WHITE PAPER

# Eyes on the Street: How Wireless Video Solutions are Transforming Public Safety.

More and more government and public safety agencies the world-over are using high-speed wireless video networks to enhance officer safety, save lives, increase effectiveness and solve budget dilemmas.

Veteran police officers will tell you there's nothing quite like feet or tires on the street for increasing public safety. Patrolling, whether by foot or car, allows officers to see exactly what's happening in an area with their own eyes. Today, however, as departments are increasingly faced with fixed or shrinking budgets and increased responsibilities, it's difficult to provide all the resources necessary for optimizing public safety and law enforcement.

That's why many departments around the world—from a small town like Sergnano, Italy to large cities like Los Angeles, California—are turning to wireless video technology to supplement feet on the street with eyes on the street.

Wireless video solutions are transforming police work before our very eyes. They are empowering experienced police officers to view live, real-time, 24/7 visuals of their communities: commercial districts, neighborhoods, high-risk areas, crowded public events, dangerous intersections, public transit vehicles, municipal buildings and much more—even when they're not physically on the scene.

With today's advanced wireless video networks, public safety agencies can maintain round-the-clock visual monitoring of their communities from a centralized control center. When a problem is detected, officers can be dispatched immediately, helping to minimize response time and maximize safety and effectiveness.

### *Exponential Growth*

A recent study by ABI Research projects that overall growth of the video surveillance market will expand from $13.6 billion in 2006 to upwards of $46 billion by the year 2013. Other studies reveal that about 70 percent of police departments in the United States are either using video solutions already, or are planning to use them in the near future.

### *Street-Wise Visuals*

Real-time images from today's wireless video solutions systems are helping public safety professionals become even more street-wise. They're assisting in reducing crime, keeping communities safe and saving lives. Wireless video solutions are helping communities large and small improve safety and service by increasing efficiency in a number of critical areas.

- **Crime Reduction.** The mere presence of video cameras is proving to be a significant deterrent to crime. Neighborhoods where video is deployed have seen reductions in crime of up to 40 percent. Video surveillance allows monitoring of previously hidden or out of the way areas, helping to improve response times and effectiveness by alerting police of potentially volatile situations or crimes actually in progress. Faster, more informed responses help save lives and property while improving safety for first responders themselves.
- **Improved Situational Awareness.** Responders and commanders get real-time information, such as streaming video, which complements and adds considerable visual information to the already powerful voice communications they depend on in the field. Enhanced situational awareness empowers officials to manage and coordinate all responses more effectively and deploy resources faster and more efficiently.
- **Community Relations.** Public reaction to video cameras mounted on city streets and in high crime neighborhoods has been positive. Rather than being viewed as controversial or an invasion of privacy, local citizens are supportive of wireless video solutions that help keep their streets and

*"Their video surveillance system allows the two-man police force of Sergnano, Italy, to control 100 percent of the territory without moving from the control room."*

**– Aldo Punzo, Technical Manager, ISP Bettini Video, Sergnano, Italy**

***DETROIT, MICHIGAN ENHANCES BIG GAME SAFETY WITH VIDEO.***

***When the city of Detroit hosted professional football's biggest game, it took no chances with the safety and security of over 65,000 fans. The city turned to Motorola to extend its watch over public safety.***

***"With the stadium in the heart of downtown Detroit, we needed a solution that would boost officials' situational awareness at entrances and exits to the grounds," said Derrick Miller, chief Information Officer for the City of Detroit. "Motorola's solution allowed our officers to monitor a large area and population right from their laptops, while remaining in their dispatched area."***

their families safer. LAPD Deputy Chief Charlie Beck says, "It…improves public relations between the community and the law enforcement agency."

- **Evidence Gathering.** Wireless video is also an exceptionally effective evidence capture, analysis and preservation tool. Whether from a fixed location or a moving vehicle, with sophisticated archival and retrieval capabilities, digital video solution systems allow for fast retrieval of time-and-date-coded visual evidence that can prove invaluable in investigation and prosecution.
- **Budget Optimization.** Wireless video solutions are typically more cost effective to install than systems using in-ground cable or fiber. As wireless cameras can be deployed anywhere, streets and infrastructure don't need to be torn up and replaced. Furthermore, wireless video's ability to monitor multiple locations round-the-clock serves as a significant force multiplier, helping officers and other department employees become substantially more productive. Wireless video solutions and networks are also proving effective at enforcing finable offenses such as traffic citations and parking violations, providing another tool to ensure fines are collected.

Bottom line, wireless video solutions are helping public safety professionals save lives and reduce crime every day. And, while not on the same scale of importance as preserving life, the systems are also proving remarkably successful at maximizing available manpower and budgets.

## *Video Versatility*

Wireless video solutions are an exceptionally versatile public safety technology. Government and public safety organizations are using their video networks in a wide range of practical applications.

**Monitoring.** One of video's most basic yet most beneficial applications is based on 24-hour a day, remote monitoring. Uses include:

- **Neighborhood Watch.** Video surveillance via wireless mesh networks is helping police departments keep closer watch on crime-prone neighborhoods, helping both to reduce crime and improve community relations. Not only can a command center monitor the area; but, with a mobile video sharing application, the center can stream video to patrol cars or officers with handhelds arriving on the scene or relay live video from a patrol car already there, improving the overall situational awareness.
- **Event Monitoring.** Wireless video solutions are being used successfully to monitor events ranging from politics to professional sports and many more. Results include significant safety increases, more successful crowd control, optimized use of personnel and reduced costs. Event monitoring may be facilitated through a permanent video solution or, as often is the case, a portable solution that is deployed for a limited time and later reused at other locations or events.
- **Building Fires and Hazmat Scenes.** Video can also help increase firefighter safety and effectiveness. "Remote eyes" and portable video can equip firefighters with knowledge that saves lives. Reliable video streaming enables a remote hazmat expert to make fast assessments and deliver critical advice to quickly resolve a chemical or hazmat incident.
- **Analytics.** The latest video solutions also include sophisticated analytics software that can systematically monitor an area and alert personnel on the street or in the control center to potential problems. Systems can detect perimeter violations, excessive crowd build-ups, unattended baggage, traffic accidents and many other potentially dangerous or disruptive situations. Video analytics enable trained staffers to manage hundreds of cameras—something not possible even just a few years ago.
- **Traffic Control.** Many government agencies use wireless video networks to monitor traffic in real-time, improve problem recognition and response dramatically, and help to maintain traffic flow even in harsh weather and on highly congested highways.
- **Traffic Enforcement.** Remote video of restricted parking areas, such as metered parking and major arteries during rush hours or snow falls, enables municipalities to not only monitor traffic flow, but also provide a means to enforce codes. Similarly, traffic signal cameras help reduce violations and improve safety by deterring red light runners simply by their visible presence. They are also helping to ensure that violators can be easily identified.

**Mobile Video Recording and Sharing.** In a growing number of departments, the patrol vehicle is now augmented with a digital patrol camera. Today's wireless video systems are eliminating the hassle of bulky VCRs in car trunks and labor-intensive manual videotape management. Systems now record

*"(Video surveillance) is not just about prosecution, it's about prevention. It's the most effective crime deterrent we have in our arsenal."*

**– Antonio Villaraigosa, Mayor, Los Angeles, California**

digitally, automatically recording when the light bar is turned on or when other predetermined events occur. Supplementary data such as GPS coordinates, time of day and vehicle speed are embedded into the video stream. Additionally, when the shift is over, digital video is wirelessly transferred from the patrol car to the station for archival, cataloging and later evidentiary use.

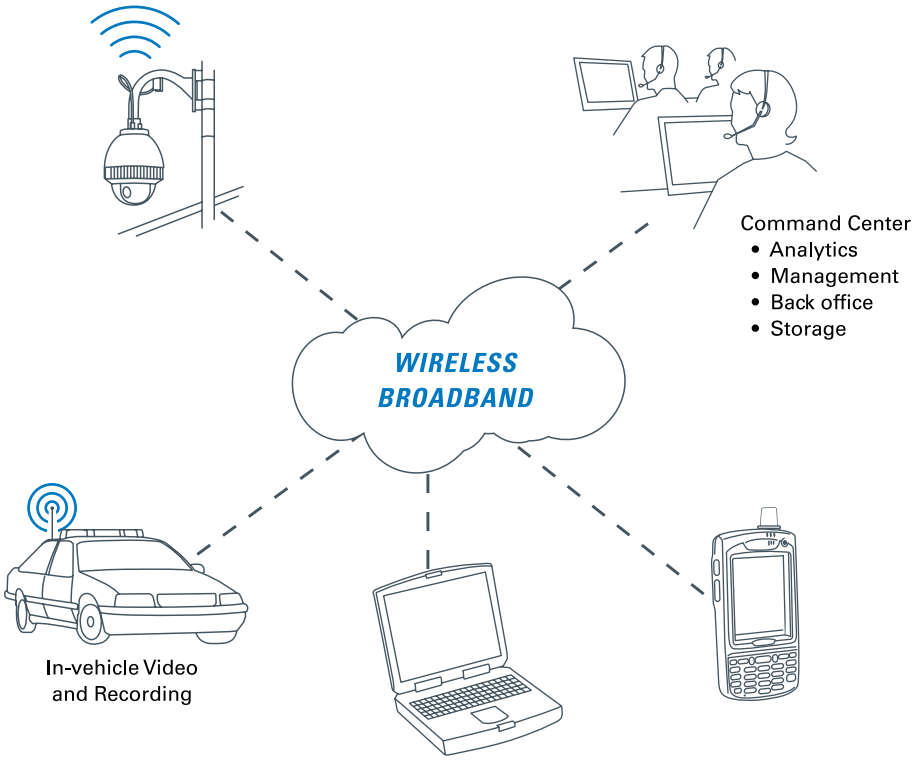
**Evidence Preservation and Access.** Digital wireless video systems are also dramatically improving management of video for use as evidence in judicial proceedings. Rather than having to sort through hundreds or thousands of videotapes, police can now locate and access the correct footage virtually instantaneously. Equally important, the video is digital quality and will not deteriorate with age or repeated playback and duplication.

**The Future.** Fully integrating video technology and solutions into public safety operations will continue to greatly improve the effectiveness and efficiency of first responders and other professionals from the command centers to the incident. In the very near future, most public safety agencies will have the capability of streaming live video from rapidly moving patrol cars, back to the command center or other mobile units in real time, even units from other departments. Analytics will be more advanced and further access and integration into interagency and departmental databases will enable the software to search crowds for suspects, guns or other dangerous items. Additionally, links to private sector video will be more commonplace, greatly enhancing the quality of data and making it easier to act upon. In short, public safety professionals will soon rely on video and view it in the same manner they do voice communications—it's mission critical.

## *Wireless Video System Components*

Aside from the inherent benefits of wireless technology—such as remote monitoring, mobile video, and high-speed transmission—wireless video solutions and networks are generally faster and less expensive to plan, deploy and manage. A typical

***SHARE VIDEO SEAMLESSLY***



*"Officers are able to plan based on what they're seeing, not second or third hand information. It gives us a margin of safety we've never had before."*

**– Steve Merchant, Police Sergeant, Ripon, California**


***RIPON, CALIFORNIA USES VIDEO TO LOWER CRIME RATE.***

***After their cellular service that provided officers with limited access to data in the field discontinued the service, Ripon, California police installed a Motorola network that now gives police units more widespread situational intelligence, enabling them to act faster and more effectively.***

***"We have the lowest crime rate in San Joaquin County and I don't think it is by accident," explains Police Chief Richard Bull. "It's because we make a lot of arrests that would have been missed if we didn't have the information going out to the police officers."***

wireless system can be deployed or extended in a few days as opposed to months or longer with an in-ground fiber or cable network.

Components of the system usually include devices, applications and network equipment. Devices include both fixed and mobile digital cameras for video capture (often infrared cameras for night use), rugged notebook computers, mobile workstations and handheld units. All devices should be designed for reliability in the harshest of climates and locations. Software applications provide the analytics, management and sharing capabilities, while network equipment provides wireless access, backhaul, storage and processing power.

## Planning Considerations

As organizations plan to deploy new or extended video solutions, there are a number of factors to take into consideration.

***Fixed vs. Mobile.*** One of the most important decisions is whether to deploy a simple fixed wireless network, or a combination of a fixed and mobile system. While deploying a fixed system greatly enhances situational awareness, it is often only half a solution. Fixed solutions keep those in the command center informed, but a mobile solution can also significantly benefit those on the front lines. In a crisis situation, timely information is critical and the ability to stream video from the command center to a mobile unit or an officer on the street provides real-time information, enabling on-scene professionals to make better decisions for safer outcomes.

***Mobility and Network Coverage Area.*** Equally important are size of coverage area, potential terrain issues and optimization for motion and vehicular mobility. There are hundreds of vendors who can implement a simple indoor wireless network. However, wireless networks deployed for public safety must often work through trees and foliage, over water, through or around buildings and hills, and with full mobility for vehicles driving over 70 mph. Few suppliers have proven their ability when measured against these critical criteria and in particular for situations involving full vehicular mobility.

***The Camera.*** The choice of camera capabilities is critical as well. For example, will cameras need to view only a small, defined area or a larger geography? Effectively monitoring large locations requires cameras that can easily tilt up and down, pan left or right and zoom in to provide a more detailed look and to optimize visual information. Other considerations are whether cameras will be used at night or for identifying license plates. Night use requires infrared cameras or further illumination by an infrared light source. License plate identification requires a more purposeful sighting usually at a distance of no more than 75 feet. In addition, cameras must often be protected or sealed from the elements and/or optimized for a particular usage.

***Video Characteristics.*** Video quality is an outgrowth of a few basic characteristics; frame rate, color depth, resolution, and file format. Frame rate is measured in frames per second (fps), with live video feeds requiring a minimum frame rate of 10 to 15 fps. Color depth can be black and white, grayscale, color or true color. Resolution is typically measured in the number of pixels (picture elements) within each picture frame and will need to be considered in relation to the device screens or monitors the video will be viewed on. Higher resolution, higher frame rates and video with color contain much more information/data and require more network and storage capacity than lower resolution black and white images.

Compression algorithms, often referred to as video formats such as MPEG 4 and H.264, allow video files to be compressed and take up less network bandwidth and less storage space. Each format has different characteristics and care must be taken to select the format most suitable to a particular situation. Considerations in choosing the appropriate sizing of solution components must include: frame rate, resolution, color depth, types of compression and subject matter for recording.

Wireless networks deployed for public safety must often work through trees and foliage, over water, through or around buildings and hills, and with full mobility for vehicles driving over 70 mph.

***Storage.*** In sizing a video solution, estimating the proper amount of storage is key because storage can represent the most hardware- and cost-intensive component of a design. If not properly understood and estimated correctly, it can quickly make a project exceed its allocated budget. In addition to video characteristics, strong consideration must also be given to how the video will be used. Will it be used strictly for monitoring or will it be used for training or evidentiary purposes later? If data will be stored for later use, how long will it need to be kept? Weeks? Months? Years? The answer to these questions will vary by the types of video being stored. The number of actual cameras and video feeds on the system will also influence the amount of storage and in some cases, the types of available storage will influence the video characteristics of a solution design. For example, if storage capacity is budget constrained, a frame rate of 15 fps will allow for storage of more video footage than 30 fps when all else is equal.

***Analytic Software.*** Departments must also take into consideration whether they wish to utilize computerized analytics. If staff is limited and there are significant numbers of cameras to monitor, analytics act as a force multiplier. Analytic software can identify predetermined events and alert the command center to a potential incident for further investigation. Proper analytic software decreases human error, makes staff more efficient and maximizes available personnel dollars.

***Strategic Partners.*** Modern video solutions require a number of components to make a complete solution. The best components should be designed with public safety in mind and they all may not come from one single supplier. When selecting a company to purchase a solution from, public safety agencies should contract with a manufacturer or integrator who will bring the best components for their particular needs, whether that is their own component or a partner's. For this reason, it is critical to choose a supplier who has a strong network of partners, as well as one who intimately understands the needs of government and public safety.

While beyond the scope of this paper, bandwidth considerations—uplink and downlink speeds—are key decisions, as are network security, authentication procedures, and backup requirements. Finally, it's crucial to plan a scalable network that can be deployed rapidly and built upon to allow for cost-conscious future network growth and expansion.

## *Investigate Further*

As with any emerging technology solution, wireless video surveillance networks are evolving and improving rapidly. That's why it's important to partner with a provider that knows wireless technology inside and out. For nearly 80 years, Motorola has been recognized as the leading provider of wireless communications systems, networks, devices and services. To learn more—and actually see in action—how Motorola can help government and public safety agencies develop and deploy intelligent wireless video solutions that will both provide immediate benefits and position the department to take fast advantage of future innovation, please visit us as ***www.motorola.com/secondnature***.

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