

# Modern Policing and Digital Video Surveillance

By

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## Background

How can technology aid in law enforcement? Historically, technology has increasingly been applied to policing to better equip the police in doing their jobs. Communications has long been the most notable technology enabler for police. Radar detection, Computer Aided Dispatch (CAD), and forensic science technologies are just some examples of the applications of technology for policing. Video surveillance is as well.



Video surveillance is a technology that can truly make a difference in law enforcement. Acting as a force multiplier, video surveillance better enables the police to perform various command and control functions remotely. With the advent of Digital Video Surveillance (DVS), even more capability is available to help the law enforcement community. (For more information on the evolution of video surveillance, visit [www.mts-consultants.com/evolution.pdf](http://www.mts-consultants.com/evolution.pdf)) Additionally, with the application of internetworking and intelligence into a DVS architecture, a significant increase in the capability of that surveillance solution can be realized.

For the context of this paper, there are five basic functions for video surveillance in modern policing. They are:

- **Discrete Surveillance** of known and unknown criminals
- **Command and Control** to act as a force multiplier for police and first responders
- **Provision of Evidence** by increasing guilty pleas and reducing the time and expense of the prosecution processes
- **Deterrence** when used as part of an overall policing or protection strategy
- **Re-assurance** to help increase the public confidence through crime reduction and other factors

Each of these five functions has difference effectiveness for different situations. Although the general population would like to have DVS (and other technologies) prevent crime and terrorism outright, this may not be completely realistic. Deterrence is the greatest factor in preventing crime. But part of a comprehensive policing strategy, discrete surveillance can also significantly aid in the prevention of crime or prevention of the escalation of criminal activity. Remote command and control flat out gives the police the ability to be more effective in more places. Re-assurance has been proven to boost economic areas that have been in decline due to crime and to provide a sense of confidence within the



public at large. Reducing the cost and time for prosecution is evolving as one of the biggest value statements for video surveillance.

MTS recognizes the importance of police officers as the single most critical component of law enforcement. We encourage you to think of a police officer and the resources that you would provide for him/her. You would equip that person with a weapon, a radio, and in most instances, a cruiser. The weapon is for the apprehension of dangerous felons and for the protection of citizens and the officer. The radio is to propagate command and control information to and from other officers and for the officer's personal safety. The vehicle allows the officer to be more effective by increasing the area that they can patrol. DVS technology takes that one step further, by allowing a virtual patrol of a community with a significant return on investment (ROI).

## Intelligence

MTS believes that an alarmed-based DVS solution is more effective than a purely surveillance-based solution. With the addition of pixel-based algorithms for alerting, individuals responsible for monitoring of video activity are more effective and can monitor significantly more cameras. It is a known fact that by simply viewing monitors, the average individual loses the ability to detect incidents within five minutes. This is a highly ineffective surveillance solution. However, by creating alerts that are triggered by certain activities detected by the DVS software, attention can be focused on surveillance areas that need a closer look.

By leveraging DVS technology, police officers can extend their vision beyond one patrol area. By strategically placing cameras in high crime areas, one officer can 'patrol' multiple areas simultaneously, at all times. If the DVS architecture includes intelligence, this makes this patrol even more effective and the chore of monitoring can be distributed.

Some algorithms that are currently developed and deployed that would aid in policing include:

- **License Plate Recognition** – If key roadway intersections are equipped with cameras targeted at LPR, then police can “search” for vehicles and have alarms identify when that vehicle passes the intersection. Police can use this to look for suspects. Vehicle plate information of known pedophiles can be monitored to ensure they do not come within unsafe distances of schools. Additionally, if stolen vehicle license plate information is provided, then vehicles can be identified when they pass through the cameras
- **Facial Capture** – This is particularly useful when a visitor log of people is desired, such as a stadium event, or at a police station, or a school. Through basic DVS technology, a daily log of all personal entering or leaving a facility can be monitored and distributed. People counting can be added to this to make it even more effective, like at an event or on a bus
- **Riot/Fighting Detection** – Rioting and fighting algorithms can alert officials to take a closer look at the situation to determine if a response is warranted and also can help facilitate a more effective response and more effective discipline/prosecution (you can see how the incident transpired)
- **Object Left-Behind** – This is a critical detection capability in areas where bomb threats are likely
- **Facial Recognition** – This technology can enable the identification of known offenders, best when used in a controlled environment (like a school). This is particularly favorable for the identification of pedophiles and known narcotic traffickers. Conversely, this can be used for a

‘good guy list’, where you have access to pictures of people that are permitted in an area and want to identify those not permitted, for access control

- **Fare Evasion (Transit application)** – This has been effective for individuals who evade fares by jumping over or ducking under turn styles. It can set off an alarm
- **Loitering Detection** – By applying detection and logic relevant to time, you can identify persons loitering who may be trafficking in narcotics or prostitution
- **Crowd Gathering** – This application is useful for events such as stadium events or public events like town picnics, etc. It alerts personal to simply take a ‘closer look’ to determine if a response is required.

## Internetworking

Internetworking technology is also an enabler for law enforcement. Through the use of digital transmission networking (TCP/IP) and privacy technology such as Virtual Private Networking (VPN), the Internet can be used as a medium of providing cost effective remote viewing and sharing of video. Multiple officers in multiple locations can view the same video. Senior officers can view video from their homes when off duty, through residential internet connections. Safe community architectures can be realized by interconnecting the video surveillance architectures of multiple institutions, including schools, municipal facilities, tourism areas, and the retail community. Wireless transmission can help send clips of digital media to police cruisers in route to a response, better equipping the officer with current information. Creating ‘hot spots’ at key locations such as schools, banks, and mall parking lots allows cruisers to ‘sign on’ to that facility’s DVS architecture and view activity from within the cruiser, better enabling the officer to make an intelligent and informed response.

## Fourth Amendment Implications <sup>1</sup>

The U.S. Supreme Court in *Katz vs. United States* 389 U.S. 347 (1967), defined modern "search and seizure" law under the Fourth Amendment.<sup>2</sup> The Court declared that "What a person knowingly exposes to the public, even in his own home or office, is not a subject of Fourth Amendment protection, but what he seeks to preserve as private, even in an area accessible to the public, may be constitutionally protected. Generally, a person walking along a public sidewalk or standing in a public park cannot reasonably expect that his activity will be immune from the public eye or from observation by the police."<sup>3</sup> As recognized by the Supreme Court in *United States vs. Knotts* 368 U.S. 276, 281-82 (1983):

A person traveling in an automobile on public thoroughfares has no reasonable expectation of privacy in his movements from one place to another. When [an individual] traveled over the public streets he voluntarily conveyed to anyone who wanted to look the fact that he was traveling over particular roads in a particular direction, and the fact of his final destination when he exited from public roads onto private property.<sup>4</sup>

Following this reasoning courts, for the most part, have allowed police to videotape individuals on public roads.<sup>5</sup>

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<sup>1</sup> MTS recognizes the California Research Bureau CRB-97-005 Report for much of the references in this section

<sup>2</sup> 389 U.S. 347 (1967).

<sup>3</sup> *California vs. Ciraolo*, 476 U.S. 207, 213-14 (1986); *Illinois vs. Andreas*, 463 U.S. 765, 771 (1983); and *McCray vs. State*, 581 A. 2nd 45 (Ct. App. Md. 1990).

<sup>4</sup> 468 U.S. 276, 281-82 (1983).

<sup>5</sup> *USA vs. Taketa*, 923 F. 2nd 665, 677 (9th Cir. 1991); *USA vs. Broadhurst*, 805 F. 2nd 849, 855-56 (9th Cir. 1986)



Transactions in plain view in a public forum generally do not raise Fourth Amendment issues. This is known as the *plain view rule* and *open field doctrine*. If a person does something illegal in plain view (e.g. in front of a video camera), an officer would not need a warrant to search that person to find the incriminating evidence. Court decisions interpreting and applying the Fourth Amendment do not classify this situation as a person, house, paper, or effects that are protected against unreasonable search and seizures.<sup>6</sup> In a recent unpublished opinion, *United States vs. Sherman*, 990 F. 2d 1265 (9th Cir. 1993), the Court of Appeals for the Ninth Circuit held that individuals videotaped in public view have no reasonable expectations of privacy, and could not challenge the government's use of videotape at trial as violating the Fourth Amendment.<sup>7</sup> When this test is applied to video surveillance of public streets, the prevailing legal view is that it does not violate the Fourth Amendment.

## Cost and Value

It is important to recognize that we are not, in any way, advocating a substitute for police officers. Police officers are the single most important component in a policing strategy. What we are emphasizing is better equipping the police through video surveillance to make a limited force more effective. For reference, the average police officer annual salary in New Jersey is \$72,767<sup>8</sup> For a 24x7 patrol, this could equate to two or three officers. For a police officer to be effective, most communities require a police vehicle to patrol a particular area. The cost of a police vehicle is between \$21,000 and \$23,000 per car, based on Crown Victoria, which constitutes 85% of the National police fleet.<sup>9</sup> A police-equipped Crown Victoria gets approximately 16 mpg. A police cruiser is typically driven between 75,000 and 120,000 miles per year. Even at the lower end of this mileage range, at a nominal \$2.50 per gallon, this equates to almost \$12,000 per year. This does not include maintenance and repair. Bottom line is even at one officer and one car, this is over \$100,000 per year. For the same \$100,000, MTS estimates that a policing community can implement a 40-60 camera architecture, with sufficient internetworking and network recording capability applicable to a policing environment. This is a one time cost. Once in place, the cost of maintenance of such a system is nominal at best. This is based on technology only, and does not include construction costs for a DVS Command and Control environment. Most police stations have a dispatch area that can typically be modified to include this capability. This also does not include the connection to other community video architectures, such as retail stores or schools. These connections can be accommodated at a very low cost, further expanding the surveillance area through the common sharing of video with the police. This estimate assumes that internet connectivity is pervasive within the community, which is true for the majority of New Jersey.

## Effectiveness of DVS in Policing

Most recently, the effectiveness of video surveillance in policing was demonstrated in July when British police used videotape from some of the London subway's 6,000 cameras to identify four suicide bombers who killed at least 55 people. The London cameras were set up initially to combat the Irish

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<sup>6</sup> *Dow Chemical Co. vs. United States*, 106 S. Ct. 1819 (1986); *People vs. Mackey*, 121 Michigan App. 748, 329 N.W. 2d 476 (1982).

<sup>7</sup> *USA vs. Sherman*, 990 F. 2d 1265 (9th Cir. 1993), 990 F.2d at 1265 (internal quotations omitted) (citing *United States vs. Taketa*, 923 F. 2d 665, 677) (9th Cir. 1991).

<sup>8</sup> U.S. Census Bureau

<sup>9</sup> Science Daily: March 28 , 2005



Republican Army. Unfortunately, the video system could not be used to prevent the bombings, as the bombers were not on any watch list and as such, unknown.

Also in July, Philadelphia police charged Pennsylvania Hospital worker Juan Covington with the shooting death of X-ray technician Patricia McDermott after viewing video of the killing and video from another camera a few minutes later showing Covington dressed like the killer. Police say the accused is now a suspect in an unsolved murder from 1998.

- New Orleans has installed more than 200 wireless digital cameras in locations that include housing projects, cruise terminals and the French Quarter.
- Baltimore is putting in a \$2 million network of more than 90 surveillance cameras in the Inner Harbor tourist area and high-crime neighborhoods.
- Chicago is adding 250 cameras in high-crime areas and plans to link the existing 2,000 that monitor public housing, the transit system and public buildings, so their feeds can all be watched at the city's emergency operations center. The new cameras can hear gunshots and aim at the sound. "The goal is basically public safety," says Monique Bond of the city's Office of Emergency Management. "That's crime reduction, it's homeland security, it's traffic management." Law enforcement says they've helped drive crime rates to the lowest they've seen in 40 years.<sup>10</sup>
- Los Angeles has installed anti-crime video cameras in three neighborhoods, paid for by local businesses and the Motion Picture Association of America, which wants to thwart street sales of bootleg DVDs.

In New Orleans, federal anti-terrorism funds covered \$2.5 million of the \$6 million cost of new cameras. They enhance public safety and homeland security, says Greg Meffert, head of the Mayor's Office on Technology. About half the cameras are entirely or partly for anti-terrorism purposes, he says. "When we have Mardi Gras, we have a crime and a homeland issue, and we want to just saturate that with cameras."

If cameras installed to prevent terrorism also fight street crime, so much the better, DHS spokesman Marc Short says. "It's not as if we want to become an agency that supplies equipment for domestic law enforcement purposes, but we recognize there are dual uses."

Cameras watch downtown streets in Durham, N.C., Revere, Mass., and Jersey City. They keep an eye on partying students in the college towns of Athens, Ga., and Cedar Falls, Iowa. And they monitor tourist-heavy cities such as Honolulu and Virginia Beach.

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In most cases prior to the last few years, street crime - not terrorism - was the driving factor behind the cameras. There has also been a boom in traffic-monitoring cameras, and huge reliance on surveillance cameras in private business, especially in retail establishments like convenience and department stores<sup>11</sup>

Cameras at automated teller machines capture 250,000 customer transactions daily for Citibank, for instance, and the security industry estimates that more than 2 million surveillance cameras are in use across the country. In Manhattan in 1998, volunteers counted 2,400 electronic eyes in public places used

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<sup>10</sup> USA Today, July 18, 2005

<sup>11</sup> Associated Press, July 23, 2005 "Pressure on US to use more surveillance", Robert Tanner



to catch everything from red-light runners at traffic intersections, shoplifters outside grocery and department stores, and drug sellers loitering near lampposts. Former mayor Rudolph W. Giuliani (R) credited surveillance with slashing crime in public housing by 20 to 40 percent, and cameras have been added to Washington Square and Times Square in the city.

A 2001 survey by the International Association of Chiefs of Police concluded that 80 percent of 19,000 U.S. police departments have deployed closed-circuit television in their jurisdictions, and 10 percent more plan to do so soon. Police in Tacoma, Wash., cut service calls in half with seven cameras in a neighborhood plagued by drugs and gangs.

D.C. police officials, acknowledging the sensitive nature of the debate, say they intend to move carefully. Their project has won support from several established law enforcement and technology figures. In addition to the Secret Service and FBI, the U.S. Capitol Police and U.S. Park Police are expected to reach agreement soon to permit links from their video assets to the D.C. center when events warrant, said Stephen J. Gaffigan, a former Justice Department director of community policing and head of the D.C. police project.

As described by police officials, the District links computer video servers to 13 digital police cameras programmed to automatically scan such public places as the Capitol, the White House, the Washington Monument, Union Station and major bridges. D.C. public schools, Metro and the D.C. Department of Transportation have agreed to link 500 cameras overlooking train stations, roads and school hallways in an emergency. As a crime is reported, the cooperating agency can feed views of the scene, surrounding alleys or streets to police commanders and to computer screens installed in nearly 1,000 squad cars.

"In the event a biochemical or any other event happens in a subway," Gaffigan said, "a central command officer can actually look in and see what's going on." Police could also see inside a school in case of a shooting or hostage incident, manage an evacuation, track a getaway car -- or perhaps stop a saboteur before one struck.

The power of surveillance images was clear after the 1995 Oklahoma City bombing, when agents combed through neighboring buildings' videotapes in an effort to identify their "John Doe" suspects.<sup>12</sup>

The use of video surveillance in policing is not new. Below is a snapshot of some major CCTV activities in the US from almost a decade ago.

**Baltimore**, Maryland installed CCTV in 1995. The program's goal was to reduce violence in the downtown business district, and thereby reverse the area's declining attractiveness for shoppers. Aggressive panhandling, prostitution, street dealing of drugs and larcenies from vehicles are the most notable nuisance crimes found by consumers.<sup>13</sup> The initial installation cost of cameras, monitors, recorders, and wiring for the project was \$47,000. Sixteen fixed-position exterior surveillance cameras provide coverage across the "Howard Street/Lexington Market corridor," an open air farmer's market and business district near the heart of the city. The cameras are positioned to capture activities in public places such as streets, sidewalks and public parks. Anecdotal information from businesses and consumers suggests that the system is providing a certain degree of comfort.

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<sup>12</sup> Washington Post, February 2, 2002 "D.C Forms Network of Surveillance", Spencer Hsu

<sup>13</sup> Linda Schiffer, Maryland Governor's Office of Crime and Prevention, Press Release, "New Downtown Video Patrol Program Uses Technology To Reduce Crime," January 19, 1996.



**Newark**, New Jersey installed a CCTV system in 1991 called "Video Patrol" that provides 24 hour surveillance of a two square mile area in the city's business district. The project was funded through a federal block grant to the Newark Economic Development Corporation. The system is composed of 6 CCTV cameras which are enclosed and protected by environmental housing and connected by fiber optic cables. Both the police department and the downtown business association support the project. No official crime-related data measuring the effectiveness of the system has been kept since the system was installed. According to a police spokesperson for Newark, car theft in the downtown district has declined significantly since the CCTV system has been in operation. There has also been steady commercial growth in the business district of Newark over the last four years.<sup>14</sup>

**Memphis**, Tennessee initiated a \$450,000 CCTV video surveillance program for its downtown business and entertainment district in 1996 in order to discourage and prevent crime. This area was chosen because of its high visibility and increased business growth. The surveillance system consists of 10 pan/tilt/zoom cameras which are mounted on buildings covering a 12 square block area. The CCTV cameras are linked to police dispatch centers via fiber optic cable. Police officials believe the CCTV system will give the general public a sense of safety and will assist in identifying and apprehending criminals much faster. "The goal of this project is not to substitute officers for cameras. Rather, this equipment will be an addition to the patrol officers to help with their effectiveness. The overall objective of this surveillance program is to make the city a safer place for tourists and business owners."<sup>15</sup> According to Memphis police, crime has decreased 10 percent in the downtown area where the cameras are located since the program was initiated.

**South Orange**, New Jersey municipality approved the installation of 7 CCTV surveillance cameras in 1994 to promote public safety in parking lots, intersections, and parks. The project cost \$10,000 and was funded through a combination of federal grants and municipal funds. According to South Orange officials, crime has decreased since the cameras' installation. Police Chief Thomas Andrew stated that as a result of the surveillance cameras, auto theft is down 40 percent in the district and people in the community generally feel much safer walking the streets. South Orange officials are considering expanding CCTV video surveillance to the city business district, much like their neighbors in Newark

Other cities include San Diego, California, Dover, New Jersey, Anchorage, Alaska, Hollywood, California, Tacoma, Washington, Virginia Beach, Virginia, and Tampa Bay/St Petersburg, Florida, all with improved crime statistics. This was as of 1997. That number has greatly increased since that time.

**International.** Many European countries now employ public video surveillance as a primary tool to monitor population movements and to prevent terrorism. The United Kingdom (UK) in particular relies extensively on video surveillance as a tool to fight crime and prevent terrorism. According to some researchers, the camera surveillance systems in the UK are discouraging and thus preventing crime.

Public video surveillance in the UK began in 1986. By 1994, over 300 jurisdictions in the country had installed some form of public video surveillance. In 1995, the national government made available up to \$3.1 million in matching grants available to cities and towns to establish CCTV video surveillance programs. According to the police superintendent of a large metropolitan area, "public video

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<sup>14</sup> Telephone Interview with Detective David Collins, Video Patrol Information Officer, Newark Police Department, September, 19, 1996.

<sup>15</sup> Telephone Interview with Sam Moses, Deputy Police Chief, Memphis Police Department, September 1996.



surveillance has been very helpful in making arrests, and perhaps more important, helping to allocate resources to where they're most necessary." British government reports cite CCTV surveillance as a major reason for declining crime rates: in the small town of Berwick burglaries fell by 69 percent; in Northampton overall crime decreased by 57 percent; and in Glasgow, Scotland crime decreased by 68 percent.<sup>16</sup>

In Liverpool, crimes such as shoplifting, prostitution, graffiti, and other nonviolent crimes have decreased by 25 percent between 1994 and 1997. People apparently notice the cameras but do not appear to be concerned about them. One study conducted by a British research firm found surprising support among citizens for CCTV video surveillance.

CCTV surveillance has also helped UK officials to clean up the country's tarred international soccer image. At the Euro '96 soccer championships, up to 50 British soccer troublemakers who had disrupted games in previous soccer matches were barred from attending the championship matches after being identified by video surveillance cameras.

## Conclusion

Crime rate reduction statistics are being gathered and analyzed. There are mixed results but the trend is clearly on the positive for reduced crime. Many believe this is because video surveillance deters 'opportunistic' crime, where people take advantage of a situation on the spur of the moment. Today's opportunist is tomorrow's professional criminal. If we decrease the number of opportunities for easy crime, we can reduce the number of people becoming professional criminals. Opponents suggest that video surveillance merely relocates crime to non-surveilled areas. There is no empirical evidence to support this, however this would be true of any visible policing function. A convenience store robber would more than likely choose a store that is not regularly patrolled by police. Regardless, video surveillance enables our police to be more effective, reduces crime, and reassures the public of safety. All these factors contribute to the value proposition of using DVS technology for modern policing. Equally compelling, the technology afforded by advances in DVS and internetworking makes video surveillance even more attractive and affordable than ever before.

For related information on this topic and an understanding of intelligent DVS solutions, please contact Rob Merchant at [rob.merchant@mts-consultants.com](mailto:rob.merchant@mts-consultants.com) or visit <http://www.mts-consultants.com>

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<sup>16</sup> William Montalbano, "Public Cameras Change Crime Picture in Britain," *Los Angeles Times*, Section A, Page 10, June 6, 1996