

INTEL IS POWERING THE FUTURE OF SMART TRANSPORTATION

More than half of the world's population currently lives in cities, and this number is predicted to increase 60 percent by 2030.¹

As a direct result of this massive growth, demand for urban mobility is expected to grow more than 2.5 times by 2050.² Today's transportation networks aren't optimized for this kind of rapid demographic shift, resulting in numerous pain points for travelers, businesses, and governments. For example, transportation users **encounter traffic congestion, air traffic delays, safety hazards, high fuel costs; drivers spend more than 70 hours per year in gridlock in heavily congested cities.³**

User expectations are also changing, with a demand for **public digital experiences** such as real-time infotainment and automatic paperless payment. Users also expect seamless integration between transportation technologies and mobile devices such as smartphones, enabling them to have up-to-date planning information about closures, schedules, and route changes.

City and transit authorities face increasing operation requirements and environmental impact due to large populations utilizing public transit. Cities also rely on fast, efficient and reliable transportation of goods, but will face supply chain breakdown, hampered growth, and lower quality of life if they **lack robust transportation networks.**

Only Intel can deliver a comprehensive suite of proven offerings for intelligent transportation.

Intel and the Intel ecosystem are uniquely positioned to offer components, solutions, and 5G connectivity to overcome smart transportation challenges and deliver value for cities and businesses. It all starts with Intel's suite of power-efficient, ultra-compatible Intel Atom,[®] Intel[®] Core™ and Intel[®] Xeon[®] processors, which integrate seamlessly with many existing transportation management architectures to help maximize existing investments.

By placing high-performance compute near cameras, sensors, and terminals, Intel helps cities and businesses reduce latency, improve real-time responses, and relieve the demand on network bandwidth. Intel[®] Vision Accelerator Design Products based on Intel[®] Movidius™ VPU and Intel[®] Arria[®] FPGAs can also support new, performance-hungry tasks at the device and gateway level, such as vision technology for use cases including terminal safety or traffic management.

Intel is also delivering the future of vehicle automation, including Intel autonomous driving systems and consolidated multi-camera systems based on Intel[®] Xeon[®] Scalable Platforms. These platforms are optimized specifically to run high-performance analytics and deep learning inference, offering unprecedented support for autonomous and intelligent transportation, and more.

Cities and businesses are turning to smart transportation to tackle modern challenges.

Public transit authorities are looking to automatically monitor infrastructure and vehicles to optimize existing assets, make highways and railways safer, reduce congestion, automatically notify drivers of delays and parking changes, and enable interactive passenger experiences—in fact, smart mobility projects can save each city resident an average of three working weeks per year.³ **Fleet managers** are looking to optimize processes and save money by accurately monitoring and managing trucks, trains, and barges.

But there are challenges to implementing truly smart transportation solutions. Difficulties budgeting for smart infrastructure expenditures have led cities to utilize public-private partnerships with IoT specialists to manage costs. Furthermore, smart transportation devices generate massive amounts of data which can overload networks and fail to deliver the right information when and where it can be valuable.⁴

Put your data to work with intelligence from edge to cloud

- Transform your business with AI and analytics where they make the most sense, all on a foundation of security†
- Edge computing and inference turn your data from smart and connected “things” into actionable insights in real time, while the cloud offers more extensive intelligence

Strengthen your competitive advantage with proven solutions built for IoT

- Improve your ability to lead your industry without the guesswork
- Proven solutions from Intel's strong partner ecosystem and purpose-built IoT technologies help reduce the time, cost, and risk of IoT deployments

Consolidate systems at the edge for greater efficiency and value

- Place high performance compute at the edge to help reduce latency, improve real-time responses, and relieve demand on network bandwidth
- Intel®-based solutions help you replace many disparate systems with one common platform while adding new AI capabilities, such as vision and inference

Visualizing an end-to-end smart transportation network



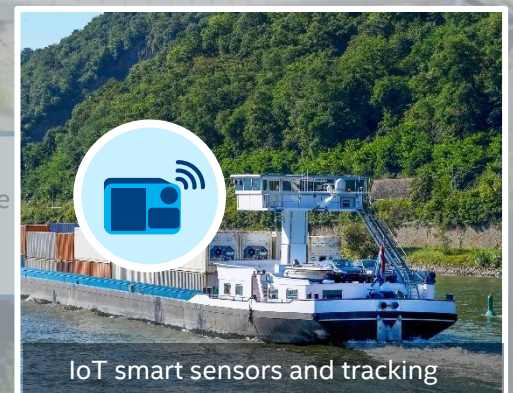
Make city roadways cheaper, easier to maintain, safer and more insightful: Intel-based cloud analytics deliver intelligent insights to plan for future development. While the promise of 5G and automated driving will help cities lower maintenance costs, reduce traffic and quickly respond to traffic incidents.



Promote digital passenger experiences, efficiency and buy-in: Deliver truly interactive passenger experiences by enabling a wide range of interactive payment, infotainment and educational IoT technologies powered by intelligent compute.




Save, grow and streamline fleets: Intel-based edge devices put high-power, low latency, AI-powered processing onboard vehicles or at infrastructures' edge. Intel solutions can help fleets become more cost effective through predictive vehicle maintenance and accurate, real-time shipment tracking.



Embedded onboard, at station, or across infrastructure for a variety of use cases



Intel-based transportation solutions have proven value



Cisco Mass Transit* with Davra in San Diego

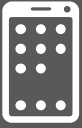
Challenge: Operating over a large service area, while providing maintenance, security, safety, and a high level of customer service.

Solution: The City of San Diego partnered with Intel, Cisco, and Davra Networks to bring new levels of connected intelligence to transit. Devices on trains have a GPS antenna to capture data every five seconds, which is processed through an algorithm in the Davra software to create accurate ETAs, before sending the information to platforms or mobile devices.

Technologies: Davra algorithms, Cisco routers, Intel® processors

Results: Transit passengers now experience a dynamic ETA system that responds to changing variables to keep riders informed of schedule and arrivals. Information is shared on digital signage, at stations, and on vehicles themselves.



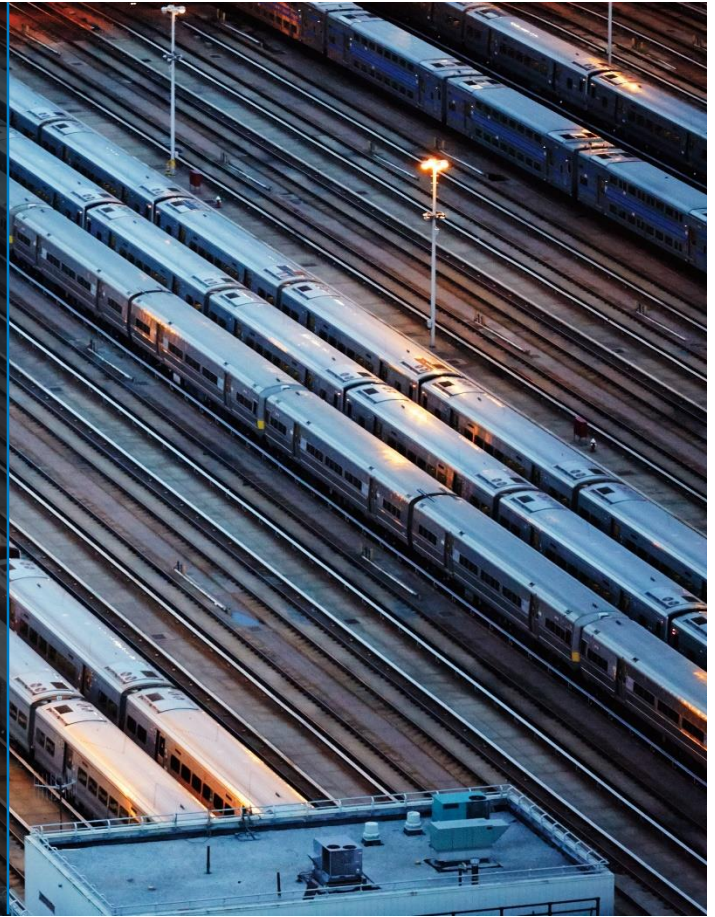


LoRa Networking Platform* from Intel and Kontron

Challenge: Train operators require a solution that can overcome the limitations of cloud-only solutions to enable mobile asset management of trains and cargo in real time.

Solution: LoRa Networking Platform* from Intel and Kontron enables secure train-to-ground station communication, providing reliable transmission across LoRa-connected devices and directly on trains. This new platform compliments the existing Kontron TRACe portfolio of Intel-based railway certified computers, enabling a single gateway to cover connected devices inside a whole double-length high speed train.

Technologies: TRACe™ LoRa-MQTT based on Intel Atom® processors

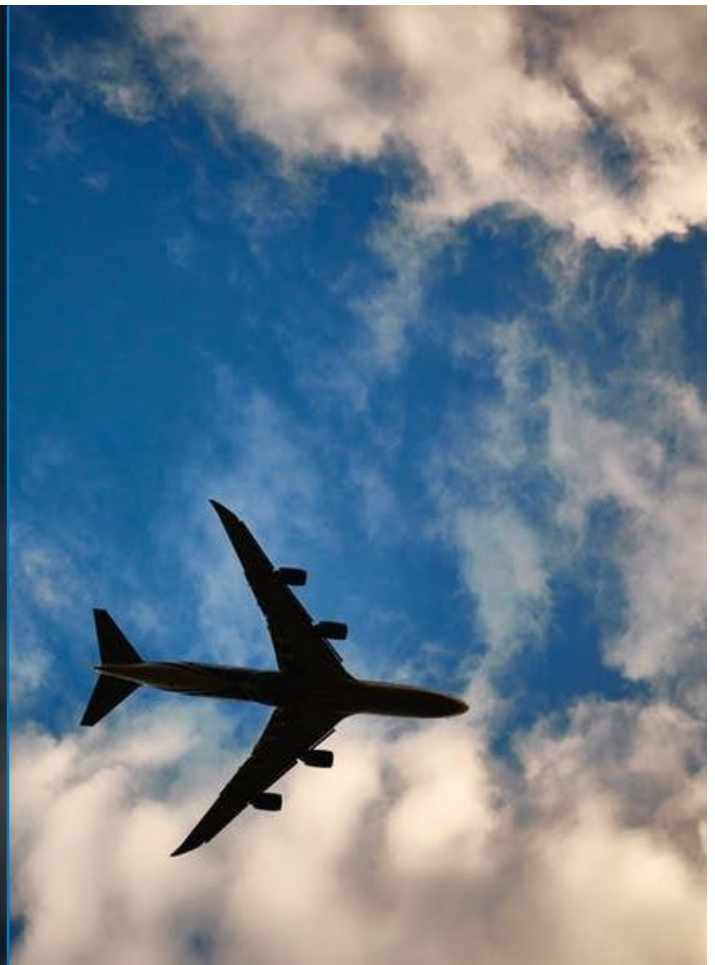


Zhejiang Dahua Technology Co. More Intelligent More Secure for Airport*

Challenge: Airports require a complete, intelligent security system that uses video surveillance and deep learning AI to keep people safe

Solution and Technologies: Network video recorder based on Intel® Core™ processors, General Surveillance Management Platform and Intelligent Video Server based on Intel® Xeon® processors, Intel® Movidius™ Myriad™ vision processing unit

Results: Provided Nadi International Airport in Fiji with video surveillance for more than 60 duty-free shops; Peruvian LAN Airline premises with security solutions using a combination of access points and wire transmission; Santiago Pudahuel Airport in Chile with a front-end camera and storage control center for video surveillance; Liverpool Airport with TV walls to display daily work, including front-end cameras, PC desktop signal, and wall-mounting.





GRIDSMART System for Traffic Management*

Challenge: Thailand's Ministry of Transport needed to improve safety and efficiency for the 8.5 million vehicles that travel Bangkok roads designed to accommodate only 2 million vehicles.

Solution: The GRIDSMART System for Traffic Management is unique single-camera solution for intersection actuation, traffic data collection, and situational awareness. The system provides real-time data to manage the timing of the traffic lights and improve intersection efficiency and safety.

Technologies: GRIDSMART Bell Camera, GRIDSMART GS2, client software, Intel: Intel® SSD DC S3510 Series, Intel® Core™ i5-4422E processor

Results:

- Reduced delays by 8.5% to nearly 25%
- Decreased average que length by up to 30%
- Cut red light running by up to 68%
- Saved nearly 52,000 vehicle commuter hours per year
- Saved an estimated \$855,000 per year



Learn more about how Intel and our ecosystem can deliver proven smart transportation to your city or business

For more information about Intel technologies and solutions for smart transportation, please visit:

- [Smart Cities Transportation Home Page](#)
- [Intel® Vision Products Home Page](#)
- [Intel® IoT Market Ready Solutions Home Page](#)



1. Frost & Sullivan, "The Application of Internet of Things Technologies for a More Sensible City," 30 Jul 2014
 2. Arthur D. Little & UITP, "Future of Urban Mobility Study"
 3. Juniper Research, "Smart Cities – What's in it for citizens?" Intel Newsroom, 2018
 4. Gartner, "Gartner Says 8.4 Billion Connected 'Things' Will Be in Use in 2017, Up 31 Percent From 2016" 7 Feb 2017
- † No computer system can be absolutely secure. Check with your system manufacturer or retailer, or learn more at intel.com.

Intel technologies' features and benefits depend on system configuration and may require enabled hardware, software or service activation. Performance varies depending on system configuration. No computer system can be absolutely secure. Check with your system manufacturer to learn more. Cost reduction scenarios described are intended as examples of how a given Intel-based product, in the specified circumstances and configurations, may affect future costs and provide cost savings. Circumstances will vary. Intel does not guarantee any costs or cost reduction.

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