



LAS VEGAS LTE SOLUTION TRIAL

WITH AN LTE
MOBILE BROADBAND
NETWORK SOLUTION

APPLICATION NOTE

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INTRODUCTION

The Las Vegas Metro Police Department, along with the Nevada Department of Transportation (DOT) and NV Energy, conducted a 6-month trial during 2013 of a 4G Long Term Evolution (LTE) public safety network in a designated section of the city of Las Vegas in the United States. The trial used spectrum allocated to the First Responders Network Authority (FirstNet), an independent authority set up by the United States government to facilitate the building of a nationwide, interoperable public safety broadband network.

FirstNet is permitting trials with its dedicated 700 MHz spectrum on a limited basis to gain valuable and necessary input for the planning of the nationwide network rollout. By using real-time video, vehicle tracking, Wi-Fi®, multiple devices and other data access and communications tools, organizations can quickly and securely obtain and share detailed information in day-to-day emergency situations. This integrated approach will improve the services these organizations deliver to their communities.

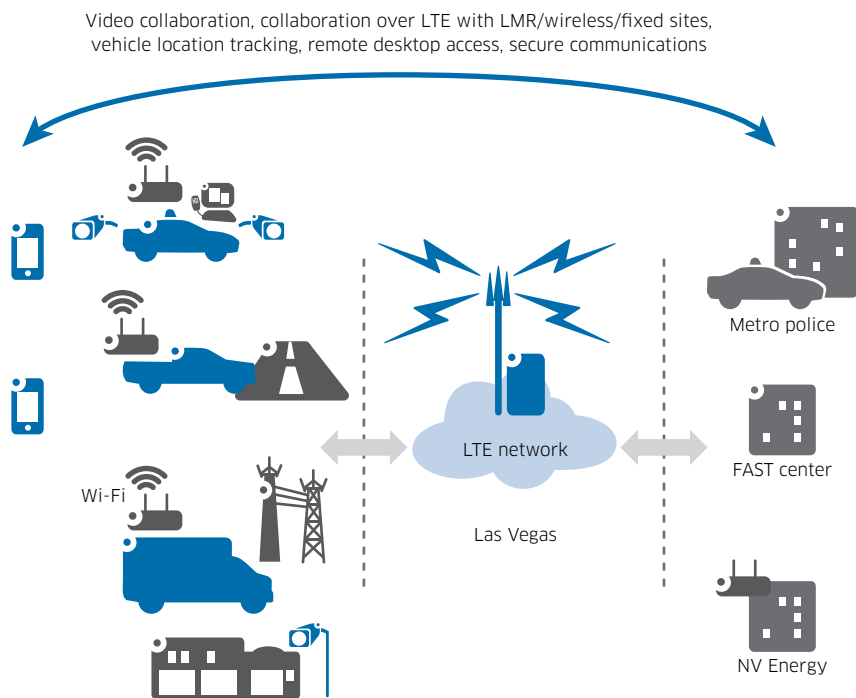
This paper describes the network and applications in the trial along with several observations and lessons learned for consideration prior to a wide-scale deployment. Several capabilities that were part of a live demonstration to the greater Las Vegas law enforcement community on October 8 will be identified.



TRIAL NETWORK ARCHITECTURE

The Las Vegas Metro Police Department, Nevada DOT and NV Energy were provided secure access to a mobile broadband network along with video, collaboration and vehicle tracking capabilities. Each agency determined which new capabilities along with existing applications were to be used in scenarios that they trialed. The 700 MHz, Band 14 spectrum allocated to FirstNet was utilized for this 4G LTE network.

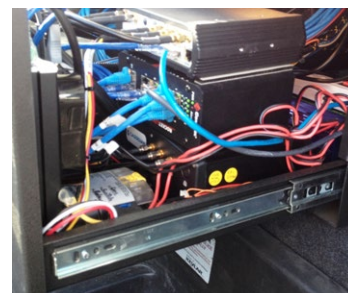
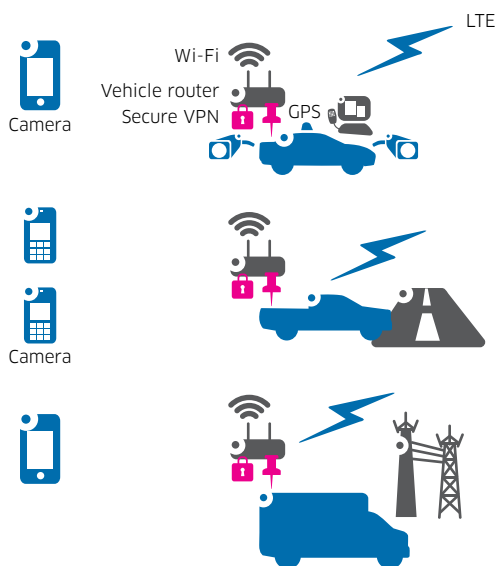
Figure 1. Secure real-time video, collaboration, vehicle tracking and desktop access over LTE network



Network access

For LTE network access, two of each organization's vehicles were equipped with a Band 14 vehicle router to provide first responders with access to the LTE mobile broadband network capabilities. The broadband vehicle routers also created a Wi-Fi hotspot around the vehicle for first responder access to the LTE network and its applications using smartphones and tablets. Vehicle routers from two manufacturers were used in the trial: CalAmp and Cassidian Communications.

Figure 2. Two vehicles equipped with specific capabilities for each agency



Video surveillance

Four HD cameras provided by Axis Communications were mounted on one Metro Police vehicle. One dash-mounted camera focused on the area in front of the vehicle; other cameras focused on the driver, the back seat and behind the vehicle. The cameras and a ruggedized laptop mounted in the vehicle were connected to the vehicle LAN. Through the LAN-connected broadband vehicle router, video was sent over the LTE network to the dispatch center and accessed on demand.

Vehicle location tracking

Two Metro Police vehicles, one Nevada DOT vehicle and one NV Energy vehicle were equipped with GPS tracking devices to enable dispatch and a remote command center to identify the location of all vehicles at any time. The devices were provided by LiveViewGPS and were connected via satellite to an Internet cloud. Over the secure LTE network, a remote command center could access vehicle information from the cloud.

Enhanced secure communications

A Metro Police vehicle was equipped with a unit that provides secure encrypted communications over the LTE network. Mutualink provided this trunk-mounted unit, which connected to the broadband vehicle router through the LAN. This connection enabled all communications — video, data and voice — to be encrypted using IPSec for enhanced security over the LTE network. First responders using push-to-talk provided by Mutualink on devices over LTE had secure end-to-end voice communications.

Personal video cameras and conferencing

Vidyo provided each organization with software for smartphones and tablets running the Android™, iOS and Windows® operating systems; that software enabled first responders to use the video captured by their device's camera in a video conferencing session. The software set up HD video conferencing sessions between the smartphones/tablets connected using Wi-Fi to the broadband vehicle router, and then over LTE with personnel in fixed locations as well as on mobile devices supported on another wireless network.

Video management

A video management system (VMS) provided by Genetec was installed at Metro Police Dispatch Center as part of the end-to-end video solution. The VMS managed and stored video from the Metro Police vehicle as well as from fixed and first responder smartphone cameras. Equipped with the Genetec client, dispatch was able to view all video on their large screen, and share one or more video feeds with other client-equipped devices such as the vehicle laptop and first responder smartphones over a secure network – LTE, Wi-Fi and LAN. The VMS system can be partitioned, so Nevada DOT and NV Energy can privately manage and store their own video content on a shared system.

Communication with fixed locations

The Metro Police Department Dispatch Center and the Freeway and Arterial System of Transportation (FAST) Center, which supports dispatch for Nevada DOT and NV Energy, were each equipped with a multimedia, interoperable communications sharing platform provided by Mutualink. This platform enabled the bridging of handheld radios, mobile phones and telephones with first responders using LTE over an LTE network for ad hoc multimedia collaboration. Each platform had a fixed connection to the LTE network.

An additional platform with a fixed connection to the LTE network was installed in a casino to support live video feeds from private cameras in an adjacent shopping area. An NV Energy site was equipped with an LTE Band 14 broadband vehicle router provided by Cassidian Communications to access the LTE network and applications.

LTE system

A complete LTE Band 14 network was provided by Alcatel-Lucent for use during the trial. This included a radio access network composed of an LTE Band 14 eNodeB that connected to three antennas mounted on a tower adjacent to the FAST Center. Mounted at a height of approximately 80 feet, these antennas provided a 4- to 5-mile coverage area in one direction and 2 to 3 miles in the opposite direction. A local Serving/Packet Data Gateway, a hosted LTE core served from New Jersey, and a management system were provided to deliver the advanced IP services. Subscriber information was handled by a Home Subscriber Server (HSS) collocated with the hosted core in New Jersey.



TRIAL APPLICATIONS

A combination of the technologies from members of the Alcatel-Lucent ngConnect Program (an ecosystem of companies dedicated to creating next generation connected user experiences), along with remote access to existing agency applications and the LTE Band 14 system provided agencies with a broad range of capabilities to utilize during the trial. To further stimulate thinking on how agencies might use these capabilities, a list of ten example scenarios were identified during the trial planning process (see “Example Scenarios”). Each agency elected which individual capability or combinations to exercise during the trial in order to evaluate the impact that quickly and securely obtaining and sharing detailed information will have on their day-to-day and disaster recovery operations.

FOCUS TRIAL APPLICATIONS

Video collaboration

Collaboration over LTE with LMR/
wireless/fixed sites

Vehicle location tracking

Remote desktop application
access

Video collaboration

To better understand the impact of real-time video sharing, during the trial the three organizations used a combination of readily available video from vehicle cameras, shopping area private security cameras, and tablet cameras, along with multimedia communications sharing capabilities over LTE. It was possible to evaluate the operational impact of a scenario in which dispatch could view an event prior to sending a vehicle and could share the video of the event with the responding vehicle upon arrival so the responders knew what was happening. It was also possible to see in real-time what a single officer was seeing when making a vehicle stop, and to evaluate the impact of that.

Each agency extensively utilized video during the trial period. Users found it was easy to set up and use video over the LTE network. Conferencing with personnel in different parts of the state using several different types of networks (LTE, Wi-Fi, commercial cellular) was tried with great results. Tablet control over the LTE network of cameras in three parts of the state was successfully exercised.



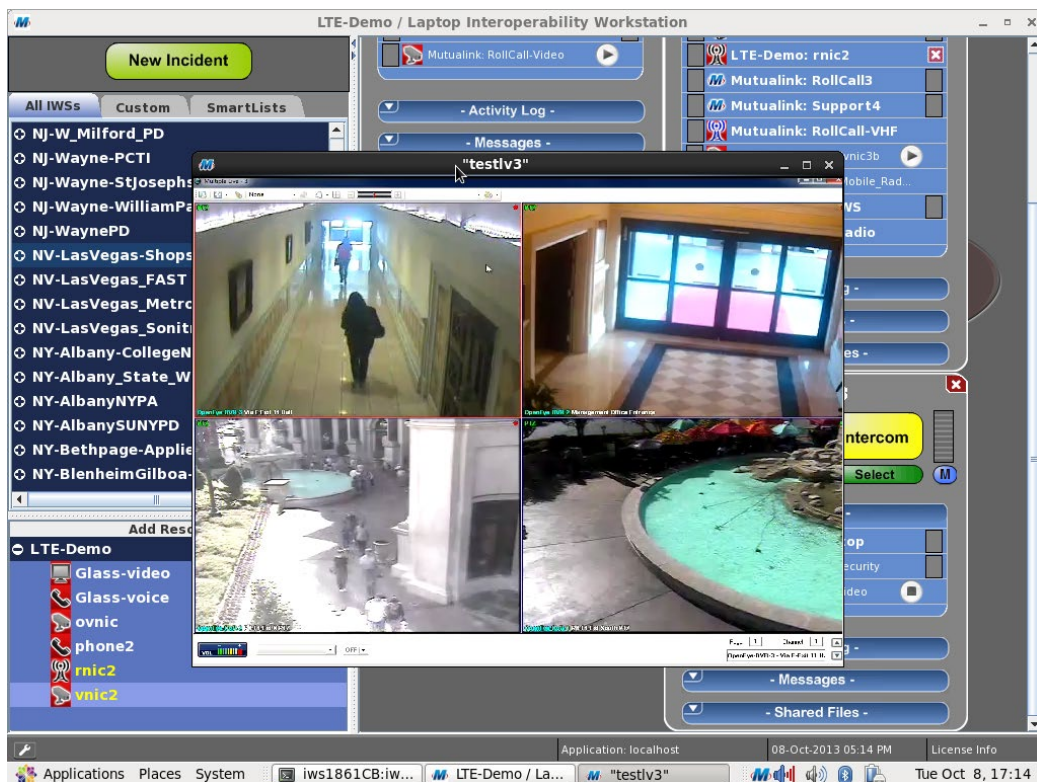
For a utility, video support on a tablet offers the opportunity to share video of a substation to collaborate with a remote resource for faster resolution. A young lineman working on old, unfamiliar equipment can share an image of equipment that is no longer stocked to speed identification of a replacement part and restore service faster. Using video this way can replace the use of an image transmitted by a smartphone and improve communication by enabling an image and voice description to be simultaneously shared and refined to more quickly reach a solution.

For the transportation sector, this provides a welcome opportunity for management and dispatch to see what is going on with work crews.

The availability of video from the shopping area offered the opportunity to explore the operational and governance issues associated with receiving video from and requesting access to private security cameras. This was also an opportunity to evaluate the impact of such video in making the appropriate dispatch and resolving a situation.

Collaboration over LTE with LMR/wireless/fixed sites

The interoperable communications between users on the LTE network and those on the LMR, commercial wireless and Las Vegas Wi-Fi networks, as well as fixed sites, were used extensively by each organization during the trial. The multimedia interoperable communications sharing platforms at Metro Police Department Dispatch Center and FAST Center enabled users on a variety of networks to be connected on an ad hoc basis. Combinations of video, voice and data sharing for enhanced collaboration were utilized.



Interoperability between users on the LTE network with personnel on other networks was one of the most talked about capabilities in the trial. Some users found it so useful that they were utilizing it while they were at their desks. This capability can be used to connect dispatch to dispatch and to tie first responders together at a major incident to enhance collaboration using video, voice and/or data communications. During the October 8 demonstration, voice communications between a smartphone on the LTE network and LMR unit in the police vehicle were utilized as the vehicle was traveling on the road. Video was simultaneously being shared from the demonstration dispatch center and displayed on the vehicle's laptop.

Vehicle location tracking

Together the LiveViewGPS GPS tracking device and the LTE network provided the vehicle tracking solution that enabled dispatch and a remote command center to identify the location of all vehicles. Each agency had the capability to identify the location of their vehicles equipped with a GPS tracking device during the trial. NV Energy currently subscribes to a service that provides them vehicle location information.

This solution can also generate an alert if a vehicle deviates from a specified route and area. During the October 8 demonstration, the ability to identify the specific route that a vehicle took was shown.

Remote desktop applications access

Having secure, rapid access to the applications that are available from the desktop while at an incident or working in the field can positively impact effectiveness and safety. Two of the organizations had the security and policy in place that permitted the trialing of remote access to their desktops over LTE.

For a police officer, remote secure desktop access over LTE can provide convenient access to a morning briefing that was missed. It might also be used to access databases to search on a gang while at an incident when it is mentioned, and provide the information to accelerate the investigation by probing the relevant areas in real time rather than later by a detective. Live desktop access over LTE was demonstrated on October 8.

For a utility, this enables a lineman to access outage data, and then drill down to see what specific neighborhoods and transformers are impacted, which helps to safely accelerate the restoration process. This capability is possible today, but at a slower rate using a commercial 3G service. The trial solution provided sufficient range from the vehicle for access with a ruggedized notebook using the Wi-Fi supported by the broadband vehicle router. The true test was the rapid download of proprietary maps (tiff files) using an IPSec tunnel over the LTE network.



For transportation, this offers the future possibility of enabling roadside workers the required access to work orders and road conditions, which due to security concerns are today only accessible in the office. With the required security in place, the LTE network might offer more timely access to more required information to improve productivity than what is feasible today using remote email access.

OBSERVATIONS AND LESSONS LEARNED

After trialing the range of new applications as well as remote access to existing desktop applications over an LTE network, participants offered a number of observations. These include suggestions on what is needed for wide-scale deployment, additional capabilities to trial and perceived performance.

- A selectable power holdover timer on equipment installed in a vehicle is desired to reduce start-up time and enable first responders to rapidly access the applications and LTE network upon returning to a vehicle.
- A critical mass of capabilities (applications and devices) for LTE exists today to provide substantial operational benefits.
- LTE enables consolidation/savings plus new capabilities by replacing the payment of up to three existing mobile charges — notebook air card, cell and GPS — with one for LTE. The current justified business case for GPS, which includes its own dedicated wireless access, will be furthered strengthened with support on LTE.
- Provide the required level of security before desktop access is allowed over the LTE network. Two agencies tested this during the trial.
- Though fixed cameras were used in the vehicle, expect dispatch to periodically take control of pan, tilt and zoom capabilities for events such as when a single officer is making a vehicle stop in a remote area.
- Pre-emption is a big concern with a shared network; and the continuing availability of bandwidth for critical utility operations is important when there is a major public safety incident.
- As part of any future trial, include the ability to experience a handoff between base stations to provide firsthand experience with public safety applications and with multiple agency network sharing when there is high usage.
- There is interest in testing the broadband vehicle routers for failure rates when they are providing communications access for capacitor banks (small amount of traffic per month). Current failure rates of cellular devices are too high.
- PBS is interested in further testing the real-time use of county-wide school video surveillance streams by Metro Police equipped with an LTE network. This video is centrally accessed and aggregated by PBS with their spectrum.
- Investigate the financial benefit of an LTE network for road side sign communications as a replacement for the current cellular solution and in areas that currently lack coverage as one of its applications. These have an RS-232 interface, utilize a low baud rate (56 kb/s is fine) and generate a small amount of data usage per month.



SUMMARY

This trial with video, collaboration, vehicle tracking and remote desktop access highlights that there is a critical mass of applications available today for an LTE network to enhance decision-making, effectiveness and safety for public safety, utilities and transportation. Field experience with these applications has identified capabilities to deploy and further refine to address first responder needs. As well, the trial has revealed potential applications to test prior to wide-scale deployment that may enhance the benefits of a broadband network and its business case.



ACRONYMS

3G	Third-Generation Mobile Network
4G	Fourth-Generation Mobile Network
DOT	Department of Transportation
FAST	Freeway and Arterial System of Transportation
FirstNet	First Responder Network Authority
GPS	Global Positioning System
HSS	Home Subscriber Server
LMR	Land Mobile Radio
LTE	Long Term Evolution
VoLTE	Voice over LTE

PRODUCTS IN TRIAL NETWORK

Broadband Vehicle Router

CalAmp

The CalAmp Fusion is a mission critical, multi-network LTE router designed for use by first responders, transportation and energy industries to enable secure, wireless data connectivity over LTE cellular networks as well as FirstNet Band 14. When 4G/3G high-speed connectivity is mission critical, Fusion accelerates real-time communications and enables vehicle tracking and location-based services, interoperability with Computer Aided Dispatch (CAD) software, camera surveillance and other crucial mobile and fixed solutions such as fleet management and analytics reporting, push-to-talk, AVL and more. Fusion offers the ultimate in connectivity and redundancy by routing traffic concurrently between carrier networks, without requiring an external router or switch. For additional connectivity options, Wi-Fi is available and routes between wired and wireless networks, with the ability to connect to multiple devices. Fusion offers full router capabilities and is able to simultaneously support data, VoLTE and video applications. The 50-channel GPS precisely locates vehicles for AVL applications, key to decision making for dispatchers and fleet managers. Rest assured that sensitive, critical data is safe through the IPSec enabled VPN. Fusion is able to withstand a broad range of temperatures and humidity levels and is ruggedized to meet military specifications.

<http://www.calamp.com/products/licensedandunlicensed/mobile-networks/fusion-lte-broadband1>



Cassidian

Modular in design, the BVR700 offers excellent coverage and high bandwidth for a variety of mobile and fixed applications, including mobile command and control and video surveillance. By adding plug-in Cassidian Communications LTE700 mPCIe wireless modules, the BVR700 can be easily modified to support access to a variety of commercial and public safety networks, including 3G, 4G, and LTE (Bands 13, 14 and 17). Intelligent algorithms provide “smart routing”, automatically handling selection between the primary and secondary bearers with no user action required. An integrated two-port Gb Ethernet switch makes it possible for the BVR700 to host a number of different clients, including laptops and in-vehicle terminals, as well as portable and fixed high-def video cameras, providing true “bring your own device (BYOD)” flexibility. Compatible with the 802.11a/b/g/n standard, the BVR700's WLAN access point also creates a hotspot that extends coverage outside of the vehicle to portable LTE or WiFi devices. Last but certainly not least, the superior shock, vibration, temperature and water specifications of the BVR700 provide a rugged design that meets public safety durability requirements, accommodating installation and use in all types of vehicles, including cars, trucks, tracked vehicles and motorcycles.

http://www.cassidiancommunications.com/pdf/LMR_BVR_ProductBulletin_FINAL.pdf



Cameras

Axis Communications

AXIS M3114-R Network Camera is specially designed for mobile video surveillance applications such as in buses, trains, subway cars and emergency vehicles. The camera has protection against dust and water, and can withstand tough conditions such as vibrations, shocks, bumps and temperature fluctuations. The active tampering alarm can detect tampering attempts such as blocking or spray-painting. AXIS M3114-R has support for HDTV 720p streaming at full frame rate and is specially adapted to respond quickly to changes in light levels, ensuring that high image quality is maintained. The use of progressive scan also produces clearer images of moving objects. The pixel counter helps verify that the pixel resolution of an object or face meets regulatory or specific customer requirements. As the market leader in network video, Axis is leading the way to a smarter, safer, more secure world – driving the shift from analog to digital video surveillance. With a strong focus on providing solutions for transportation, public safety and critical infrastructure, Axis' global relationship with Alcatel- Lucent will continue to forge opportunities to provide scalable, future-proof, and flexible solutions to enhance proactive safety planning and emergency response.

www.axis.com/products/cam_m3114r/



Interoperable Communications

Mutualink

Mutualink demonstrated secure public safety 4G LTE interoperable communications between public safety agencies and private entities during the recent Las Vegas field trial. This infrastructure-independent capability allowed entities to bridge together FirstNet and wired agencies for seamless interoperability during emergency incidents such as attacks on energy facilities, school shootings, and weather-related natural disasters. During the field tests, Mutualink deployed its solution in mobile vehicles and on mobile devices, as well as in command and control centers, enabling the secured sharing of video, radio, voice and data for optimal collaboration and situational awareness. Mutualink also invited multiple Las Vegas entities to participate in a number of nationwide exercises, including a National Capabilities Briefing connecting fusion centers in California, Massachusetts and New Jersey, Homeland Security and multiple state police departments.

www.mutualink.net



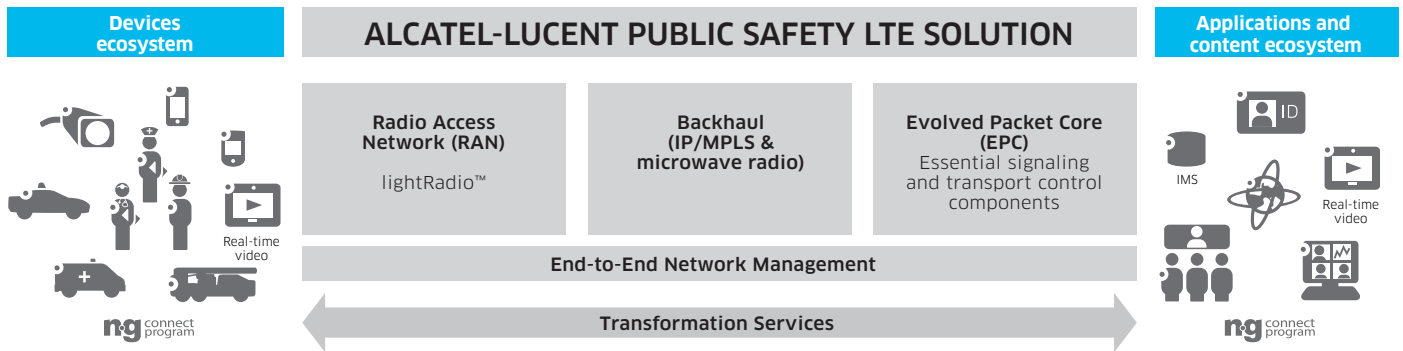
LTE Network

Alcatel-Lucent

The Alcatel-Lucent Public Safety LTE solution for FirstNet is the industry's most innovative and comprehensive answer to unleashing mobile broadband public safety interoperability with speed, massive capacity and network performance to enhance first responder safety and effectiveness. This delivers real-time access to video, images and updates from multiple agencies. What's more, it enables public safety agencies to now use applications and devices from many vendors. The net result? Increased operational effectiveness and cost efficiency with a unified infrastructure that can be securely shared by cooperating agencies. It's all part of Alcatel-Lucent's standards based architecture, empowering public safety to realize the full potential of FirstNet.

The Alcatel-Lucent Public Sector Labs is pre-integrating and pre-testing the Alcatel-Lucent LTE solution with partner application technology to create an end-to-end public safety network. This ensures network component interoperability, and significantly reduces an agency's implementation and ongoing operational risk while helping maximize their ROI.

<http://www.alcatel-lucent.com/public-safety/always-on-first-responders>

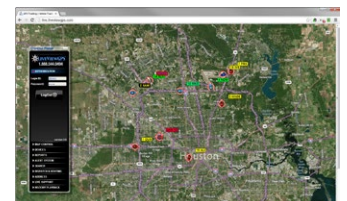


Vehicle Tracking

LiveViewGPS

The Live Trac G5 vehicle tracker is comprised of a hardware GPS tracking component as well as a web based software as a service component. The Live Trac system is capable of real-time vehicle tracking with 1, 5 or 10 second position updates. Notifications and alerts can be sent based on vehicle speed, geographic location, off route driving, ignition status, light bar activation, shotgun rack release and even device tampering. Telematic data is also retained and stored for instant reporting such as start/stop, excessive idling, mileage, aggressive driving, speeding and more.

Please contact LiveViewGPS for further information, 661-294-6805 or online at <http://www.liveviewgps.com>



Video Conferencing

Vidyo

Designed for outstanding performance over both wired and wireless networks, the VidyoMobile™ and VidyoDesktop™ apps connect field personnel on smartphones and tablets with colleagues on Windows, Mac, and Linux computers. With support for HD encoding, full-screen multipoint video, and resilience over network links with up to 20% packet loss, VidyoMobile and VidyoDesktop deliver reliable quality to everyone with a broadband connection, even in challenging environments where other solutions freeze and fail.

VidyoDesktop Data Sheet: <http://www.vidyo.com/wp-content/uploads/DS-VidyoDesktop.pdf>

VidyoMobile Data Sheet: <http://www.vidyo.com/wp-content/uploads/DS-VidyoMobile.pdf>

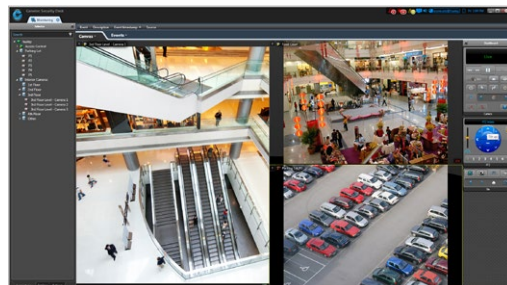


Video Management System

Genetec

Genetec's flagship platform, Security Center, includes the industry's leading IP video surveillance system Omnicast™. Omnicast provides customers with advanced support for a wide range of edge devices and CCTV equipment, while ensuring intelligent video management and high fault tolerance over existing IP networks. With multiple failover, redundancy and maintenance mechanisms built-in, users can depend on Omnicast for their critical safety and surveillance operations.

<http://www.genetec.com/solutions/all-products/omnicast>



ng Connect Program

Technologies from members of the ng Connect Program, an ecosystem of companies dedicated to creating next generation connected user experiences, were a key part of this trial. Members in the ecosystem are collaborating on public safety applications and devices for first responders that include video management, facial recognition, and mass casualty medical monitoring, along with vehicle routers, ruggedized smart phones and dongles designed to work on Band 14.

<http://ngconnect.org/>

<http://ngconnect.org/documents/ng-Connect-Public-Sector.pdf>



EXAMPLE SCENARIOS

To further stimulate thinking on how agencies might use new mobile broadband application capabilities, a list of ten example scenarios were identified during the trial planning process. These provide an opportunity to gain insight into the operation, benefits and governance associated with intra- and inter-agency use of these capabilities and collaboration.

1. Video sharing

- An incident occurs at a casino. The casino calls 9-1-1 to report the incident. At that time the casino states they would like to share video of the incident with Metro Police.
- Metro Police says yes. The casino sends a request using the Mutualink system to Metro Police which they accept. Metro Police Dispatch Center now has a live view of the incident.
- Metro Police assigns a vehicle to respond. At this time they also state to the responding vehicle that they will be sharing live video from the casino, so that upon arrival they will know what is occurring at that moment. Due to access to the live video, a description of the actor might be identified and provided before the vehicle arrives at the casino.

2. Video sharing

- Metro Police is chasing an actor who enters a casino.
- While this chase is on, Metro Police sends a request using the Mutualink system to the casino for access to their cameras. The casino accepts the request.
- Metro Police can now access and view the cameras to assist the officers that are in pursuit. The video of the casino can also be sent to other responding officers so they know what is happening in the casino and have visual identification of the actor.

3. Video sharing

- NV Energy has a crew responding to an incident at one of their facilities. As they arrive on scene they find an unsafe condition which requires the assistance of Metro Police.
- The FAST Center (NV Energy Dispatch Center) contacts Metro Police to request that they respond to the incident. NV Energy states they have live video of what is occurring and would like to share that with Metro Police using the Mutualink system.
- Metro Police accepts the Mutualink system request that NV Energy sends them and now has a live view of the emergency that they are responding to.
- Metro Police states to their responding vehicle that they will be sharing with them live video of what is occurring at the incident.

4. Video sharing

- Metro Police is on a motor vehicle incident that requires the assistance of NV Energy and Nevada DOT.
- The Metro Police vehicle has cameras sending live video over LTE back to the Dispatch Center.
- Metro Police contacts the FAST Center for NV Energy and Nevada DOT to ask them to respond to the incident. Metro Police states that they are sending a Mutualink system request to the FAST Center to share live video from the scene with them.
- The FAST Center accepts the request and can now view what the incident actually looks like; and make better recommendations for resources that may be required from their respective agencies. Since NV Energy's vehicle is equipped with a Mutualink device, it can also share live video from the scene to the responding vehicle(s).

5. Vehicle location tracking

- Dispatch Center sees in real-time the location of all vehicles equipped with a LiveViewGPS device and selects the appropriate vehicles to respond to an incident.
- Dispatch Center shares this view over LTE to the device of a remote command post or commander so they have a view of the vehicles at the scene of an emergency and those that are responding.
- Map is utilized to simplify directing additional resources to that exact location. Enables the Dispatch Center to know where a vehicle is even if it cannot make direct radio contact with it.

6. Video surveillance

- Video from cameras is received by the Genetec Video Management System located at the Dispatch Center.
- An incident occurs where video from permanently mounted or in-vehicle cameras is being viewed at the Dispatch Center.
- Dispatch Center selects the devices (equipped with Genetec Security Center Mobile client) to share video with over the LTE network.

7. Mobile video surveillance

- Metro Police is on a motor vehicle stop and the Dispatch Center has a live view of the motor vehicle stop.
- This same video is shared with a responding backup vehicle.
- If the location of the incident is one that a commander would like to view what is occurring, the video is sent to the commander's device over LTE.

This solution will allow others to see what I see.

8. Video collaboration

- A Nevada DOT vehicle comes upon a large incident on a highway.
- The vehicle contacts the FAST Center to ask them to alert Metro Police and NV Energy for what they feel may be required for this incident.
- The Nevada DOT vehicle at the scene notifies dispatch that they will send live video of the incident from their tablet camera back to the FAST Center and also establish a live video conferencing session using the Vidyo application and LTE broadband router equipped vehicle.

This allows a unit at an incident to collaborate with the FAST Center. Since NV Energy and Metro Police also have the Vidyo application, all units can share the video and collaborate on what may be required for the response. The LTE network allows personnel in a fixed or mobile situation to collaborate.

9. Video collaboration

- Metro Police responds to the scene of a large incident (fire, large motor vehicle accident or mass casualty).
- A vehicle with an in-vehicle camera system is unable to show the full magnitude of the incident to the Dispatch Center. The vehicle is equipped with an LTE broadband router and a tablet.
- The officer uses the tablet camera and Vidyo application to send live video from around the scene back to the Dispatch Center.
- Dispatch Center uses the Vidyo application to send it to the FAST Center and additional responding units so they can view and determine what may be required at the scene.

While this video is being sent, multiple users can see the video and collaborate on the incident.

10. Video collaboration

- NV Energy has a service person at a facility that is having trouble identifying a problem or requires assistance.
- Person contacts his supervisor and tries to describe the problem. The supervisor asks the person to use his tablet and activate the Vidyo application so they can view the equipment and collaborate on the problem over a Wi-Fi and LTE connection supported by the broadband vehicle router.

Collaboration by onsite personnel and a remote resource that can offer guidance helps to more quickly resolve the problem without dispatching additional resources to the scene.

