

Smart Cities: Intelligent Transportation and Emergency Preparedness

Today's cars offer safety features that were unimaginable a generation ago, with high-tech capabilities like lane departure warning and blind spot detection. Yet travel will be even safer in years to come as Smart Cities around the world develop and deploy transportation infrastructure in the form of Intelligent Transportation Systems (ITS).

Intelligent Transportation Systems use advanced, real-time Internet of Things (IoT) technology to optimize traffic flow and improve the safety of surface transportation. These systems use sensors and cameras — with high-speed cellular routers as the communication backbone — to dynamically adjust traffic lights, freeway on-ramp meters and roadside message boards to optimize traffic flow and enable emergency responder access.

The most advanced ITS technologies involve active two-way communication between onsite devices and vehicles on the road, through connected vehicle technology, which enables cars to connect with nearby devices over wireless networks. These advanced systems will have the capability to alert drivers to possible hazards, inform them about road conditions and even provide conveniences like the location of available parking spaces near the driver's destination.

Let's look at a few examples of the ITS applications that are currently being tested or deployed in Smart Cities.



ITS Helps Cities Puts Safety First

ITS programs and connected vehicle technology have the potential to save thousands of lives every year because of the simple fact that human error causes the vast majority of accidents. In a review of New York City traffic accidents conducted by the National Highway Transportation Safety Association (NHTSA), human factors were found to be the cause of about 94% of all crashes.¹

The NHTSA review also found that:

- Only 2% of crashes involve mechanical failure or vehicle-related factors
- 73% of all crash fatalities in New York involved pedestrians, compared to a national average of 14%
- Speeding was a factor in over 25% of deaths

One of the top priorities of ITS applications is safety at traffic intersections. And this is where ITS and connected vehicle innovation will produce the most dramatic results. Roadside units can be installed to support real-time communication between vehicles, traffic control systems, and pedestrians who can be detected using sensors and Bluetooth.

Vehicles equipped with connected vehicle technology will be able to communicate with the roadside units using high-speed cellular routers like [Digi TX54](#). Soon, high-speed networks will enable real-time vehicle-to-vehicle and vehicle-to-pedestrian communications. These applications will then have the ability to initiate automatic braking of a vehicle that is on a collision course with another vehicle or a pedestrian.

When technology and automation can detect and prevent an impending accident faster than a human can respond, human factors will be much less of an issue.

For more information, visit:

www.digi.com

877-912-3444 | 952-912-3444

© 2020 Digi International Inc. All rights reserved.



ITS Enabled by 5G Technology

Some of these applications require the near instantaneous response that is only possible with the super-fast, low-latency connectivity of 5G. The infrastructure for 5G networks is being installed in many major cities now and **5G connectivity** is a major building block in the development of autonomous or “self-driving” cars. ITS programs will gradually start making use of 5G networks, but we will see safety benefits long before the broad use of fully autonomous vehicles.

5G-connected cars will be able to connect to the 5G networks and to each other. For example, two 5G-connected cars approaching each other from opposite directions on the freeway will be able to share data on road conditions. Two cars approaching a stop sign can automatically decide which vehicle will go through the intersection first, saving time for both motorists.

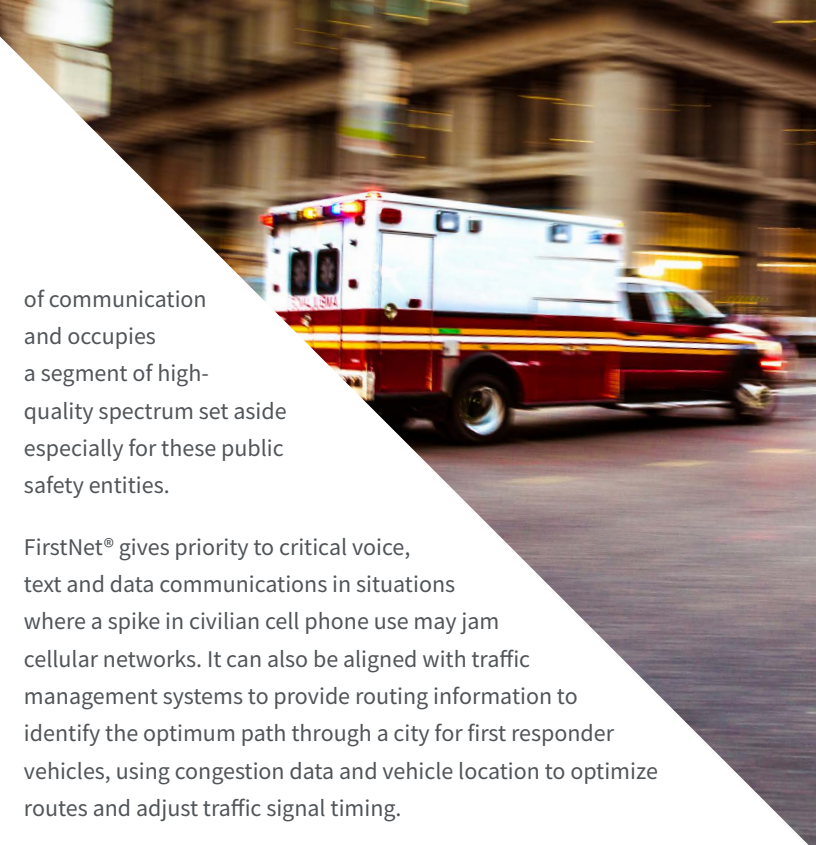
Wrong-Way Drivers – A Rare but Deadly Hazard

ITS applications can be designed to address very specific traffic issues. Consider, for example, wrong way drivers on the freeway, a rare but deadly phenomenon that claims approximately 400 lives per year in the U.S. One city in Michigan has developed a system that detects wrong-way drivers using a combination of sensors, connected-vehicle systems and a heat-mapping algorithm.

According to *Smart Cities World*², this system defines the roadways and directions of travel, and notifies other drivers of a wrong-way driver's location using highway message boards and text messages broadcast to in-vehicle message systems. Using a form of machine learning, it can adapt to changing conditions and improve with experience.

ITS Speeds Emergency Response

Another important capability of modern ITS systems is facilitating better communication with first responders during an emergency. Communication platforms such as **FirstNet®**, which are rolling out in cities across the U.S., provide first responders with priority, pre-emptive communications in the event of an emergency. These systems are particularly critical during large-scale public emergencies such as a flood, hurricane or earthquake when many citizens reach for their phones to connect with loved ones. FirstNet® is a nationwide wireless network for the use of police, fire, and EMT personnel, as well as “**extended primary**” users responsible for a range of utilities and public services. FirstNet® helps ensure clear lines



of communication and occupies a segment of high-quality spectrum set aside especially for these public safety entities.

FirstNet® gives priority to critical voice, text and data communications in situations where a spike in civilian cell phone use may jam cellular networks. It can also be aligned with traffic management systems to provide routing information to identify the optimum path through a city for first responder vehicles, using congestion data and vehicle location to optimize routes and adjust traffic signal timing.

Who's Deploying ITS and Connected Vehicle Technology?

ITS systems are a smart investment for governmental bodies at all levels that are trying to realize the maximum value from budgets for streets and roads. ITS traffic control applications make it possible to boost the capacity of road systems while limiting the need to add traffic lanes or rebuild roads. They have the added benefit of saving fuel and reducing greenhouse gas emissions.

Investments in public ITS infrastructure will help improve the speed and safety of daily commutes. But realizing the full potential of connected vehicles will require a substantial increase in the number of cars and trucks capable of communicating with that infrastructure. Fortunately, connected vehicle technology is being developed by virtually all major auto manufacturers.

For example, auto giant General Motors is investing heavily in connected and autonomous vehicle technology, having paid \$1.5 billion to acquire a San Francisco-based startup that is a technology leader in autonomous vehicles. *Bloomberg Businessweek* observed that GM is “racing into autonomy faster than any other carmaker.”³ It's also worth noting that GM is dramatically increasing its commitment to the development of electric vehicles, with 20 new battery-powered models currently on the drawing boards.⁴

For more information, visit:

www.digi.com

877-912-3444 | 952-912-3444

© 2020 Digi International Inc. All rights reserved.



Growing Cities Drive the Need for ITS Systems

ITS and connected vehicle technology are becoming a matter of necessity in growing cities around the world. The percentage of the world's population living in urban areas has grown from 15 percent in the early 20th century to over 55 percent today. And this growth has put a corresponding pressure on transportation infrastructure to accommodate the increasing volumes of traffic.

In addition, in some of the sprawling megacities of the world, the absence of conventional numbered street addresses makes it difficult to provide emergency services.⁵ But new ITS solutions using technologies such as GPS will enable emergency responders to locate people in need faster and more reliably.

The time is right to deploy the infrastructure to enable Smart Cities technologies, including traffic management and public safety. In fact, the global market for intelligent traffic management systems is expected to grow from USD 20.53 billion in 2018 to USD 40.22 billion by year 2026, according to industry experts.⁶

Digi – Your Partner for ITS and Traffic Management Technology

Smart cities around the world are deploying ITS and connected

vehicle systems today – and Digi is helping them take advantage of these new applications with [cellular solutions](#) that can integrate and connect all the pieces.

If your organization has traffic management responsibilities and is looking into smart traffic management or connected vehicle solutions, Digi can help. With systems installed in more than 15,000 intersections so far Digi has extensive experience in ITS projects. Our experts can provide you with guidance and support, from needs assessments to complete development and deployment services. [Contact us today](#) to start the conversation.

¹ New York City (NYC) DOT Pilot, https://www.its.dot.gov/pilots/pilots_nycdot.htm

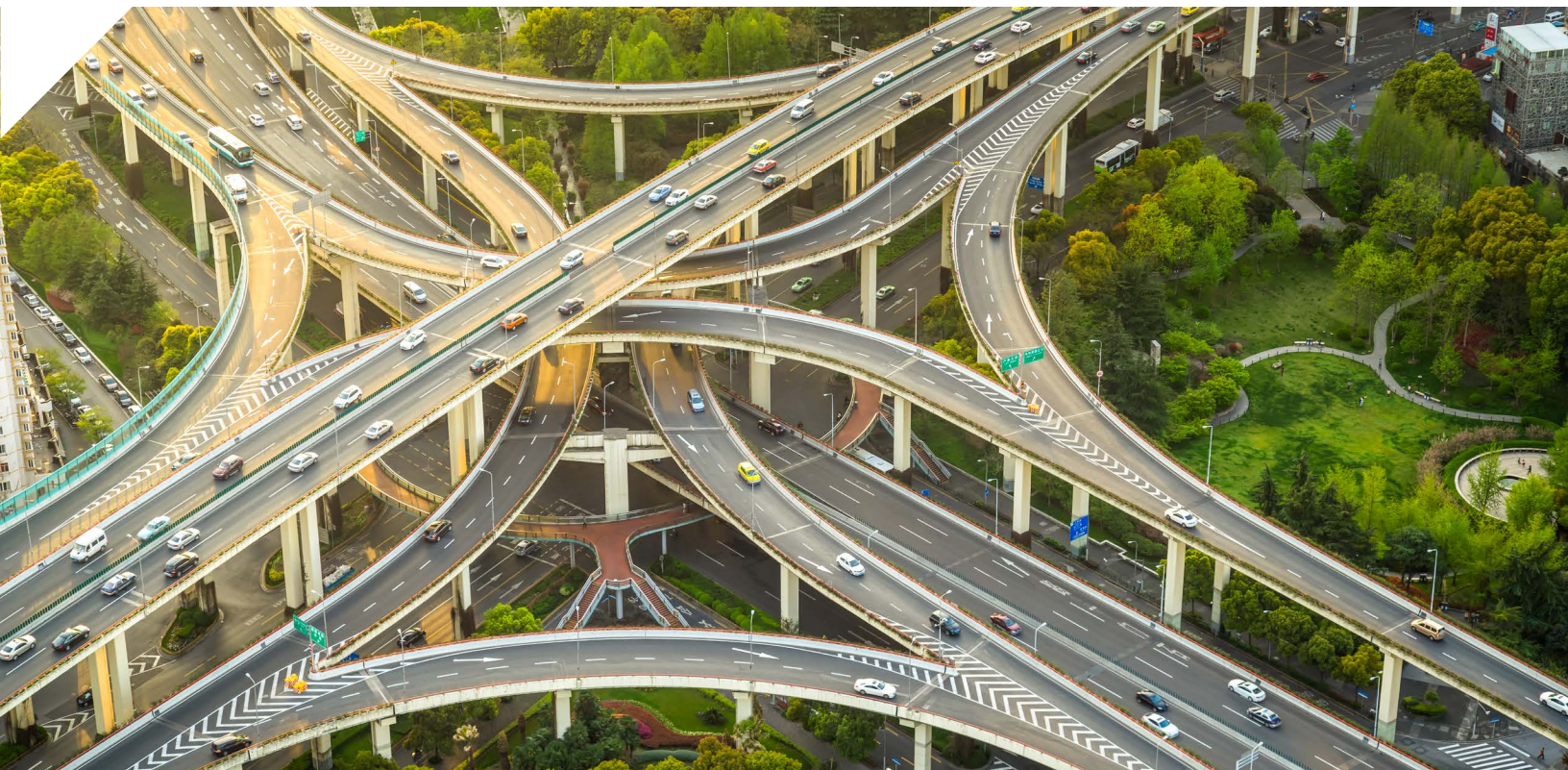
² Matt Bird, *Building the smart cities of the future: Think long-term and local*, Smart Cities News, March 11 2019 <https://www.smartcitiesworld.net/smart-cities-news/smart-cities-news/building-the-smart-cities-of-the-future-think-long-term-and-local-3948>

³ Sue Weekes, *Continental launches smart intersections with wrong-way driver detection in Michigan*, Smart Cities World, December 30, 2019 <https://www.smartcitiesworld.net/news/continental-launches-smart-intersections-with-wrong-way-driver-detection-in-michigan-4887>

⁴ David Welch, *Bryan Gruley, Mary Barra Risks it All*, Bloomberg Businessweek, September 23, 2019

⁵ David Welch, *Green Cars Won on Election Day, Too*, Bloomberg Businessweek, November 16, 2020

⁶ David Rocks, *Nate Lanxon, Location. Location. Location.*, Bloomberg Businessweek, September 3, 2018



For more information, visit:

www.digi.com

877-912-3444 | 952-912-3444

© 2020 Digi International Inc. All rights reserved. 91004447 A2/1220

