

360° SITUATIONAL AWARENESS: KEEPING EYES EVERYWHERE WITH LIVE VIDEO

Public safety professionals know there is no substitute for having eyes on the situation, whether that is a natural disaster, a major fire, a public disturbance, or a prowler call.



Traditionally, this has meant placing the incident commander at the scene where he can direct personnel and resources to where they're needed. Of the many promises offered by 4G/LTE wireless networks, the ability to stream a video image from virtually anywhere there is a remote camera or an officer with a smartphone has the best chance to change this paradigm. With budgets stretched more tightly than ever before, police, fire service and emergency medical service agencies are using cameras and other sensors to put eyes where there may

be no first responders, sending them only when and where they are actually needed.

We're the most watched and monitored society in history, and we're learning how to use our surveillance capabilities to enhance our freedoms and improve our lives, while at the same time preserving personal privacy and liberty.

In this issue of LifeTalk, public safety thought leaders share their unique perspectives and insights.

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SOCIAL VIEW

VIDEO SURVEILLANCE: BALANCING SECURITY AND PRIVACY, CAPABILITY AND COST

There is a delicate balance between privacy and security with the expansion of video surveillance networks, but with new and evolving public safety issues these resources become critically necessary.

ECONOMIC VIEW

IS VIDEO SURVEILLANCE WORTH THE INVESTMENT?

Broadened responsibilities for critical infrastructure protection are forcing both private industry and public agencies to expand their security networks and capabilities.

AGENCY VIEW

SÃO PAULO POLICIA MILITAR EXPERIENCE WITH LTE: BIGGER, BETTER AND CHEAPER

Deploying hardwired video surveillance facilities are expensive, time-consuming, and often produce unreliable results. The availability of an LTE network changes the game. São Paulo Policia Militar experiments its benefits in term of cost savings and capabilities.

EXPERT VIEW

VIDEO IS THE GAME CHANGER FOR PUBLIC SAFETY

Deployment of a public safety LTE network will provide first responders with capabilities never before possible: enhanced situational awareness, everywhere real-time collaboration and connected communities.



VIDEO SURVEILLANCE: BALANCING SECURITY AND PRIVACY, CAPABILITY AND COST

WITH: ANDREAS OLLIGSCHLAEGER, PH.D., PRESIDENT, TRUNORTH DATA SYSTEMS, INC.

HIGHLIGHTS

- Video surveillance is common in the U.K., expanding in the U.S., and possible almost anywhere
- Applications like ALPR and facial recognition make systems more efficient and effective
- Privacy is a concern in the post-9/11 world.
- Surveillance is more effective in investigating crime than in preventing it
- Flash mobs and social media also drive the demand and the need for video surveillance

Public safety and security executives struggle with a never-ending calculus of watchful protection: how much is too much? When people feel threatened or otherwise unsafe, they want their guardians to be omnipresent, ready to respond in an instant. At other times when going about their daily business, and especially when they're doing something they shouldn't, they want privacy. Aggravating the problem is that it's difficult to get two people to agree on what is just the right balance between security and privacy. Those most vulnerable to harm will sacrifice some anonymity to feel safer; people who are more willing and able to assume responsibility for their own welfare don't want to be watched. Is there a way to provide security and preserve privacy?

In exploring this issue, we spoke with Dr. Andreas Olligschlaeger, the president of TruNorth Data Systems, Inc. in Freedom, PA. "Olli" has contracted to and consulted

for local and federal law enforcement agencies and is an active member of Police Futurists International. Besides having a Ph.D. from Carnegie-Mellon University, he has the experience of growing up in several countries, the son of a German foreign service officer.

"The notion that we are being watched more than ever isn't based in paranoia," Olli told us. "In some urban settings in the United Kingdom, the typical person is captured on video monitoring systems 20 times each day." Surveillance systems are not as pervasive in the United States, mainly because it doesn't have the infrastructure to support them. This will change as wireless broadband networks propagate to cover more territory, making systems cheaper to install and maintain. Other countries will follow the same pattern, placing more cameras and recording systems as their infrastructure changes permit.

Historically, video surveillance meant a camera, a monitor, and someone watching the output and/or recording it for later review. Enhanced systems permitted the operator to pan, tilt and zoom (PTZ) the camera to concentrate on the subject of immediate interest. Better, higher-resolution cameras, bigger data pipes and faster computers now allow real-time processing of the data coming from the cameras, far beyond what a human operator could do on his best day. Facial recognition systems compare the geometry of eyes, noses and mouths to a database of "persons of interest," flagging people in the crowd for closer inspection by the human monitor. Automated license plate recognition systems (ALPR) do the same thing with the registration tags on vehicles, sounding an

alarm when a stolen, wanted, or vehicle associated with a crime comes into view. Law enforcement agencies using ALPR report dramatic increases in the number of stolen vehicles they recover with no additional manpower.

ALPR comes with its own set of privacy issues. ALPR systems can be stationary or mobile, and record the license plate, vehicle type, and location of every car that comes into view. A stationary system logs every vehicle that passes that point, where systems mounted on patrol cars record the location, time and date of all the cars it drives by. Privacy advocates complain these systems can be used to track the comings and goings of citizens with no connection to crime, and have concerns about how this data will be used. Will the police restrict their use to finding stolen cars and scofflaws, or might an officer also quietly keep tabs on the activities of an unfaithful spouse?

"Privacy is less of a concern in Europe, where surveillance systems have been in use longer and personal privacy is constitutionally guaranteed," said Olli. In post-9/11 America, the provisions of the PATRIOT Act and other measures intended to make life difficult for terrorists have eroded the protections of the Fourth Amendment. "We are more watched than ever before, and some people are concerned with who is doing the watching, and why."

"Video monitoring probably doesn't do much to prevent crime, although it can be helpful in investigating, solving and prosecuting crimes," he said. "Key to this issue is the need to have human monitors watching the video output." Applications like ALPR and facial recognition alert a

monitor to some hazards, but they don't sound an alarm when a purse is ripped from a woman's arm or a beer bottle comes crashing down on someone's head. In a typical monitoring center, operators may have hundreds of camera feeds to watch. Operator fatigue is a critical factor. It may take as little as 20 minutes of staring at monitor screens before an operator stops seeing anything at all.

One reason that video surveillance is expanding is because it's a lot less expensive than it used to be. Drivers of reduced costs include wireless broadband, smaller and more efficient cameras, and cheaper storage devices. Wireless networks eliminate the need to run coaxial cable to camera installations, and the smaller cameras reduce power requirements. Not so long ago, a video camera required continuous line power; now, a camera and transmitter can run for days or weeks on

and transmitter might be the size of a pack of cigarettes and capable of sending a streaming image anywhere in the world. "The largest and most sophisticated cities might have the most video coverage now, but broadband puts this capability within the reach of third-world countries because so little infrastructure is needed."

Some social trends drive the proliferation of video in a continuous, self-perpetuating loop. So-called "flash mobs" are organized through social media networks such as Twitter and Facebook for mostly harmless performance art demonstrations. Flash mobs have appeared in shopping malls and train stations to stage pillow fights, burst into spontaneous applause, or perform interpretive dances to Do-Re-Mi or U Can't Touch This. The performances are much more fun when they're shared on YouTube, so everyone who has a smartphone or compact video camera is recording them

enforcement agencies to put up their own surveillance networks and monitor social media connections to try and stay ahead of the lawbreakers.

"The bad guys, whether they be criminals or terrorists, also use video surveillance," Olli told us. "Everyone has a smartphone that records video, and most of them can connect to YouTube and Facebook. They're at the scene and are conducting surveillance of the police as they react to events. This gives them real-time situational awareness. That's one of the downsides to this technology—the bad guys can use it—too."

Expansion of video surveillance will be governed largely by geography. "In the U.K., video surveillance is already prolific. It's everywhere you go. This is true to a lesser extent in the United States. The growth markets will be in developing countries."

Olli spoke of several considerations in choosing a broadband provider. "Availability is the most critical one—you can't use a provider if they don't serve that area. Reliability and bandwidth are important. Price is more of a consideration in the United States than in Europe. The United States is so far behind the rest of the world in broadband access, and there is so little competition here in the United States. In most communities, one company has the monopoly for broadband. In a community near my own, the price for the same broadband access I have in my town is half what I pay, because there are two providers competing for the business."

When asked what questions a potential customer needed to ask of a broadband provider for carrying video, he said, "Reliability is paramount. Any service should have at least 99% uptime. Availability is obviously important, as is cloud services. You should be able to store data remotely as a backup, should your own network go down."

"Wireless broadband also permits users to set up video surveillance on demand," Olli told us. A self-contained camera, battery and transmitter might be the size of a pack of cigarettes and capable of sending a streaming image anywhere in the world. "The largest and most sophisticated cities might have the most video coverage now, but broadband puts this capability within the reach of third-world countries because so little infrastructure is needed."

a battery, and may be able to recharge via a solar collector. Where a US\$5.00 VHS cassette could hold two to six hours of NTSC or PAL-quality video, a US\$100.00 terabyte hard drive can store hundreds of hours of HD video.

"Wireless broadband also permits users to set up video surveillance on demand," Olli told us. A self-contained camera, battery

for posterity. But flash mobs can have a dark side, too. One flash mob raided a convenience store in Maryland, with thieves running inside to steal merchandise off of the shelves, protected by the anonymity of the crowd. Another flash mob attacked people leaving the Wisconsin State Fair, knocking people to the ground and stealing personal belongings. This prompts business owners, security firms and law



IS VIDEO SURVEILLANCE WORTH THE INVESTMENT?

WITH: SHERIDAN NYE, SENIOR ANALYST WITH THE ENTERPRISE VERTICALS PRACTICE AT INFORMA TELECOMS AND MEDIA

HIGHLIGHTS

- **Regulations imposed by homeland security concerns are driving deployments of surveillance video networks.**
- **Protection responsibilities are shifting from the police and military to the owners of critical infrastructure.**
- **Indirect cost savings, such as reduced insurance premiums, can serve as return on investment in security networks.**
- **Costs of surveillance are reduced by sharing resources, using low-bandwidth video when appropriate for the application, and pairing video with other sensor networks.**
- **Metal theft is an international problem in multiple industries, and one that is ameliorated with video surveillance.**

High-capacity wireless data networks bring down the cost of video surveillance and other information-gathering utilities. That doesn't mean the cost isn't still significant. Organizations considering deployment or expansion of video and other sensor systems have to consider the price of the initial purchase, recurring costs for operation and maintenance, and return on investment. London-based Sheridan Nye studies these costs as Senior Analyst with the Enterprise Vertical Practice of Informa Telecoms and Media, and was gracious enough to provide her view on the economic issues associated with video surveillance and associated information networks.

Nye sees the concern for countering terrorist attacks on critical infrastructure as a major motivator to expand the use of video surveillance. "Investment in homeland security in the US and Europe is driving investment in surveillance video, or CCTV. The UK is an enthusiastic adopter of this technology and probably has the most cameras per citizen of any country

"Video surveillance is not a huge investment and the returns can be substantial, whether economic or social."

in the world. In the US energy market, for example, the NERC-CIP regulations [North American Electric Reliability Corporation-Critical Infrastructure Protection] require that utilities tightly control access to their most important infrastructure. You're seeing this kind of regulation crop up in different areas, passing responsibility for homeland security from publicly-owned agencies such as the police and onto the owners of the infrastructure. If you're an energy distribution company and you own substations that could potentially be the target of a terrorist attack, or which could be vulnerable to extreme weather power, then you have to ensure that it is adequately protected. It can mean access control to ensure that only the right people are getting in, or it can mean monitoring to ensure that everything is fine and that early warnings are received of any problems. That's the kind of regulation that is driving wider interest in surveillance television."

In this tight economy, any executive is concerned with return on investment, especially when the investment is one

that produces no direct revenue. Return on investment in surveillance systems is indirect, but hails from multiple sources. "It's a matter of looking at drivers and alternatives too ; so, for instance, by protecting assets, that has a direct impact on insurance premiums as well as meeting regulatory requirements. If an electric utility doesn't meet its NERC-CIP

requirements, for example, there are very high penalties for that. Potentially, they could face a serious fine if they don't have the right protection for the infrastructure that is considered to be critical to the national interest."

Nye cited several examples of ongoing crime problems that can be addressed with video surveillance solutions. "In the UK, we have a growing problem with metal theft. The price of copper is rising with demand in rapidly growing economies like China. Where an asset becomes valuable, it becomes a target. Road signs are being stolen, water pipes being stolen, it becomes a really big problem. The Energy Networks Association in the UK has estimated that electricity companies in the UK spend at least £12 million each year on security to prevent metal theft, but if they spent three times as much it wouldn't be enough to prevent it. On the rail networks, the Transport Select Committee estimated the rail industry lost £43 million worth of metal in the last three years, and that figure is going up due to the price of metal on the market. Now, whether video is the

best solution to that is a slightly different question, because what you can also do is ensure visible marking of pipes and cables, and so on, so when it's stolen it can be traced. In the UK, there is proposal to better regulate scrap metal dealers, so people won't be able to just offload a whole bunch of suspicious-looking cabling and get away with it. So video isn't always the best solution, but when you look at the cost and the deterrent effect, there is often a return on investment there. There is a wide range of applications for video surveillance, for instance, environmental monitoring to prevent the dumping of rubbish, or monitoring occupancy of cars using car-sharing lanes, as well as lowering fear of crime generally among the public. I think the return on investment is clearer in these contexts."

Public safety agencies in both the US and the UK are experiencing the leanest funding that their managers have seen in their entire careers. One way to leverage resources is to share them with other users. "Public safety agencies have to do more with less and they have to share resources. Video is an example of a service that can

be shared between the transport service and the police or other agencies like the ambulance service. So that's one area to be looking at, where the cost can be shared."

Sometimes technology isn't the best solution, or a different technology may have to be applied to achieve the most favorable outcome. "Video isn't always the unique solution. Video is far more efficient when it's being recorded or monitored by someone who's trained to know what they're looking at. Also in some contexts, end-to-end sensor networks might be more appropriate. Today, cameras are used extensively to monitor how traffic is flowing. Moving ahead five or ten years, sensors can take the place of video in some instances."

Complementary technology can drive the return on investment on video surveillance. "Motion detection can help reduce bandwidth needs, as you're not constantly feeding video, it's only when something has been detected. But in some ways it's simpler technologies like video compression that boost efficiency, alongside increasing capacity in wireless networks, such as LTE. It's important that the

customer chooses the quality of video that they need. For instance, for CCTV on public transport, you don't really need super-high quality video and very rapid frame refresh rates. On the other hand, if you're monitoring the condition of infrastructure for maintenance, it's critical that you have very high resolution. For facial recognition in a crime context, you need high resolution. It's a matter of having the right technology for the right context."

Asked whether the expansion of video surveillance has peaked, Nye was optimistic for the prospects of expansion of this technology. "I wouldn't say we've reached the peak, no. Not everyone is going to follow the UK's camera-centric approach to public safety, but if you look at the safety implications of large events, clearly video has a huge role to play there. Also, investment in modern transport is another area that's going to drive video. Also cities are looking at what can they do with their municipal networks and the fiber they may already have in the ground, all these things, they enable video surveillance. So I would say the market's got a lot of growth ahead of it."



SÃO PAULO POLÍCIA MILITAR EXPERIENCE WITH LTE: BIGGER, BETTER AND CHEAPER

WITH: COLONEL ALFREDO DEAK JR., DIRETOR DE TECNOLOGIA, POLÍCIA MILITAR DE SÃO PAULO

HIGHLIGHTS

- São Paulo's Polícia handles crime prevention, order maintenance and fire suppression for Brazil's largest state.
- Video surveillance is a critical component of police missions, but conventional hard wired camera networks are both expensive and unreliable.
- LTE allows for deployment of five times as many cameras for the same cost with increased reliability.
- Video provides better intelligence, which allows the police to perform better with less use of force.

Expanding the role of technology in public safety for one of the world's fastest-growing economies is, in many ways, a problem of too many choices. There are a great many solutions, but few that are both cost-effective and reliable. Leveraging the power and versatility that comes with LTE for applications such as video surveillance makes it easier to identify the best approaches and deliver them to São Paulo's police officers and firefighters.

The Polícia de Estado de São Paulo (São Paulo State Military Police) provides for the public safety of Brazil's most populous state. The state of São Paulo is about the size of Michigan, covering about 96,000 square miles (248,000 square kilometers), but with over 41 million people, more than California. The capital of the state of São Paulo is the eponymous city, which is Brazil's largest.

Police and fire services in São Paulo are modeled differently than in most other countries. The Polícia Militar is not solely a law enforcement organization, and despite the name, does not handle only military matters. In addition to the over 100,000 police officers in its ranks, it also includes the state's firefighters. The Polícia Militar is responsible for general crime prevention, order maintenance, and traffic control in São Paulo. Criminal investigation is handled by the Polícia Civil (Civil Police), who act once a crime has occurred, collecting evidence and preparing cases for prosecution.

Colonel Alfredo Deak Jr. manages much of the technology used by the Polícia Militar. He oversees the agency's extensive telecommunications system and the data center and data networks that transport and process the information flowing to and from the state's police officers.

"Surveillance video is a critical component of this data and communications system. Even with 100,000 police officers, the police cannot be everywhere and see everything all the time. Deployment of video surveillance allows the Polícia Militar

to expand their capacity to prevent crime, especially in areas where police aren't present 24 hours per day. The presence of overt video surveillance also provides a sense of security for São Paulo's citizens, who see the police cameras and know there is someone operating and monitoring it proactively."

The video network is especially helpful during disaster and emergency situations. "Police commanders who cannot be at the scene of the incident are usually reliant on voice communications and spoken descriptions of what is taking place, transmitted over their telephone and radio network. Those descriptions are colored by the experience and perspective of the officer at the scene, who is typically seeing only a small portion of the overall situation. A real-time video image allows the commander to see what is happening with his own eyes, from multiple perspectives, and apply his own experience and training to that scenario."

INTELLIGENCE USE TO PREVENT EXCESSIVE USE OF FORCE

Colonel Deak characterizes the use of technology by the Polícia Militar in a

"Even with 100,000 police officers, the police cannot be everywhere and see everything, all the time. Deployment of video surveillance allows the Polícia Militar to expand their capacity to prevent crime, especially in areas where police aren't present 24 hours per day. The presence of overt video surveillance also provides a sense of security for São Paulo's citizens, who see the police cameras and know there is someone operating and monitoring it proactively."

philosophical way: “The intensive use of intelligence to prevent the intensive use of force. The more intelligence and the more the police officer is prepared, the more information and knowledge he has about an emergency, the less force he will use to protect himself and the citizen. This is the biggest benefit; to protect the citizen without the need of excessive force.” He particularly cites the use of video to identify and interact with suspicious people before they can commit a crime. “Approaching suspicious persons is what reduces crime, along with the removal of weapons, alcohol and drugs from circulation. The more the police can act on people who are involved with these four factors, the lesser the violence in the streets and the greater the reduction in crime.”

SAVINGS WITH LTE

A trial of an LTE network in São Paulo deployed by Alcatel-Lucent shows the benefit that wireless broadband can have for public safety. Colonel Deak is enthusiastic about the advantages of wireless video over a comparable hardwired network. “From the moment I

system. I may have to go through seven or eight different points to get to our radio monitoring center. If the condominium authorizes me to construct a radio tower, I have to have authorization to enter and leave the condo each time you have a problem with this radio. 30% of the time, the camera will be off the air. If a repeater on top of a building stops working, service to 10 to 15 video cameras fails. It’s not a very easy strategy for me to work with this type of infrastructure.”

“What interests us with LTE is that it is a tool that allows efficient communications redundancy for applications such as video surveillance. It allows me to use my APCO 25 system towers which support my mission critical voice communication network for the LTE antennas with much less cost. If any tower has problems for some reason, I have the redundancy of other towers that will cover the same space. With this redundancy, rather than have 30% of my video cameras off the air daily, I have zero video cameras down. Also, I do not have to pull optical fiber. The direct cost of a non-LTE video camera

“LTE is a tool that allows efficient communications redundancy for applications such as video surveillance. It allows me to use my APCO 25 system towers which support my mission critical voice communication network with much less cost... What interests us is to do more things for the same money, put more technology in the service of society.”

decide to install a camera on a street, it takes me between six to nine months to make this video camera function. Why? First, I need to put a pole up, which requires authorization from the city hall. If I’m going to use the building of a private condominium, I need authorization for me to use their building. When I create my transmission network, either I have to drill miles of streets to pull optical fiber, or I have to put in a radio communication

is, on average, 55,000 Reais (US\$29,270) per video camera on the street. With LTE it is estimated that this cost would fall to around 10,000 Reais (US\$5,322) per a video camera, reducing by five times the cost of each video camera. In short, I get to place five times more video cameras with the same video surveillance money. This is what interests us, to do more things for the same money, put more technology in the service of society.”

COMPATIBILITY AND CONTINGENCY

As a government service, the Polícia Militar is concerned with keeping tax dollars in the country and using Brazilian vendors as much as possible. Colonel Deak also needs a system that will build on, rather than replace, existing equipment and infrastructure. “For that, the LTE trial has been excellent. It has drawn the Polícia Militar and Alcatel-Lucent together with a focus on allowing the adaptation of our existing tablets, of our equipment, of our current software to the infrastructure provided by the trial. It is most important to allow Brazilian industry to begin to create devices for it. To make it accessible to our suppliers, our partners integrate it into our laboratory. The goal was not to test the transmission of data. The most important goal is making sure that our partners and other technologies would adapt well to LTE. This could happen only by bringing LTE to Brazil, to our infrastructure to ensure that it would work.”

Other communications technologies the Polícia Militar considered have not shown the promise of LTE. “The great advantage of LTE is the convergence. You can create a private network using two 5 MHz blocks, using the 700 MHz band. The LTE modem equipment can be dual band and talk to two broadband mobile networks. That is, my police car can use the same radio communication protocol when connecting to my private network, the public network, and in case of failure I can also use the private network for this and hire a contingency service. I think this is the great advantage of LTE over Wi-MAX. With much less money, I can create an infrastructure with much more efficiency and contingency options. Other technologies do not compete because of very low, low, volume of data traffic. The most important thing about LTE evolution is what we call quality of service. The quality of service on LTE is something I can measure, something that on the current 3G technologies, I have no way to measure. I don’t have a way to dedicate part of the capacity traffic for emergency service so that these don’t have to compete with



public traffic or video download of things that do not interest the emergency operation. LTE allows me to create several different ways of delivery and quality of service and to ensure that in an emergency

there will never be a lack of data space. I don't think that there is a technology that today can replace the LTE in this vision, the vision of quality of delivery and ease of installation."

These are all key reasons why Public Safety LTE is a key component in a building a cost effective, reliable, pervasive video surveillance infrastructure.



VIDEO IS THE GAME CHANGER FOR PUBLIC SAFETY

WITH: PHILIPPE AGARD, ALCATEL-LUCENT'S VICE PRESIDENT OF BUSINESS DEVELOPMENT FOR PUBLIC SAFETY

HIGHLIGHTS

- **A Push-to-Talk network for situational awareness does not fulfill public safety needs to address the new threats and new challenges.**
- **Wireless Broadband will bring new capabilities and better situational awareness to public safety agencies in responding faster to any incident, saving lives.**
- **Wireless Broadband (4G LTE) provides low latency, enabling real-time services (Video, Multimedia...) allowing incident commanders to exploit the OODA Loop (Observe, Orient, Decide and Act).**
- **Wireless broadband (4G LTE) is fully based on common standards providing an unprecedented opportunity for Interoperability – even on nationwide scale.**
- **LTE for public safety encompasses the evolutionary convergence path from today's radio to tomorrow's all IP-based, highly reliable, secure and time-cost effective solution.**

Public safety communications have always implied voices, talking, phrases of words and numbers abbreviated into arcane codes to preserve air time. The police voice radio is so closely identified with law enforcement that many television programs and movies in the police genre (*Adam-12*, *COPS*) begin or end their episodes with recordings of radio traffic to set the stage. Public safety communications divisions are filled with operators sitting at computer consoles, wearing headsets and speaking softly to officers executing their duties in the field. With the emphasis on voice radio, it's easy to forget that voice is only one medium we use to communicate with one another, and not even the primary channel in face-to-face communications. Most experts will tell you that a relatively small portion of our message comes through in words, the remainder transmitted by tone, inflection, volume and body language.

Why have we become so dependent on voice? Until relatively recently, speaking over a radio or telephone was the fastest and most reliable means of getting information to and from the field. The technology to communicate a more complete picture required too much hardware and bandwidth to be practical.

The advent of wireless LTE networks carrying as much information as the wired/ fixed network coming into our homes and offices now make it possible to use those other communications channels and use our public safety resources more efficiently.

VIDEO IS A GAME-CHANGER

State troopers, who have been on the road for a long time, used to have no technology other than a car radio – no handheld radio, no laptop. Video has changed the way they communicate, collaborate and operate.

Public order events are a major challenge for public safety, especially in larger cities. Extended protests and demonstrations such as the current Occupy Wall Street movements in many U.S. cities are not the disorganized crowds of years past. These groups employ scouts equipped with smartphones and social networks like Twitter and Google Maps to keep tabs on law enforcement units and each other. They deploy people tactically, creating a diversion at one location to draw officers away from the main event, where they can operate unopposed. Public safety officers can use LTE wireless broadband to stay ahead of the crowds, sending live video to command posts and providing the same visual information the officer sees.

Alcatel-Lucent has been busy using its demonstration Striker command vehicle around the U.S., showing agencies how many dissimilar communications channels and devices are linked to one another using [public safety LTE wireless broadband](#) so that everyone can see the same picture. "It's a fundamentally different experience. Some software applications gave a 'what you see is what you get' experience, while

STRIKER PUBLIC SAFETY VEHICLE CONCEPTS

The Striker connects to an LTE 4G network and enables paramedics and police officers to communicate using Push-to-Talk devices. Data from health-monitoring devices in the Striker vehicle could be transferred through the cloud to a doctor's office or hospital. Using a secure LTE broadband base station in the vehicle, it also serves personnel when traveling in an area without cellular connectivity.

[Watch the Video to discover the striker's innovative services](#)

with video it's 'what I see is what you see.' Streaming video from one device to another isn't the only medium. Consumer devices like smartphones and tablet computers can display the same maps, photographs or blueprints simultaneously to all the users on the network.

When a Police chief says, 'I need somebody *here*,' he can point to a place and drop a pin on a Google Map, everyone will see the same thing without a doubt.

Analysts and trainers in public safety disciplines make frequent use of a method developed by U.S. Air Force Colonel John Boyd, called the "OODA Loop." The letters represent four steps in a continuous cycle of tactical operations: Observe, Orient, Decide and Act. By using the OODA Loop, an operator can "get inside" their opponent's decision cycle and gain the advantage. Instant access to video enables the OODA Loop. In a conventional command net, officers on the ground report their observations back to a command post via voice radio. They have to describe what they are seeing, each from their unique perspective and frame of reference, so the information received by the commander is both delayed and colored by the sender. If that same officer can send streaming video of what he is seeing, the commander gets the information first hand, as it is happening, and has the same frame of reference—his own—for all reports. Access to video changes the entire fabric of incident management.

Video moving in the other direction changes the way officers are deployed. In the traditional setting, all of the participants in an operation gathered at the outset and periodically thereafter at a common assembly point for briefings. There was a lag time while the briefing was ongoing and afterward, as the officers moved out from the briefing site to their posts. By using video streamed to laptops, smartphones and tablets in the field, commanders can hold virtual briefings at any time, with all of the operators or a subset. Everyone sees the same

information displayed on their device, and if anyone has a visual to contribute, they can stream it back to the group through peer-to-peer networking.

An expanded demonstration project is in operation with the Polícia Militar in São Paulo, Brazil. Philippe Agard, Alcatel-Lucent's Vice President of Business Development for public safety described some of the capabilities of that system. "With a 20-30 mb/sec LTE connection to a first responder, there is a tremendous opportunity to rapidly communicate a considerable amount of visual information like pictures and surveillance footage to improve their safety and situational awareness.

Alcatel-Lucent has successfully demonstrated the First Responder Video application, a Bell Labs innovation; over a live LTE network to stream video in and out the PMSP's police cars. First Responder Video allows real time video collaboration between incident response teams and C2. It provides a natural, individual, dynamic, real time and situational aware user interface on first responders' tablets, laptops and future LTE smartphones while optimizing bandwidth consumption by building a composition of multiple requested video streams into a single delivery stream to the tablet; coping with the proliferation of smart terminals by using a thin client

strategy while being future proof (e.g. to extend to augmented reality). Through operational procedures the first responders will have guidance and get the optimum balance of information to efficiently execute their mission without saturating them with too much information.

It's not always necessary to wait for a permanent LTE network installation when broadband capabilities are needed immediately to leverage the benefits of video. Alcatel-Lucent is in discussions with security providers for a large upcoming summit with national security concerns. By bringing in portable assets like the [Striker demonstration vehicle](#) that can serve as a temporary complete public safety mobile broadband network, a client can have all the benefits of video with LTE over a limited area for as long as they are needed.

LTE: TAKING PUBLIC SAFETY APPLICATIONS TO THE NEXT LEVEL

LTE will bring the deployment of data applications for public safety agencies to the next level as the network is scalable to grow as application usage grows. Agard said "The benefits for the operations are huge considering that LTE networks are fully scalable. Their data channels can be expanded to accommodate more bandwidth for intensive applications and subscriber use over time. In addition, LTE networks are cost effective, since LTE is

LTE BENEFITS FOR PUBLIC SAFETY AGENTS

- greater interoperability for real-time collaboration
- high-definition video streaming, high-resolution photos, detailed mapping, and high-speed transmission for better situational awareness
- more accurate Automated Vehicle Location and Location Based Systems
- better access to remote databases
- faster reporting
- improved computer-aided dispatch
- dependable telemetry / remote diagnostics, etc.



gaining acceptance – firstly with most of the 4G operators and secondly by the public safety in US, selecting de facto this technology as the most appropriate.” As demonstrated, worldwide LTE network

deployments bring down costs of applications and equipments. Available now and a standard, the equipment suppliers will be interoperable offering high speed, low latency and future-proof solutions.

“All the signs are green to fulfill the expectations of public safety personnel. LTE is the new generation technology to increase responsiveness everywhere and enhance safety for everyone.”

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