

CONNECTIVITY, BIG DATA AND ARTIFICIAL INTELLIGENCE WILL REVOLUTIONIZE TRAFFIC AND INFRASTRUCTURE, MAKING THEM MORE SUSTAINABLE AND SECURE, ACCORDING TO INDRA

- **In its Smart Roads Transportation Trends Report, Indra anticipates real-time management of safer, more efficient and environmentally-friendly traffic thanks to the digitalization of the sector, an estimated business of more than 30,000 million dollars in 2022**
- **Indra foresees a future in which it will be possible to access an automated traffic control center with virtual reality, capable of predicting and reducing a traffic jam, guiding an autonomous vehicle or responding in real time to an incident, detected with smart devices on the road**
- **The Report proposes a solution of continuous and hybrid connectivity, with short-range communications and wireless technology, as the most appropriate option for the safe deployment of self-driving vehicles, in which all the systems involved can “talk” to each other**
- **Smart pay-per-use systems, which arrange and optimize traffic according to demand and promote more sustainable mobility, with less polluting vehicles, are shown as the best solution to reduce congestion on busy roads and urban environments**

Madrid, January 28, 2020.- The connectivity of infrastructures with vehicles and travelers through IoT, the use of data as a true value generator in the future of mobility and the application of Artificial Intelligence to facilitate automation, will contribute to converting conventional roads into intelligent ecosystems that facilitate a more secure, efficient and sustainable automated real-time management of traffic.

Improving the traveler's experience, contributing to the drastic reduction of CO2 emissions and a future of zero road accidents are the main objectives of this new mobility, as can be seen from the Transport Trends Report (ITT Report) *Smart Roads* (<https://www.indracompany.com/en/ittreport>) presented by Indra, one of the leading global technology and consulting companies, and a world leader in smart mobility.

The company explains how the Internet of Things (IoT), Big Data and Artificial Intelligence, along with technologies such as 5G and Edge Computing, blockchain, BIM (Building Information Modeling), drones and Distributed Acoustic Sensing (DAS) are revolutionizing the road traffic sector and driving it towards new models of infrastructure exploitation, in which technology companies are given center stage, until taking on the role of partners. This new market has a potential estimated economic impact of more than 30 billion dollars in 2022, with a spotlight on advanced traffic control and charging systems, which will provide the answer to future electric, connected, collaborative and autonomous driving.

Indra foresees a future in which it will be possible to access an automated traffic control center with virtual reality, capable of predicting and reducing a traffic jam, steering a hacked autonomous vehicle or responding in real time to an incident. Such incidents can be detected in real time thanks to smart devices or a fiber-optic network installed on the road, which are based on technologies such as DAS (distributed acoustic sensing), DTS (distributed temperature sensing) and intelligence and machine vision, and can be managed automatically, making decisions such as mobilizing nearby drones for an initial evaluation, redirecting traffic in anticipation of a traffic jam or other signaling decisions, user notices, pricing, etc.

This new scenario that facilitates smart, optimized and automated traffic control will be possible thanks to the new IoT platforms capable of integrating all Intelligent Transportation Systems (ITS) into Edge Computing, with low-latency communications between devices and an increasing degree of localized intelligence; and into C-ITS cooperative Intelligent transport systems, allowing vehicles to communicate with each other and with the infrastructure.

Big data and intelligent algorithms incorporated in these new platforms will be able to integrate and analyze the data provided by all these systems and other diverse sources to predict future traffic or incident probability up to two hours in advance, helping to minimize delays and other negative effects, such as fuel consumption and CO₂ emissions, which can be reduced by 6%. Big data and artificial intelligence will also contribute to improving asset management by up to 50% and preventive maintenance of road infrastructure, reducing the risk of accidents.

In this context, cybersecurity will become more important, guaranteeing the integrity of the information that is sent and received from a vehicle, preventing attacks that could compromise system security.

Autonomous vehicles integrated into sustainable urban mobility plans

The Report points out how this new connected and participatory ecosystem will be the basis for a safer infrastructure and for the arrival of autonomous driving, another great way of developing future mobility.

The road to autonomous driving requires strategic planning in coordination with the rest of means of transport through the Sustainable Urban Mobility Plans (SUMP), which prevent the increase in traffic levels and respond, for example, to the need of special areas for picking up or dropping off passengers.

For Indra, a scenario of safe autonomous vehicles also requires real-time monitoring so that it is possible to inform the vehicle network and the control center of unusual or unforeseen behaviors, the result of hacking or malfunction. In this way, the autonomous driving of the network as a whole will be enriched and road safety risks will be prevented, as it will be possible to intervene to reduce autonomy or take control of the vehicle by taking action from the control center.

Faced with the debate on the most appropriate connectivity model, the company's experts state in the Report that the future may be a hybrid solution that guarantees continuous communication in which all systems can be in communication with each other: short-range communications (ETSI ITS-G5) would serve specific situations, for example, inside tunnels or near incidents, and mobile technology-based communications (4G, LTE and future 5G network) would generate information on the entire infrastructure well in advance.

Variable pricing, an ally against CO₂ emissions

The new IoT platforms that integrate all elements of the infrastructure and the merging of classic Intelligent Transport Systems (ITS) projects with those of road pricing and toll can respond to the challenge of predicting, channeling and rationalizing the increasing road traffic of passengers and goods, especially in cities, also reducing traffic jams and environmental impact.

Thus, according to Indra's Report, smart pay-per-use systems with dynamic tolling and variable pricing that enable the rationalization and optimization of traffic according to demand and promote more sustainable mobility, encouraging the use of less polluting vehicles, are seen as the best solution to relieve traffic congestion on high-occupancy roads and urban environments.

The free-flow toll gates that allow vehicles to pass without reducing speed and the automatic detection systems of vehicles and occupants with artificial intelligence make it possible to vary pricing according to weight, pollution index and the occupancy rate of each vehicle, as well as its use of infrastructure and traffic on the road. In this way they contribute to advanced mobility management. Blockchain ensures the transparency of information in payment and distribution of pricing.

The Report shows the correlation between pricing and CO₂ emissions and explains that all European countries have already chosen to charge 100% of their high-occupancy routes, with the only exceptions being Spain, France, Finland, Ireland and Italy. This pricing trend is also reinforced in the United States with the expansion of the Managed Lines model and it is likely to reach large cities in developing countries as the problem of traffic congestion increases.

Commitment to safer and more sustainable mobility

The Transportation Trends (ITT Report) Connected and Intelligent Roads Report is the result of Indra's analysis and experience in some of the most important national and international innovation projects and initiatives in the field of smart management technology of traffic and infrastructure. It also includes interviews with some of the most important clients and figures in the sector.

Indra puts its technology at the service of safer, sustainable and environmentally friendly mobility, contributing to some of targets of the UN Sustainable Development Goals.

The company's systems contribute to reducing accidents, improving the safety and protection of travelers and infrastructures, making the latter more efficient and optimizing the use of public resources. They also help to make transport management more efficient and less polluting, reducing the carbon footprint, promoting sustainable mobility policies and improving air quality, thanks to the reduction of emissions associated with tailbacks.

Indra's commitment to facilitate this more sustainable mobility through innovation and the use of new technologies has been key to executing important contracts with top-level customers in Australia, the United States and Europe.

Indra has unique experience in transportation, with more than 2,500 projects developed in more than 100 cities and more than 50 countries. Its Transportation Division, Indra Mova Solutions, covers the entire life cycle of its clients' projects and combines the new digital, integration, specialization and innovation capabilities demanded by the market, with reliability, business knowledge, Indra's proprietary transport technology and the unique experience of its team of professionals.

Its In-Mova Space technology platform lends cohesion to and reinforces this portfolio to promote more sustainable and collaborative mobility. It integrates the entire ecosystem of transportation, infrastructure and operators, enhances the inter-modality, inter-operability and integration of all data and facilitates the development of new business models in terms of smart mobility.

About Indra

Indra (www.indracompany.com) is one of the leading global technology and consulting companies and the technological partner for core business operations of its customers world-wide. It is a world-leader in providing proprietary solutions in specific segments in Transport and Defense markets, and a leading firm in Digital Transformation Consultancy and Information Technologies in Spain and Latin America through its affiliate Minsait. Its business model is based on a comprehensive range of proprietary products, with a high-value focus and with a high innovation component. In the 2018 financial year, Indra achieved revenue of €3.104 billion, with 43,000 employees, a local presence in 46 countries and business operations in over 140 countries.