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RESOURCES





Up, Up and Away

No longer bound by outdated telephone networks, mobile technology is helping public safety officials respond to crises with nearly invincible speed and efficiency.

The usefulness of telephone booths to Clark Kent and Superman may just be a comic book fantasy, but today's mobile 4G LTE technology is a real tool for cities' and counties' modern-day superheroes — public safety officials. 4G LTE wireless technology is allowing public safety responders to respond to emergency situations more quickly and efficiently.

4G LTE, which is offered by the majority of commercial wireless carriers worldwide, is a mobile technology that transmits data 10 times faster than its 3G predecessor. Consumers are well aware of 4G LTE's capabilities, as they rely on faster mobile broadband upload and download speeds to quickly share pictures, data and video among their familial and social networks. And just as mobile technology use in the form of smart phones, tablets and apps has become common among the general public, "the use of mobile technology has equally exploded in the public safety environment," says Chief Michael Duyck of Tualatin Valley, Ore. Fire & Rescue.

In fact, cities and counties say safety responders who used mobile technology in their personal lives were the first ones demanding the same capabilities in their work environments, because they realized it could help improve their operations.

"Many public safety agencies have adopted 4G LTE to enhance their situational awareness, video surveillance capabilities, geo-spatial mapping and GPS tracking of critical assets, real-time crime centers [and] predictive policing initiatives," according to Verizon.

Indeed, with the ability to transmit data, pictures and video over commercial 4G LTE networks, responders say they can more easily relay vital information, speed response time and more effectively serve their communities while helping control costs.

Right Resources at the Right Time

When a Fire and Rescue department relies on a group of volunteer firefighters, it's important to know where responders are, to "make sure the right resources are located at the right place and get to the right incident at the right time, with the right amount of staffing," says Chief Duyck. 4G LTE mobile technology is helping him to do that, allowing him to better manage his limited resources and help make his staff more effective when working with the community.

Located in a 210-square-mile area in Portland, Ore., Tualatin Valley Fire and Rescue serves approximately 400,000 people with 21 fire stations and about 500 staff, including 65 volunteer firefighters. The department has a "bring your device to work" policy but also provides responders with department-issued mobile devices that work over commercial broadband networks. As broadband speed has increased and smart phones have proliferated among his staff, Duyck says his department is able to push out more computerized dispatch data to help make responders and the entire Portland community more effective in emergency response.

For example, with mobile technology, firefighters are transmitting 12-lead EKGs (electrocardiograms) from a patient's current location to the hospital in preparation for the patient's arrival. And using the PulsePoint application, which any consumer can download onto a smart phone,

the department can also quickly direct persons who have registered with the app and indicated that they are trained in CPR to help someone having a cardiac emergency. The app will map these people to the patient's location if they are within 1/8 of a mile of it. "This dramatically helps patients when they are suffering from cardiac arrest," Duyck notes.

With mobile technology, Duyck says his department is better able to mobilize citizens as well as keep tabs on its volunteer firefighter staff. At the onset of an emergency, "in the past, we had to wait to see if anyone showed up at the fire station to see if we could staff vehicles," he explains. But thanks to mobile technology and GPS information about responders and whether they are on duty, his department can determine "who is nearby and has the knowledge, skills and abilities to help mitigate a problem."

Furthermore, mobile technology's ability to transmit data is allowing Duyck's department to determine whether resources are located in the right place, how it could better mitigate a crisis, and whether time is a factor in some incidents. For instance, if he finds that one fire station is over-staffed or is not necessary in one location because its coverage area overlaps with another station, data helps to direct staffing and facility adjustments.

"Every fire station we have to open costs between \$1 million to \$2 million to operate [yearly]. In a service area with multiple stations, if we can leverage technology and make other fire stations more effective, over time can

4G LTE

*up to 10 times greater
download speeds
than a 3G network*

4G LTE: A New Standard for Speed

4G LTE technologies are advantageous to first responders, allowing them to more quickly access data and video information when dealing with emergency situations. But what do the number and letters mean?

The International Telecommunication Union, a United Nations agency, is the international standards body that designates wireless technologies as 1G, 2G, 3G or 4G, with each generation featuring faster speeds. The ITU says 4G LTE (Long-term Evolution) technology differs from its predecessors because it is based on an Internet protocol (IP) architecture,

which transmits everything — including voice — as data. This creates an interactive mobile service with faster data access, enhanced roaming capabilities, unified messaging and broadband multimedia.

4G LTE can support peak data download speeds of 100 megabits per second (Mbps) — up to 10 times greater than a 3G network, ITU says. Verizon's 4G LTE network is capable of download speeds of up to 40 to 50 Mbps for downloads, and 20 to 25 Mbps for uploads, with average speeds ranging from 5 to 12 Mbps for downloads and 2 to 5 Mbps for uploads.

These enhanced capabilities are helping improve public safety officials' situational awareness, allowing them to get critical information to the people who need it. With faster data speeds, responders can more easily coordinate with outside departments, agencies and jurisdictions, even transferring large data files or providing video conferencing, to help develop a more effective response to crises.

"Think of [4G LTE] like moving from a dial-up internet connection to cable or DSL — suddenly you could do more with your computer and do it faster," says CNET[1], an expert in technology and consumer electronics.

saves millions of dollars,” he says. Three or four years ago, data to make these decisions wasn’t available, he notes.

“With mobile technology, we know where people are, where the incidents are, where knowledgeable responders are, and we can put that information together,” Duyck says. “This makes a volunteer group much more effective in how it’s utilized and available to respond.”

Safety on the Front Lines

If you’re in an area in which 4G LTE mobile broadband service is available, then Chief Harlin McEwen, chairman of the Communications and Technology Committee for the International Association of Chiefs of Police, is confident that the local law enforcement officers are using smart phones to improve public safety. “It’s very unusual to find a police force, if they have any commercial service, that doesn’t have a smart phone in their jurisdiction,” he says.

Regardless of whether they’re using government-provided mobile devices, personal devices subsidized by the government, or personal devices at their own expense, city and county law enforcement officers are sold on the benefits of commercial broadband 4G LTE service because it allows them to download and upload large amounts of data so that they are more equipped to respond in emergency and potentially dangerous situations.

For instance, some police officers are preparing incident reports in the field using a mobile device, then sending that report to their central records system. That allows personnel to be more efficient in the field and helps reduce the amount of desk time required to file reports, McEwen says.

Officers also are using wireless devices to access state and national databases through which they can determine whether someone has a criminal record. In the past (and in areas where commercial wireless service is not

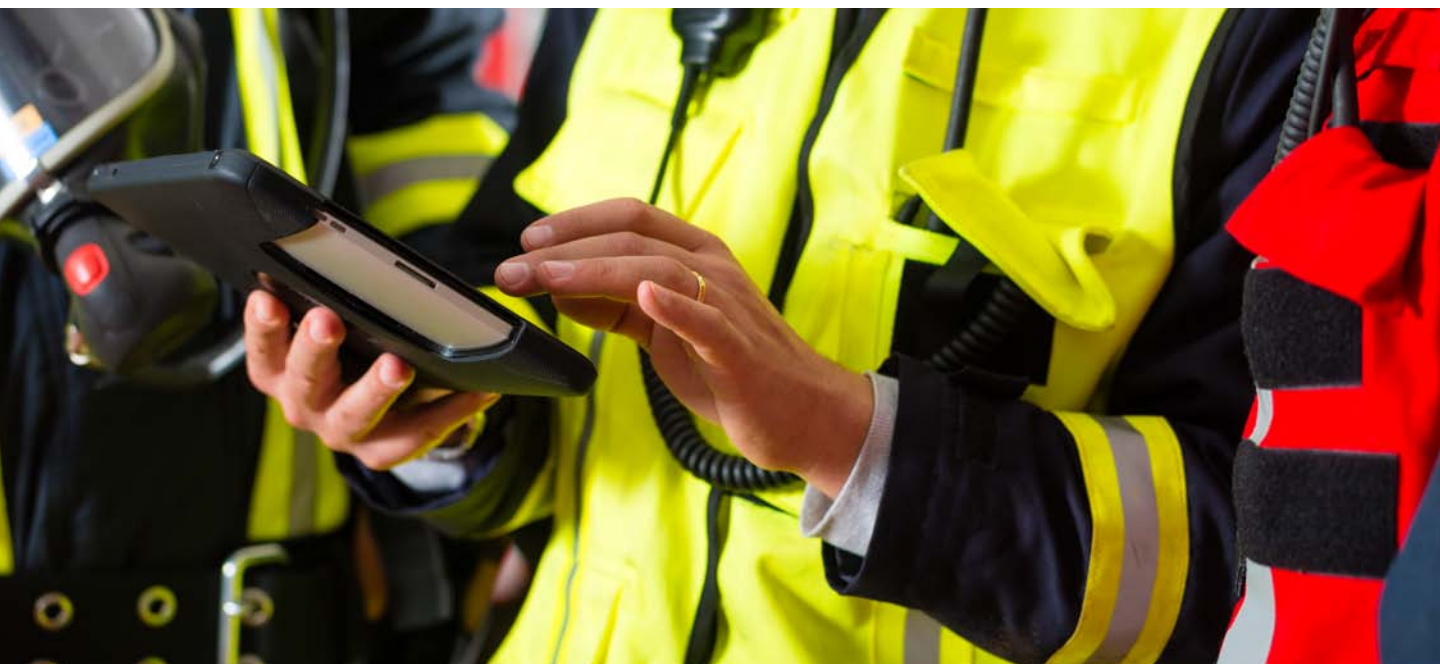
available) officers typically accessed Nlets, an interstate justice and public safety network, to gather information on a person’s driver’s license record. That information typically was delivered in a text format. However, because of 4G LTE’s ability to transmit large amounts of data, officers are able to access information more quickly, and also view photographs and images, McEwen says.

The benefits of mobile technology to police officers “is not just a time-saver, but it also helps keep them safe,” McEwen says. “For instance, if an officer is following a vehicle, runs the license plate through the system and hasn’t stopped the vehicle yet, and a [report] comes back and says the vehicle is stolen or associated with someone who’s wanted, and here’s the crime, assault, rape, whatever, then the officer is able to protect himself because he knows he’s potentially dealing with a violent criminal... Officers are able to make decisions based on information that in years past they didn’t know and weren’t able to access. A few seconds can make a difference in an officer’s life.”

Shaving Seconds

When your job is to respond to crises and help defuse emergency situations as quickly as possible, every second counts. That’s why Chief Charles Werner of the Charlottesville, Va., Fire Department says mobile devices and the capabilities of a 4G LTE network have become “mission critical” tools among his staff.

The Charlottesville Fire Department (CFD) provides fire protection and EMS response to the city of Charlottesville, which includes the University of Virginia, as well as to Albemarle County. To improve communications and information delivery as it services the area, CFD has purchased mobile broadband services on two commercial networks and downloaded the Active911 application on



its mobile devices — iPads for first-line fire apparatus and chief officer positions, and iPhones for senior staff. That helps provide officers and firefighters with access to vital information more quickly and more accurately, Werner says.

When the department receives an alert from the emergency dispatcher, the app, created by a former volunteer firefighter in Oregon, delivers alarm, incident and route information to CFD, along with the location of hydrants.

Additionally, Active911 can track engines and personnel in real time and allows firefighters to download building information and floor plans, thus improving firefighters' response time. "When we get to an apartment complex, we've already figured out where Building 2, Apartment 12 is, so we're not trying to find it after we arrive at the complex," Werner explains.

In the past, the CFD relied on laptops installed in its engines for alarm and route information. When the department received a call, firefighters would have to log into the computers and flip to a map to determine the location. "It took so long to start up and log in that we were receiving information way too far into the response. We started using the laptops less and less," he recalls. Additionally, firefighters sometimes struggled to reach the incident quickly when streets shared a common name.

With Active911's mapping and GPS function, emergency personnel quickly get route information on their mobile devices. "The accuracy of information helps to prevent, 'I thought it was Park Center instead of Park Street,' which can save a few seconds," Werner says.

Werner says he was sold on the implementation of the mobile technology once he saw how efficiently some of his firefighters were using the app on their personal smart phones. "Some of my firefighters set it up and used it on their own, and they were getting alerts on their personal devices around 15 to 20 seconds before we would receive it on department-issued equipment," he says. He observed their actions for two months, then implemented a three-month trial across the department. Once Werner realized the devices and app were helping move people and apparatus more quickly, it made sense to continue using it in CFD's daily routine.

"We're cutting time in different areas of how effectively we get to the scene of an emergency," Werner says, noting he has seen a 10- to 15-second improvement in response from notification since adopting the new mobile technology. "In our job, every second counts; we literally try to shave seconds [in response time]," he says. So when mobile devices help to reduce response time while simultaneously improving efficiency, it seems irresponsible not to take advantage of the technology.

Moreover, implementing iPad and iPhone mobile devices throughout the department has helped save CFD about \$50,000 in what had initially been planned for laptop expenses, as well as helping reduce the time needed to



configure the devices, Werner says. For laptops, CFD would have to work with the appropriate requisition channels, and then have the IT Department configure the devices. "We'd have to wait for the purchase and [it took] weeks before the device could be installed," he explains. But because operating a smart phone is simple, his staff can quickly purchase and download the app without another department's help. "Cultural/generational challenges have not been an issue," he adds.

To enhance the CFD's mobile technology capabilities, Werner is exploring ways to partner with other city departments. For instance, he's looking into one application that could merge city infrastructure information such as water main sizes, and gas and power lines, plus in-depth building plans, into one view on an iPad to help build a more informed emergency response.

CFD also is working with the Commonwealth of Virginia to share information during widespread emergencies. For example, when there is a major storm, his staff typically finds a lot of downed trees. Currently, someone out in the field has to note each downed tree and whether it is on a power line. From that information, the department creates a list and sends it to the Public Works Department to develop a workflow plan. But with iPads, Werner says his department can mark trees on a map and note in 30 seconds and a click which are "green" trees that public works can clear immediately, and which are "blue" trees that are entangled with wires that Virginia Power must address.

"Again, the [benefit of] mobile technology is that it allows for much better awareness of the magnitude of an emergency and lets agencies activate, mitigate and recover much quicker," Werner emphasizes. "My job is to be effective and efficient, and to do it in the most fiscally responsible way possible so I don't spend more tax dollars than we absolutely need to." Mobile technology has helped Werner and CFD reach those goals. So it's no wonder that when it comes to the efficiency and safety of public safety responders, he says, "a 4G LTE network makes a difference."



Toning Down Traffic

Intelligent transportation systems technology aims to ease traffic gridlock.

Sitting in traffic can seem like a mild form of torture, but state and local government leaders are hoping to ease the pain with the help of intelligent transportation systems (ITS). By incorporating advanced technology into vehicles and traffic management projects and infrastructure, cities and counties are helping reduce traffic congestion, make travel faster and safer, and improve the environment.

Technology and Transportation

The U.S. transportation system is touted as being among the best in the world, yet on a daily basis, traffic forces Americans to face vehicle crash risks, traffic congestion, environmental impacts and other detriments that erode quality of life. For instance, according to the U.S. Department of Transportation, U.S. highway users waste 4.8 billion hours per year stuck

in traffic — nearly one full week for every traveler.

ITS aim to help improve the safety, efficiency and performance of the transportation system by incorporating a range of information and communication technologies and integrating them with systems that are used to manage the transportation industry, says Joerg Rosenbohm, chief technology officer for the Intelligent Transportation Society of America (ITSA). For example, ITS has been incorporating wireless connectivity to collect accurate, near-real-time roadway data. This information subsequently is used to improve traffic flow and optimize transportation infrastructure investments, says Patrick Son, program manager/senior ITS specialist for ITSA.

ITS has taken off because technology has expanded exponentially in the past decade, as it has been leveraged to enhance transportation networks, Son explains.

“ITS attempts to integrate all sorts of technology systems that are used to manage the transportation

industry — electronic toll collection, freeway management systems, telecommunications and more — so that the transportation system can be managed as a whole, instead of the fields being looked at in isolation,” Rosenbohm adds. And “when integrated into roadways, vehicles and public transportation networks, ITS can save lives, reduce congestion, improve mobility and optimize existing transportation infrastructure,” he says.

Santa Clarita Keeps Up With Volume

When a city has a boost in its population, that boost can lead to problematic traffic conditions. But ITS has helped Santa Clarita, Calif., develop a dynamic traffic management system, according to Andrew Yi, city traffic engineer.

At the time Santa Clarita was incorporated in 1987, it encompassed about 30 square miles and had a population of about 100,000. Today, those figures have doubled, with an area encompassing more than 60 square miles and population of 200,000.

“Previously, we were pretty much a suburban city in which a lot of people left and drove 35 miles south to Los Angeles where they had jobs,” Yi says. Now, however, the city is much more metropolitan, and people tend to stay in the city for their jobs. “That means a lot of traffic stays on city roads throughout the day,” he says.

To manage the massive volume increase, Santa Clarita built an ITS system that incorporates 184 traffic signals, 184 video detection systems, 46 closed-captioned TVs, 48 midblock wireless traffic volume and speed detection systems, and 79 battery backup systems to provide the traffic operation

center with real-time traffic condition information. The city also has main and backup traffic operation centers, in case an earthquake or other emergency forces the transportation department to reroute operations to another location.

Wireless connectivity is key to the city’s operations, Yi says. For instance, ITS monitors Bluetooth mobile devices using the unit’s media access control (MAC) address to calculate travel times. Additionally, even though the city only has a few adaptive traffic signal controllers so it is unable to adjust all traffic signals according to real-time traffic conditions, transportation personnel can nevertheless make traffic signal adjustments quickly because they have access to the ITS on their phone, tablet and computer when they’re on the go.

“All of these things give us the tools to analyze traffic and forecast traffic, identify problems and make changes as necessary,” says Cesar Romo, city signal operations supervisor.

Yi says the tools help the city remain on the offense in mitigating many traffic problems before they occur. But if problems do occur, transportation personnel can detect malfunctions and fix the problems quickly.

“We’re very aggressive on signal timing, constantly changing it to improve traffic flow,” Romo agrees. Because of ITS, he says the city has reduced travel time by 10 to 20 percent over the past decade, despite the population growth.

Chicago Partners With Sister Agency

In large metropolitan areas, members of the public routinely have access to traffic information on expressways or toll roads so that they can modify routes accordingly. However, David Zavattero, deputy director of the Chicago Department of Transportation, says traffic information can be difficult to come by on arterial city streets. “You can get on many websites to get highway system information; the missing ingredient often is how arterial systems are operating,” he says.

In Chicago, that lack of traffic information was problematic for commuters because roughly half of the vehicle miles commuters travel are on the city’s 350 miles of arterial streets. Moreover, when there is a problem on the expressways, commuters often flood surface streets, creating more congestion there.

With the goal of providing better information to the public so that they could make smarter commuting decisions, the DOT looked for ways to gather the missing traffic information and improve its ITS system. Unfortunately, installing detection devices on streets was cost-prohibitive. The city has 3,000 traffic signals, and some of the equipment has been in place for more than 30 years. While Chicago DOT wants to install adaptive signal control so traffic signals can adjust to conditions in real time, modernizing the controllers all at once does not fit in the city’s budget.

“We’re going through the process of upgrading traffic signal controllers, but it takes some time to





replace all of that equipment,” Zavattero says. So, the city instead found a cheaper and quicker way to gather the necessary traffic information — partnering with a sister agency, the Chicago Transit Authority (CTA).

The CTA, since 2006, has been using global positioning technology on its buses to provide commuters with web and text messages showing bus arrival times and service updates. Zavattero says the buses report data every few seconds to a bus tracking system that monitors how buses are flowing and whether they are on schedule. The DOT realized that it could use that same information to infer whether the city’s arterial street system was operating as expected. So the city now provides traffic condition information on Chicago Traffic Tracker, based on data gathered from bus GPS data.

“We built Chicago Traffic Tracker using information from Chicago Transit Authority buses with some algorithms to convert bus performance into traffic performance that we can relay to the public,” Zavattero says. “As traffic managers, it helps us to identify where disruptions are on surface streets, and we can address them by dispatching emergency vehicles or taking whatever is the appropriate response.”

In the meantime, to enhance its ITS system, Chicago DOT also is upgrading its traffic signal controllers to adaptive signal controllers, installing red light cameras and launching an automated speed enforcement program.

Chicago has one of the largest automated traffic enforcement systems in the country. Zavattero says the city aims to improve safety with the help of technology, particularly in sensitive locations such as near schools and parks.

“The goal of ITS is not only to make traffic flow better, but to also make it more effective by making it safer. One of the ways traffic can be made safer is by getting drivers to obey the traffic laws,” Zavattero explains.

New York’s Network

If any city is troubled by traffic, it’s New York. The City That Never Sleeps is in the third most-populous state

and has 5 million commuters and 12,500 signal light intersections, more than any other city in the world. So it’s not surprising that as technology improves, the Department of Transportation wants to take advantage of it.

To that end, New York has aggressively expanded its ITS program to help improve safety, mobility and real-time travel information, reduce emissions, and centralize monitoring and management of ITS infrastructure while allowing for regional coordination.

Key components in New York’s ITS plan, which began nearly a decade ago, involved computerizing intersections and creating a wireless communications network to improve the efficiency of traffic flow, thus reducing delays, says Mohamad Talas, deputy director of system engineering, intelligent transportation system management, for the New York City Department of Transportation (DOT). So, the city deployed a wireless communication network, NYCWiN, making it available to all of its agencies and providing the entire city with wireless connectivity for city services’ mobile and fixed-point applications.

At the same time, NYDOT began modernizing electromechanical traffic signal controllers to advanced solid-state traffic controllers (ASTC) across its jurisdiction. The ASTC controllers rely on NYCWiN, so the city expects it will be able to decrease the \$5 million it has been spending annually to use leased telephone lines to communicate with traffic controllers.

More importantly, “these controllers are capable of supporting much more sophisticated functions,” Talas says. For example, upgrading the controllers allowed the city to implement its Midtown in Motion project, which encompasses 500 intersections in the core of midtown Manhattan. At those intersections, 100 motion sensors on the street, 23 E-ZPass toll pass readers and 32 traffic video cameras monitor movement and detect the presence, distance and speed of vehicles in real time, then wirelessly feed the traffic flow information to the city’s traffic management center in Long Island City, where transportation engineers can change traffic signals as needed to optimize traffic flow.

As a result of the adaptive traffic signal control, Talas says travel times have improved by 10 to 20 percent. And because there is less traffic congestion, vehicles spend less time idling, which subsequently has helped reduce air pollution.

“The technology is there, providing us more capability to make the system network more robust so that all modes of transportation can be more efficient,” Talas says. He noted that New York’s system will be compatible with connected vehicle technology that would allow vehicles to “talk” to each other over wireless networks to exchange information on location, direction and speed and help prevent accidents. “ITS provides the ability to detect changing conditions or predict future conditions, and provide information to the public so while they’re en route and plan their trips, they can have better choices and make faster, safer decisions.”

1. Solutions for State & Local Government **i**

Verizon's ISE tool provides an overview of technology solutions that can help to streamline operations and expand access to services, while curbing costs and keeping data secure. Information in the "small squares" tab at the bottom of the page describes Sierra Wireless Mobile applications, Good for Government Solutions, and Sixnet Wireless Gateways.

2. Business Solutions for Public Safety Agencies **i**

This page on mobile public safety describes how cities and counties can employ first-response teams with secure mobile access to the communication tools and databases they need. Learn how to: securely access the critical databases you need from the palm of your hand; how Verizon is working with notebook manufacturers to help the devices withstand the rigors of public safety; and how RaveAlert mass notification solutions allow public safety officials to respond in a cost-effective manner.

3. Verizon Wireless Public Safety Solution Center **i**

Business requires contact, and the Verizon Wireless Public Safety Solution Center allows you to exchange ideas and get the support you need to drive business forward. Use the Vertical Industry drop-down menu to select Advanced Communications solutions that are ready to assist with public safety.

4. Emergency Preparedness Commitment **i**

Always being prepared is central to Verizon Wireless' culture and built into everything it does, including network operations, account management and customer service. Read four case studies about Verizon Wireless' commitment to emergency preparedness and how business and government have relied on its network when the unexpected strikes.

5. LexTech Labs Security and Surveillance Solution (pdf) **i**

This case study describes how Lextech Labs, running on Verizon Wireless' 4G LTE network, allows organizations to access real-time and recorded video feeds from mobile devices to enhance their situational awareness and responsiveness.

6. Sixnet Wireless Gateway Router (pdf) **i**

Connectivity is crucial to companies in both the public and private sector. This describes how operating wireless routers, such as ones provided by Sixnet, over a cellular network can be used as a backup connection for businesses in need of failover communication or as a primary connection for remote and temporary offices.

7. Security & Surveillance Blue Force (video) **i**

Watch how Blueforce Development and Verizon improved shipyard security through surveillance.

8. Mobile Office Solutions (video) **i**

Watch how Verizon's mobile office solutions are empowering on-the-go employees with secure, high-speed connectivity to the networks and data they need to get their jobs done.

9. Think Forward (pdf) **i**

This case study describes how public services are being revitalized thanks to a new framework — involving integrated platforms and smart technology — to collect, manage, analyze and deliver data to local governments.

10. Transportation Distribution (pdf) **i**

This case study describes how the ability to transmit data from the pallet to headquarters is changing supply chain business models and making transportation companies more nimble and aware.

11. Public Safety Always On (pdf) **i**

Daniel Johnson, director of public sector marketing at Verizon, describes how releasing the D-block communication spectrum will help to create a dedicated national 4G LTE-powered broadband communication network that all emergency services share. He notes that the National Telecommunications and Information Association is establishing the First Responder Network Authority (FirstNet) as the governing body for the nationwide public safety broadband network.

12. Six Steps to Secure a Cloud (video) **i**

Omar Khawaja, head of product marketing and security solutions for Verizon, shares his perspective on how to take advantage of cloud computing's benefits while managing risks and staying secure. He also offers a six-step process to find the right cloud provider.

