PursuitSAFETY Technology Comparison 2009

Researcher: Andrea Pérez

Technology: 3M OptiCom System: OptiCom System, aka: Emergency Vehicle Preemption or EVP

Intended Purpose: This system allows for communication between emergency vehicles and traffic signals in the vehicle's path through a high frequency signal. The signal directs traffic lights to turn green in the intended path of the emergency vehicle as well as a flood light warning for motorists in the area. The purpose is to provide safer passage for emergency vehicles through intersections as well as increased warning to surrounding vehicles in order to avoid collisions. According to the report, *Guidelines for the Planning and Deployment of Emergency Vehicle Preemption and Transit Priority Strategies: between 1994 and 2000*, the Department of Transportation reported more than 643 Emergency Vehicle crashes, involving one or more fatalities, within the U.S. (http://www.mwcog.org/uploads/committee-documents/oFlZXV420060717152607.pdf . This information emphasizes the need for emergency vehicle signal preemption systems.

How it Works- Specifics: Fire trucks, ambulances, and other emergency vehicles are equipped with a transmitter that sends a high-frequency signal to a receiver at the traffic signals. The receiver sends a message to the signal control box to give the approaching emergency vehicle a green light. Flood lights (white) light up or flash to warn motorists that emergency vehicles are approaching, and they need to stop.

Effectiveness: "St. Paul, Minnesota reported an accident rate reduction of greater than 70% between 1969 and 1976 when it installed 285 signal preemption systems on 308 signalized intersections" http://www.mwcog.org/uploads/committee-documents/oFlZXV420060717152607.pdf (pp. 8). This would imply the level of effectiveness for updated systems could be high.

Frequency of Use: Rate 1-2-3 with 1 being most used: "Most of the traffic signals" in Twin Cities Minneapolis/St. Paul in metro area are equipped with this technology. Nation-wide: 2

Limitations: (1) When more than one emergency vehicles are approaching from different directions, the first emergency vehicle that transmits the signal takes precedent over the other. Therefore, the other emergency vehicles must show extreme caution. (2) The transmitter, once activated, is not instantaneous. It must cycle through pre-programmed activities, creating a lag time. The lag time can reduce the effectiveness of this technology as police pursuits are, by nature, short in duration.

Links to Research/Stories: (1) http://www.mwcog.org/uploads/committee-documents/oFlZXV420060717152607.pdf -- "Guidelines for the Planning and Deployment of

Emergency Vehicle Preemption and Transit Priority Strategies" Research done by Virginia Tech, and George Mason

Links to the Technology: (1) http://minneapolis.about.com/od/cityservicesgovernment/qt/opticomp.htm (Twin Cities Metro Fire Directory) (2) http://www.tcmfd.com/stuff/opticom.html

Technology: Amber Alert-Like Technologies

Intended Purpose: The Amber alert is able to get an entire community involved in the recovery and search for a missing child. This technology and concept could potentially have large implications for police pursuit safety measures. (Possibility for police pursuit application)

How it Works- Specifics: "The AMBER Alert Program is a voluntary partnership between law-enforcement agencies, broadcasters, transportation agencies, and the wireless industry, to activate an urgent bulletin in the most serious child-abduction cases" (http://www.amberalert.gov/index.htm). "AMBER Alerts are distributed via commercial radio stations, satellite radio, television stations, and cable TV by the Emergency Alert System (where they are termed "Child Abduction Emergency" or "Amber Alerts"), as well as via e-mail, electronic traffic-condition signs, the LED billboards which are located outside of newer Walgreens locations, along with the LED/LCD signs of billboard companies such as Clear Channel Outdoor, CBS Outdoor and Lamar, and wireless device SMS text messages" (http://en.wikipedia.org/wiki/AMBER_Alert).

Frequency of Use: Rate 1-2-3 with 1 being most used: 2

Additional Advantages: (1) May potentially have police pursuit applications in serving to alert surrounding motorists of a pursuit occurring in the area.

Limitations: (1) Given the unpredictable nature and short duration of police pursuits, this technology may not be effective in alerting and warning vehicles in the surrounding area of a pursuit.

Technology: Biometrics

Intended Purpose: Biometrics is the use of various methods, which are described below, for identifying individuals.

How it Works- Specifics: Biometrics uses methods such as fingerprinting, facial recognition, iris recognition, DNA, hand and palm geometry, etc., in order to recognize individuals.

Frequency of Use: Rate 1-2-3 with 1 being most used: The FBI has awarded a $1 billion, 10 year contract to form a database that will compile a large array of biometrics collected. 3

Additional Advantages: (1) This technology will allow for identification of individuals from a great distance as well as the creation of a database to compile the biometric information.

Limitations: (1) This technology requires an enormous database to keep the information. (2) It brings up significant controversy with regards to personal privacy and surveillance. (3) This technology is very expensive.

Links to Research/Stories: (1)
http://management.silicon.com/government/0,39024677,10004850,00.htm (2)
http://www.cnn.com/2008/TECH/02/04/fbi.biometrics/

Technology: GPS Darts (StarChase)

Intended Purpose: This technology launches a tracking projectile (air-propelled miniature dart) that adheres to the fleeing vehicle and tracks its location and movements. It can be used to track suspects with the use of GPS technology. This will lessen the need for high speed pursuits.

How it Works- Specifics: "The StarChase system is a commercial off-the-shelf solution comprised of a miniature GPS receiver, radio transmitter and power supply encased in a tracking projectile, and a launcher which can be hand-held or mounted on a police vehicle." "A compressed-air launcher, mounted behind the grille of a police cruiser, uses a laser to target the fleeing vehicle. It discharges a projectile containing the GPS receiver, transmitter and power supply. The projectile adheres to the suspect vehicle and transmits coordinates back to dispatch. The dispatcher then views the location and movements of the tagged vehicle in near real-time on a digital roadmap via a secure Internet connection." (http://www.starchase.org/howitworks.html)

Effectiveness: "The system, which has been tested by the manufacturer in Columbus, Ohio, and Suffolk County, N.Y., is in final testing by the Los Angeles Police Department, StarChase spokeswoman Mandy McCall says" (http://www.usatoday.com/tech/products/2008-12-10-policechase_N.htm).

Frequency of Use: Rate 1-2-3 with 1 being most used: 3

Additional Advantages: (1) The effective tracking of a fleeing vehicle would allow officers to slow down and would likely lead to reduced speeds from the fleeing vehicle, as the active chase would end.

Limitations: (1) Technology is expensive ($1,200-$1,500 per police car), especially for smaller departments (http://goliath.ecnext.com/coms2/gi_0199-9064690/Pin-the-tail-on-the.html). (2) Requires significant training.

Links to Research/Stories: (1) http://www.usatoday.com/tech/products/2008-12-10-policechase_N.htm (2) http://www.usatoday.com/tech/products/2008-12-10-policechase_N.htm (3) http://goliath.ecnext.com/coms2/gi_0199-9064690/Pin-the-tail-on-the.html

Links to the Technology: (1) http://www.starchase.org/

Technology: Helicopters

Intended Purpose: Helicopters are equipped with "a combination of crime-fighting tools-- the radio, searchlight, infrared heat sensing system, and camera…" (http://www.ncjrs.gov/pdffiles/171695.pdf) All of these tools, as well as the helicopter's unique vantage point, make it an extremely useful tool during a police pursuit.

How it Works- Specifics: Helicopters are aircrafts which are lifted and propelled using one or more horizontal rotors. This allows them the unique ability to take-off and land vertically. They are also able to hover over a particular area "more efficiently than other forms of vertical take-off and landing aircrafts" (http://en.wikipedia.org/wiki/Helicopter). Police helicopters are able to make use of their aerial positions and on-board equipment, during police pursuits, in assisting "ground units as a platform from which to observe, track, and illuminate people or places on the ground" (http://www.ncjrs.gov/pdffiles/171695.pdf). They use on-board radios in order to communicate with ground units and provide them with information about a fleeing car/suspect. The searchlight serves many purposes, including illuminating a fleeing suspect's position during night pursuits, lighting up an area in order to alert other motorists of an oncoming danger, etc. The infrared heat sensing system allows the helicopter to maintain visual on a suspect, at greater speeds, despite possible thick undergrowth or other visual obstacles (http://people.howstuffworks.com/police-chase1.htm).

Effectiveness: According to the National Institute of Justice's 1998 Report entitled *Helicopters in Pursuit Operations*, "the versatility, range, and vantage point of the helicopter allows ground officers to conduct pursuits more successfully, decreasing the use of high-speed pursuits and increasing apprehension rates." A helicopter's clear tactical advantage during a pursuit often "allows the ground units to turn off emergency equipment and slow down to protect public safety while maintaining visual contact." It can also allow for the helicopter to keep "a safe distance so that the suspect is not aware of police presence" (http://www.ncjrs.gov/pdffiles/171695.pdf).

Frequency of Use: Rate 1-2-3 with 1 being most used: 2

Additional Advantages: (1) Helicopter presence and searchlights can act to alert surrounding motorists that there may be a dangerous situation occurring nearby.

Limitations: (1) Police pursuits are unexpected and many times very short in duration. The time it takes to mobilize a helicopter unit can act as a limitation in its effectiveness in pursuit situations. (2) The cost of operating a helicopter is extremely high. As a result, smaller departments often do not have access to one, and those who do might be less willing to use it.

Links to Research/Stories: (1) http://www.ncjrs.gov/pdffiles/171695.pdf - (Link to Geoffrey Alpert study, "Helicopters in Pursuit Operations").

Technology: Inter-Operational File Exchange among Agencies

Intended Purpose: The main function of inter-operational file exchange among agencies is that of increased communication. This can serve in aiding officers in many capacities, including help in assessing a suspect's past record and potential for violence or fleeing before or during a traffic stop. The significance to police pursuits can be great as an assessment of the suspect's risk to the public is vital to the officer's decision whether a pursuit is absolutely necessary.

Frequency of Use: Rate 1-2-3 with 1 being most used: 2

Additional Advantages: (1) The significance that this communication can have with regards to police pursuits can be great as an assessment of the suspect's risk to the public is vital to the officer's decision of whether a pursuit is absolutely necessary.

Technology: MEVAS: Multiple Emergency Vehicle Alert System

Intended Purpose: The MEVAS is intended to serve as an alert system for civilian vehicles to warn them when emergency vehicles in the area have turned on their emergency lights. The early warning would allow vehicles to take necessary precautions (i.e. slow down; pull to the right shoulder, etc.)

How it Works- Specifics: "Each equipped emergency vehicle emits a pulse radio signal with an identifying code anytime its emergency lights are activated. Vehicles equipped with MEVAS will receive this signal as they approach or are approached by the emergency vehicle(s) even if the emergency vehicle(s) were sent by different dispatchers and are responding to different incidents. The driver is notified by an audio and visual alert of the number and type of each emergency vehicle(s)" (http://www.mevas.us/product.html).

Frequency of Use: Rate 1-2-3 with 1 being most used: 3

Additional Advantages: (1) Gives people valuable seconds by alerting them of potentially dangerous driving conditions.

Limitations: (1) Must be installed in both emergency vehicles and civilian passenger vehicles in order to be effective. (2) Pedestrians, bicyclists and motorcycle riders would not benefit from this technology. (3) Technology's application does not help to avoid a pursuit from occurring nor does it aid officers once a pursuit has begun.

Links to the Technology: (1) http://www.mevas.us/

Technology: Mobile Deployment System Tire Spikes (Tire Deflation Device)

Intended Purpose: "Mobile Deployment Systems provides the only patented patrol car rear deployment tire deflation system." The device is attached to the rear underbelly of the patrol car and can be deployed by an officer in the driver's seat. (http://www.mobiledeploymentsystems.com/index.html)

How it Works- Specifics: "A paddle switch electrically activates the system and glows red when the system is armed. The officer deploys the road spikes by pressing a guarded switch. Hollow tubes from the spike plate remain in the tire deflating one or more tires on the vehicle and stopping the fleeing car without high risk of blowout or crash." (http://www.mobiledeploymentsystems.com/index.html)

Frequency of Use: Rate 1-2-3 with 1 being most used: 3

Additional Advantages: (1) Accidental deployment is prevented by a double switch system. (2) Deployment occurs remotely from within the patrol car, rather than manually, on the side of the road. This removes risk to deploying officer. (3) This technology requires no wires or cables which can entangle officers during or after deployment.

Limitations: (1) Requires significant training, as an array of variables must be coordinated with extreme precision for technology to work successfully.

Links to the Technology: (1) http://www.mobiledeploymentsystems.com/index.html

Technology: Nestor Traffic Systems Red-light cameras: Collision Avoidance System

Intended Purpose: Like all red-light camera systems, this system monitors and documents vehicles that run red lights. The distinguishing feature of this system is its pre-emptive strategy to thwart collisions caused by vehicles running red lights. This is achieved through a sequenced extension of the "all-red phase" of corresponding traffic lights when a red-light-runner is detected.

How it Works- Specifics: When a car is approaching a red light too rapidly the system will sequence a red alert, briefly extending the all-red signal phase. Although it holds the other side red for a time, it only senses in one direction. All-red phases are extended to prevent a collision. The system will also document the incident by snapping a picture of the violating vehicle. According to Nestor Traffic systems, "Collision Avoidance is the only proactive safety system of its kind installed anywhere in the world" (http://www.roadtraffic-technology.com/contractors/photo_enforcement/nestor/). Note: Fire trucks have an override unit in their trucks to allow them to override the sequence and pass through safely.

Effectiveness: Red-light cameras - Only one accident since lights were installed 1 1/2 years ago. Average of 30 citations monthly and $396 fine and penalty of one point on driver's record. 99.9% effective.

Frequency of Use: Rate 1-2-3 with 1 being most used: 3 (red-light system)

Additional Advantages: (1) Pursuit application: Can hold the all-red phase in the case that a pursuit crosses through red lights.

Limitations: (1) Only senses in one direction. (2) City Police/ambulances do not have override system.

Links to Research/Stories: (1) http://www.santamariatimes.com/articles/2009/02/03/news/news02.prt (In archives. Under: red-light cameras)

Links to the Technology: 1. http://www.roadtraffic-technology.com/contractors/photo_enforcement/nestor/

Technology: Night Vision

Intended Purpose: This technology allows officers to keep visual contact of a suspect during a pursuit, and particularly in the event of a foot chase. It is also used onboard police helicopters, and proves vital in allowing the helicopter to maintain visuals of fleeing suspects.

How it Works- Specifics: "Night vision technology consists of two major types: light amplification (or intensification) and thermal (infrared)" (http://www.nightvision.com/night_vision/how_nv_works.html). Night vision works through the amplification of "existing levels of available light, including light in the near infrared band (750-900 nm). The light these devices detect in this infrared band is additionally converted to a wavelength visible to humans" (http://www.irlight.com/nvdiscussion.html).

Frequency of Use: Rate 1-2-3 with 1 being most used: 2

Limitations: (2) Thermal (infrared) cameras are expensive (often $6,000 +). (2) Technology is more suited for foot chases.

Technology: OnStar: Stolen Vehicle Slowdown

Intended Purpose: This technology makes use of a vehicle's onboard OnStar system in order to causes the vehicle to gradually slow to an idle speed remotely.

How it Works- Specifics: "Once the vehicle has been reported stolen to law enforcement, the subscriber calls OnStar to request Stolen Vehicle Location Assistance. OnStar uses real-time GPS technology to pinpoint the exact location of the stolen vehicle and provides this information to law enforcement to help them recover the vehicle. When law enforcement has established a clear line of sight of the stolen vehicle, they may request OnStar to slow it down remotely. Safeguards will be in place to ensure that the correct vehicle is slowed down. OnStar then sends a remote signal to the vehicle that interacts with the Powertrain system to ignore throttle input causing the vehicle to gradually slow to an idle speed" (http://www.onstar.com/us_english/jsp/plans/svs.jsp).

Effectiveness: "David Hiller, national vice president of the Fraternal Order of Police and chief of the 44-officer police department in Grosse Pointe Park, Mich., calls the OnStar technology 'very effective'" (http://www.usatoday.com/tech/products/2008-12-10-policechase_N.htm).

Frequency of Use: Rate 1-2-3 with 1 being most used: 3

Additional Advantages: (1) This technology could prevent a pursuit from occurring, or end a pursuit as soon as it begins.

Limitations: (1) Limited availability: Must be an OnStar subscribers. (2) Critics have privacy concerns as it is conceivable that GM and LE could use this technology for things other than a pursuit.

Links to Research/Stories: (1) http://www.usatoday.com/tech/products/2008-12-10-policechase_N.htm

Links to the Technology: (1) http://www.onstar.com/us_english/jsp/plans/svs.jsp

Technology: Radar

Intended Purpose: Radar is used by police officers to gauge the speed of a motorist.

How it Works- Specifics: "Radar guns are, in their most simple form, radio transmitters and receivers. They send out a radio signal, and then receive the same signal back as it bounces off the objects. However, the radar frequency is different when it comes back, and from that difference the radar gun can calculate object speed." http://en.wikipedia.org/wiki/Radar_gun

Frequency of Use: Rate 1-2-3 with 1 being most used: 1

Additional Advantages: (1) Can be used to gauge the speed of a fleeing suspect in order for officers to react appropriately.

Limitations: (1) Radar is prone to interference from high voltage power lines, telephone lines, power stations, even neon lights. (2) Radar can only read one object's speed; therefore if there are many vehicles in the line of sight of the radar gun, there is little accuracy as to which vehicle's speed the radar gun is reading.

Technology: Spike strips (Tire Deflation Device)

Intended Purpose: According to the 1998 Pursuit Management Task Force Report, Spike Strips "consist of sharpened, hollow steel spikes that are press-fitted into expandable plastic strips of various lengths" (http://www.justnet.org/Lists/JUSTNET%20Resources/Attachments/1302/pmtf.pdf).

How it Works- Specifics: "When a pursued vehicle runs over a strip, the spikes are embedded in the tires and pull loose from the strip, remaining in the tires and allowing air to escape at a controlled rate for a safe deflation. This prevents blowouts and allows safe steering to continue until the tires are flat and the vehicle slows to a manageable speed" (http://www.justnet.org/Lists/JUSTNET%20Resources/Attachments/1302/pmtf.pdf).

Effectiveness: In the 1998, Pursuit Management Task Force Report rated it the most effective technology.

Frequency of Use: Rate 1-2-3 with 1 being most used: 1

Limitations: (1) Officers are at risk of injury or death during and shortly after manual, roadside deployment of the sticks. They are also at risk while retrieving the sticks after use. (2) The driver may continue fleeing, despite the deflation of his vehicle's tires. This can cause tires to emit sparks and shards of red hot metal and debris. (3) The presence of innocent bystanders can make deploying the sticks more difficult. The situation must be perfect for them to be effective.

Links to Research/Stories: (1) Spike Strips Pose Own Element of Danger: http://www.policedriving.com/spikestrips.htm

Technology: Stop Stick (very similar to the Stinger) (Tire Deflation Device)

Intended Purpose: The Stop Stick is a type of tire deflation device. It utilizes hollow spikes on a portable strip that are designed to deflate a fleeing suspect's vehicle.

How it Works- Specifics: Upon deployment, the hollow spikes puncture the tires in such a way as to allow air to slowly leak from the tires. This method ensures that the tires deflate gradually, therefore decreasing or eliminating the dangers of a blowout or excessive debris. The main difference between the Stop Stick and conventional Spike Strips lies in the added safety measures, including: plastic housing which "provides officer safety during deployment and removal from the roadway", and an 80-foot cord which "allows the deploying officer to stand a safe distance from the road" (http://www.policelink.com/products/products/598-stop-stick).

Frequency of Use: Rate 1-2-3 with 1 being most used: 1. The manufacturer's website boasts that Stop Sticks are used in all 50 states, with over 150,000 vehicles equipped worldwide

Additional Advantages: (1) "80-foot (24m) cord allows the deploying officer to stand a safe distance from the road" (http://www.stopstick.com/stopstick.html). This keeps officers farther from the road with the intention of diminishing the possibility of an officer being hit by a passing car while deploying the sticks as well as while retrieving said sticks.

Limitations: (1) Manual, roadside deployment of strips is still needed. Although the risk of injury to deploying officer is lessened by the length of the deployment cord, there is still risk. (2) The driver may continue fleeing, despite the deflation of his vehicle's tires. This can cause tires to emit sparks and shards of red hot metal and debris. (3) The presence of innocent bystanders can make deploying the sticks more difficult. The situation must be perfect for them to be effective.

Links to the Technology: (1) http://www.stopstick.com/index.html

Technology: The Vehicle Interdiction Projectile

Intended Purpose: The Vehicle Interdiction Projectile requires only the chase vehicle, no pre-deployment. A single officer driving a properly equipped car can safely employ the device.

How it Works- Specifics: Plugs the exhaust of an internal combustion engine to quickly cause the engine to stall and thereby disable the vehicle until the plug is removed. The most basic form of these new inventions is simply a rubberized bladder containing a CO_2 cartridge that is manually inserted into a vehicle's exhaust pipe. The cartridge is punctured, the bladder inflates, and the vehicle is shut down. The device includes an extension arm and trigger, providing one-handed operation without the need to bend down. This device allows law enforcement officers to safely establish some degree of control of a possible DUI or stolen vehicle during a traffic stop before a risky pursuit may unfold.

Frequency of Use: Rate 1-2-3 with 1 being most used: 3

Additional Advantages: (1) A chase can be prevented, through preemptive use of the technology. (2) Since it is an inflatable device, it can also be deflated, and as such, this device does not result in problems associated with expanding foams or heat-expanding materials. (3) Returning the vehicle to full operation without damage can be done quickly. (4) These devices are lightweight, easily transported in individual patrol cars, and require minimal training.

Limitations: (1) This technology is only effective if the vehicle involved pulls over when approached by a police vehicle. It does not prevent a pursuit from occurring prior to a traffic stop.

Links to the Technology: (1) For more information on the Vehicle Interdiction Device, U.S. Patent 7,246,613, contact Bob Mohar at 866-264-6689 tolls free, 653 Fairview Drive, Crossville, TN 38571-3730, 931-707-0434 or 931-261-6024 cellular. mopat@frontiernet.net

Technology: Thermal Imaging

Intended Purpose: Thermal imaging allows police to track cars and fleeing suspects when light conditions are not favorable for visual contact. The thermo graphic cameras can be mounted to both police cars and helicopters.

How it Works- Specifics: Thermal imaging uses thermo graphic cameras to distinguish between different degrees of radiation in the infrared spectrum in order to produce an image. Heat from a car or body emits different degrees of this radiation. Thermal imaging allows officers to maintain a visual of fleeing suspects or vehicles during police pursuits.

Effectiveness: The National Law Enforcement and Corrections Technology Center's TechBeat quarterly newsmagazine put out an article on Thermal Imaging units in its Winter 2001 issue. The article indicated that the National Institute of Justice, in cooperation with The Raytheon Corporation and St. Mary's University in San Antonio Texas, performed a study to evaluate the effectiveness and usefulness of thermal imaging devices. Although precise figures were not provided, the article asserted that thermal imaging was an effective tool for police officers, with the main drawback being the price and accessibility (http://www.justnet.org/TechBeat%20Files/ThermUpHeatWint01.pdf).

Frequency of Use: Rate 1-2-3 with 1 being most used: 3

Limitations: (1) "But effective as thermal vision is, its cost is a distinct disadvantage. Estimates per unit run from $10,000 to $20,000, putting it out of reach for most departments. However, there is help available for acquiring thermal imaging." (2) Another drawback has been the controversy caused by thermal imaging use and its legality under the Fourth Amendment ("[t]he right of the people to be secure in their persons, houses, papers, and effects, against unreasonable searches and seizures . . . ."). Many court cases have arisen from this debate. http://www.justnet.org/TechBeat%20Files/ThermFourthWint01.pdf

Links to Research/Stories: (1) http://www.justnet.org/TechBeat%20Files/ThermUpHeatWint01.pdf (2) http://www.justnet.org/TechBeat%20Files/ThermFourthWint01.pdf

Technology: Two-Way Radio

Intended Purpose: This technology allows officers to maintain constant contact with one another as well as with air and other forms of support.

How it Works- Specifics: A two-way radio is a radio that can both transmit and receive content (http://en.wikipedia.org/wiki/Two-way_radio).

Effectiveness: This technology proves very effective. Police forces utilize the two-way radio with extreme frequency, further emphasizing its effectiveness.

Frequency of Use: Rate 1-2-3 with 1 being most used: 1

Additional Advantages: (1) Increased communication among officers in the field, dispatchers, and inter-agency.

Technology: Video Analysis

Intended Purpose: The pursuit application of video analysis is one of review, education, and justice. The video-capturing of police pursuits can serve as a powerful tool in policy-making and enforcement as well as a strong learning tool. The video can also serve to provide indisputable evidence in subsequent cases.

How it Works- Specifics: Video cameras, often mounted on the dashboard of a police vehicle, capture footage from the front-seat point of view of all activity that the vehicle is involved in, including police pursuits.

Effectiveness: Video Analysis proves extremely useful and effective in the evaluation of pursuit techniques. It creates the opportunity for policy-makers and experts to experience pursuits in the field, as opposed to only through second-hand reports.

Frequency of Use: Rate 1-2-3 with 1 being most used: 2

Additional Advantages: (1) Perfect for training, prosecution of the suspect, quality assurance, etc.

Limitations: (1) Many pursuits are never recorded. (2) Requires significant investment.

Technology: Wireless Networking (sometimes referred to as 'Wireless Mesh Networking')

Intended Purpose: Wireless Networking allows police officers to communicate, as well as allows for the use of the internet in police vehicles. Its uses include: radio communication; internet access, which allows officers to connect wirelessly and remotely to their police database; and live video surveillance. The technology can be used to identify a vehicle/driver and to pull up relevant data (example: prior convictions) that could prove vital in making split-second decisions in a pursuit scenario. It also allows for seamless communication between the different agents in a police force. "Police Officers are finding many advantages to this wireless network. Officers can e-mail pictures of missing juveniles, wanted persons, etc.; check e-mail; review computer aided dispatch (CAD) for calls holding; complete reports and send to their supervisors for review or send to a printer without leaving their district; communicate with messaging; and soon they will be able to monitor cameras throughout the City" (http://www.bgky.org/releases_detail.php?id=1158).

How it Works- Specifics: A wireless network is used to allow for mobile communication between officers in the field and dispatchers, as well as to pull up relevant data and information involving a suspect/fleeing vehicle.

Frequency of Use: Rate 1-2-3 with 1 being most used: 1

Limitations: (1) This technology is very expensive.

Links to Research/Stories: (1) http://www.networkcomputing.com/channels/collaboration/showArticle.jhtml?articleID=198100318 (2) http://www.bgky.org/releases_detail.php?id=1158

Technology: X-Net (Tire Deflation Device)

Intended Purpose: X-Net is a full vehicle arrest system which makes use of both spikes and a net in order to entangle a car's tires and subsequently force it into a complete stop.

How it Works- Specifics: "Unique barbed spikes in the leading edge of the net pierce the front [tires], the net then envelopes the front tires and is pulled tight under the vehicle to stop the wheels and bring the vehicle to a safe stop." (http://www.qinetiq.com/home/defence/defence_solutions/landjo/xnet.html) This technology is currently deployed by hand.

Effectiveness: Serving as a testimonial for the effectiveness of this system, "QinetiQ has secured a five-year Indefinite Duration, Indefinite Quantity (IDIQ) contract with the US Military, for the supply of QinetiQ's Vehicle Lightweight Arresting Device (VLAD), the US military designation for the X-Net® system" (http://www.qinetiq.com/home/newsroom/news_releases_homepage/2006/4th_quarter/xnet_idiq.html).

Frequency of Use: Rate 1-2-3 with 1 being most used: 2

Limitations: (1) Although "QinetiQ [company producing the technology] is soon to release their X-Tend remote deployment system that can deploy the net in as little as 3 seconds, without putting personnel in the path of the oncoming vehicle" (http://www.gizmag.com/go/7150/), their current version still requires manual deployment, putting officers at risk. (2) Requires significant training.

Links to Research/Stories: (1) http://www.gizmag.com/go/7150/ (2) http://www.qinetiq.com/home/newsroom/news_releases_homepage/2006/4th_quarter/xnet_idiq.html

Links to the Technology: (1) (http://www.qinetiq.com/home/defence/defence_solutions/landjo/xnet.html) (2) http://www.amsafe.com/products/detail.php?id=46&type=markets