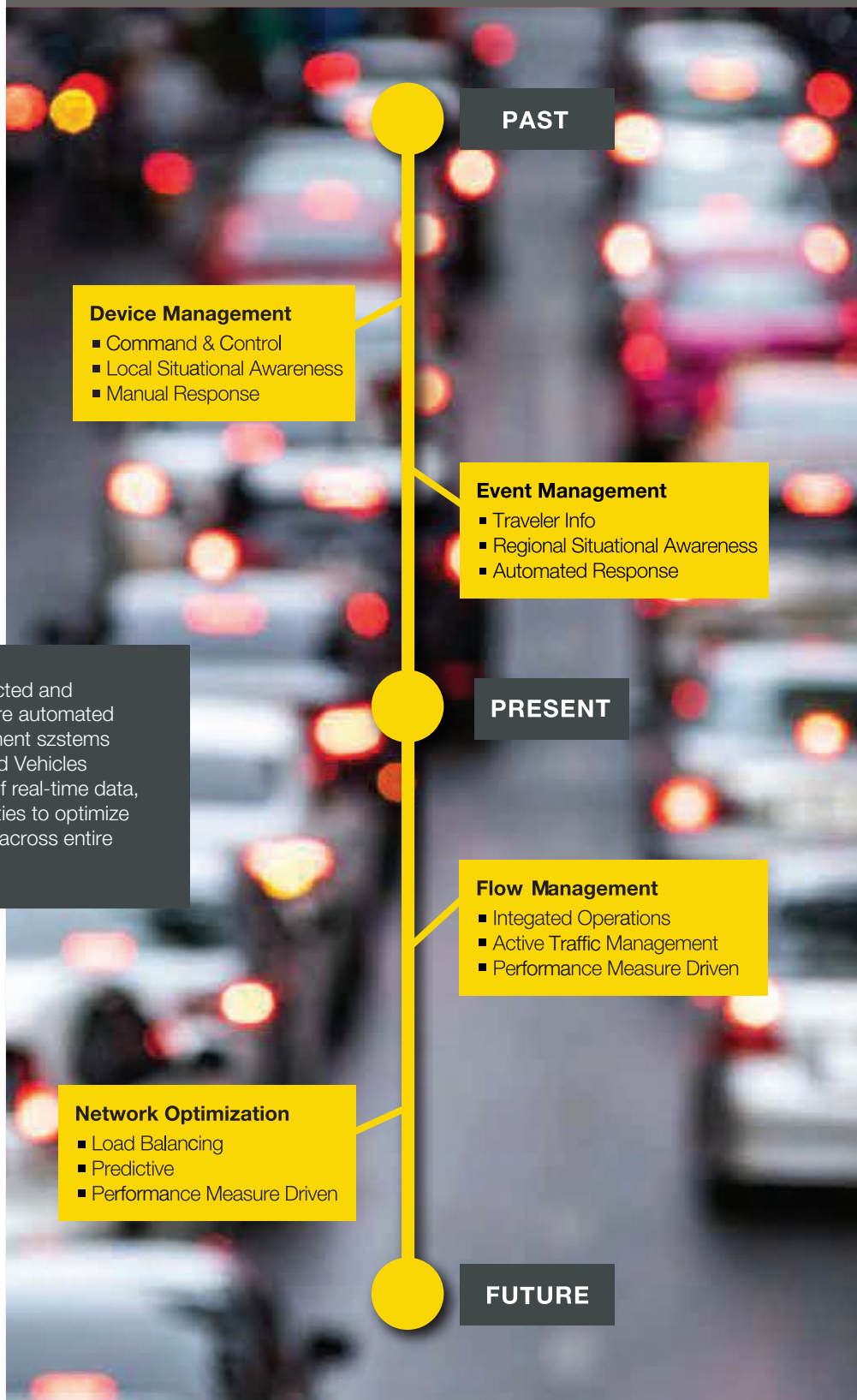
Background

Setting the Stage: A Highway Infrastructure Overview

The pressing need for intelligent and Automated ATMS

In recent years, Advanced Traffic Management Systems (ATMS) have been collecting significantly more data from external sources than ever before. To effectively manage traffic and make informed decisions, agencies require automated data gathering, fusion, and analytics processes. Automation in these processes enhances collaboration and coordination between agencies addressing network-wide congestion. It also supports region-wide situational awareness through scalable data sharing. Importantly, rising congestion challenges necessitate agencies to anticipate congestion hotspots proactively. Automated data collection and analytics enable predictive data modeling, allowing agencies to foresee traffic condition changes and optimize flow.

To address escalating congestion challenges, agencies must proactively anticipate congestion hotspots before they arise.



Introduction and rapid growth in Connected and Automated Vehicles (CAV) require a more automated approach to Advanced Traffic Management szstems (ATMS). With Connected and Automated Vehicles (CAV) producing an increasing volume of real-time data, automated technologies offer opportunities to optimize traffic management, reduce congestion across entire roadway networks effectively.

Challenges

A call to improve Highways Traffic

Increase Safety

The direct relationship between traffic and risk requires a focus on enhancing safety. With growing traffic density and inadequately sized roads leading to dangerous situations, road authorities prioritize minimizing injuries and guaranteeing high levels of safety on roads. Kapsch TrafficCom highways solutions leverage advanced technology, including connected vehicles, video analytics, and artificial intelligence, integrated into one platform. A dedicated User Experience (UX) team ensures an intuitive interface, enabling operators to prioritize safety effectively.

"Innovations in cognitive technology and business intelligence will provide the tools to process big data, support more accurate assessment and prediction of traffic flows and congestion."

Jeffrey Adler, Vice President for ITS and Solution Consultant, Kapsch TrafficCom

Reduce Travel Times

Heavy traffic congestion negatively impacts travel times, contributing to driver anxiety and inherent risks. Hence, proactive management of travel times is crucial for enhancing safety on roads. Kapsch TrafficCom expertise in traffic management provides the necessary tools to monitor travel times and implement plans to minimize congestion impact.

Proactive Management

Moving from reactive to proactive management is essential. Many road authorities still rely on manual verification of events and incidents, impacting road traffic. Kapsch TrafficCom aims to enable road operators to anticipate incidents and deploy early traffic management plans for smooth highway and road journeys.

Systems Interoperability

The fragmented operation and control of road traffic management across regional zones and independent centers hinder a unified national road ecosystem. Traffic is managed in isolation, limiting information exchange and coordinated response actions. Kapsch TrafficCom solutions address these challenges by establishing a connected road network through Advanced Traffic Managament Solutions (ATMS) and umbrella management systems, combining existing systems with innovative solutions like connected vehicle technologies.

Reduce Road Congestion

Road performance globally is hindered by traffic congestion. In recent years, congestion has worsened due to steady population growth, increased road transport, and a surge in tourism and travel. The challenge is to provide authorities with new traffic management tools to address congestion problems directly impacting road users and the efficient movement of people and goods. This requires adapting road networks to match their increased use.

Solutions

Revolutionary Technology for present and future Mobility challenges

The evolving landscape of machine learning and artificial intelligence broadens the capacity to predict traffic flow changes and assess road event risks. These intelligent solutions promise to enhance infrastructure management, optimize traffic flow, and enable faster, more effective responses to critical events by agencies.

Modular Platforms Built on Open Architectures

The shift towards Advance Traffic Management Systems (ATMS) involves moving away from proprietary platforms to modular, extensible, and scalable solutions built around open architectures and standard APIs. Agencies require the capability to seamlessly integrate these platforms into their ATMS for success.

Automated Decisioning

Next-generation ATMS, powered by Artificial Intelligence (AI) and advanced data analytics, automate critical tasks such as incident verification, response plan approval, sign messaging, and partner notifications. Automation enhances the speed and consistency of decision-making for better traffic management outcomes.

Predictive and Proactive Traffic Management

Integrating sophisticated algorithms and models, next-generation ATMS analyze data from various sources, enabling transportation agencies to predict and manage traffic volume fluctuations. Predictive models allow agencies to implement proactive measures, including routing strategies, user-facing app suggestions, and other interventions, especially when abnormal traffic conditions are anticipated.

Integration of CAV Data

Utilizing data from vehicles' onboard systems or drivers' mobile devices enhances traffic management strategies. Vehicle data, coupled with AI and machine learning, supports innovative navigation applications, compliance with traffic authorities' standards, and smartphone apps that help drivers recognize and navigate traffic challenges effectively.

Accurate Performance Assessments

Next-generation ATMS provides administrators with tools to assess decision-making performance and calibrate algorithms for better future outcomes. As technology advances, ATMS intelligence will incorporate feedback and self-calibration capabilities in the long term.

Benefits

Unleashing the power by smart Data Management

Integrated and Expandable Solution

Kapsch TrafficCom Highways solution serves as a comprehensive hub, consolidating essential features for advanced traffic monitoring and operational management. Its capabilities can be easily enhanced by incorporating additional components, such as connected vehicle services, improving system intelligence and traffic management precision for safer journeys.

High Connectivity for Sound Decision-Making

Kapsch TrafficCom Highways solution establishes connections with third-party data sources, significantly enhancing situational awareness. This approach ensures real-time traffic safety, especially in challenging environmental conditions, unforeseen incidents, planned construction zones, and similar scenarios.

Proactive Traffic Management and Congestion Reduction

Kapsch TrafficCom Highways solution enables real-time detection and navigation of changing traffic conditions. Using predictive analytics, the traffic control center can proactively anticipate congestion and automatically initiate countermeasures. Managing traffic flow becomes straightforward, with the ability to adjust signage, distribute recommendations, establish policies, and configure rule settings.

Extensive and Unified Expertise in Highways Projects

With over 30 years of experience, Kapsch TrafficCom delivers powerful web-centric software services for managing critical transportation networks. Our Advanced Traffic Management Solutions, built on the latest open architecture standards and open-source software components, support a wide range of operational needs. We are the sole vendor offering a multi-purpose ATMS platform supporting extensive regional, statewide, and national highway networks, along with connected vehicle services. Collaborating with state agencies, we have designed and built some of the most advanced traffic management solutions, providing a powerful, open-architected, modular, and extensible platform for intelligent and automated traffic management.

Example

Shifting from reactive to proactive collaborative Traffic Management

Netherlands and United Kingdom

Kapsch TrafficCom was awarded the design and construction of the next-generation, state-wide ATMS based on our intelligent traffic management solution. The primary requirement was to connect 14 independent Traffic Management Control centers (TMC) under one umbrella ATMS, ensuring homogenization of traffic management protocols and processes.

Kapsch TrafficCom ATMS is configured to command and control all ITS field devices and manage event activities extensively. Notable functionalities include queue detection and prevention algorithms within the CHARM project. These algorithms identify hazardous situations before potential accidents occur, enhancing overall road safety.

Project goals:

- Joint management between Holland and England
- Project with common and particular requirements of each country defined by its agencies
- Open and modular architecture technology to be integrated, flexible and scalable
- Single tool that unifies the different existing ATMS interfaces

Key aspects of the projects:

- >10.000 kms roadway covered
- >70.000 integrated devices
- 66 existing system interfaces
- 14 Traffic management control centers (TMCs)
- >300 users
- Redundant data centers
- ATMS software deployment + maintenance

Kapsch TrafficCom

Kapsch TrafficCom is a globally renowned provider of transportation solutions for sustainable mobility with successful projects in more than 50 countries. Innovative solutions in the application fields of tolling, tolling services, traffic management and demand management contribute to a healthy world without congestion.
With one-stop-shop solutions, the company covers the entire value chain of customers, from components to design and implementation to the operation of systems.
Kapsch TrafficCom, headquartered in Vienna, has subsidiaries and branches in more than 25 countries and is listed in the Prime Market segment of the Vienna Stock Exchange (ticker symbol: KTCG). In its 2022/23 financial year, about 4,000 employees generated revenues of EUR 553 million.

>>> www.kapsch.net

Visit us on:

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