



# Technologies for the Surveillance Mission





## Surveillance Requirements

Modern enforcement agencies such as police, drug control, and customs are required to monitor the activities of suspects during surveillance activities.

The purposes of these operations to gather evidence for prosecution, provide intelligence leading to the arrest of the suspects in the act of the crime, and to seize drugs or contraband. There is rarely a second chance in these situations, communications equipment has to work fast, intuitively, and reliably.

The officers may need to spend extended times in public places whilst appearing to be members of the public. Sometimes they will remain concealed in a building or a vehicle. Unmarked motorcycles may also be used for highly fluid surveillance situations where mobility is needed, such as in heavy road traffic, or between buildings or in difficult off-road situations.

The particular requirements for effectiveness and safety are expressed in this quotation. "The role of communications in undercover law enforcement serves two important purposes: "to ensure officer safety and collect evidence," said retired Alcohol Tobacco and Firearms (ATF) Special Agent Charlie Fuller. "In covert operations, you don't get a second chance. If a transmitter fails, huge investments in time and money are lost and an officer can literally be cut off from the only link keeping him alive."

### **The key requirements for the officers and the command and control system are:**

#### **Operation**

The operational requirements include initial deployment and efficient use of resources, current location of officers and vehicles, interworking and messaging between officers and command centers, and fast adaptation when circumstances change.

These all require effective communication with good coverage both in terms of distance from base station and also penetration into buildings. The system must be able to continue to operate without interruption at times when other communications are congested.

The command and control system will need to be well designed and robust, able to provide information on the deployment of resources, and able to rapidly react to changes.

#### **Security**

The communications between officers and the command centre must be highly secure. Criminal organizations can be well financed and have access to radio equipment. The communication links between the officers needs to have the highest possible levels of protection across all interfaces and links. In addition, if a radio is stolen it must be possible to disable the radio over the air so that it cannot be used to listen-in to the communications. Land links must also be highly secure, with no possibility of "hacking-in".

A former officer with a Los Angeles Police Department Scientific Investigations Division, Electronics Unit, explained that the ongoing advancements in communications technology and its increasing availability to the general public – and criminals specifically – has added new levels of complexity to undercover police work.

"Many of the transmission technologies in use today are analog and can be picked up on inexpensive near-field receivers available at local electronics stores," he said. "This brings potentially more people to the party and can definitely compromise an operation."

#### **Safety**

Surveillance officers sometimes work in vulnerable situations. The suspects may be armed and may react dangerously if they become aware of a surveillance operation. It follows that concealment of the communications device together with little or no sign that the officer is communicating are essential, both for effective operation and operator safety. Vehicle mounted communication equipment will need to be concealed in unmarked cars or motorcycles. As well as being concealed, motorcycle mounted kits will also need to be safe to use when driving.

The safety of officers is the operational, legal, and moral responsibility of the senior officers.

## TETRA for Surveillance

The TETRA standard was established with the requirements of mission critical networks in mind.

### **The key elements of TETRA which meet the needs of the surveillance operation are:**

TETRA is a completely separate system from other cellular technologies and will continue to operate when other communications break down or are overloaded.

As an open standard Tetra Terminals works with any TETRA network, inter-operation between agencies on different TETRA Networks is supported.

TETRA supports both TMO (Trunked Mode Operation) and DMO (Direct Mode Operation), the ability to connect a group of officers in a location, as well as to connect to a wider network, this is key to surveillance operations. Officer can remain in fast connection with colleagues in the area of the operation, and at the same time be in touch with the headquarters and command and control center. Talk groups are quickly established and changed. Officers can quickly switch between groups in either TMO or DMO.

Repeater and Gateway functionality increases the flexibility and coverage of Direct Mode operation, connecting officers over a wider area, improving coverage in urban locations, and connecting DMO groups to Operations Centers and officers in other areas.

GPS receivers in the Terminals locate the operator and this information is passed to the command and control center. This aids the dispatch and control functions in the command center to deploy and re-deploy the officers for maximum effect.

Security in TETRA is ensured by the use of cipher keys for both individual and group calls. Each radio has an identity which is used to generate the encryption algorithm between the radio and the network. These keys are highly robust and will be extremely difficult to break.

TETRA technology has features which address the issue of officer safety in surveillance situations. TETRA calls are quickly set-up, which can be a critical feature when seconds count. The GPS location function ensures that the control center can quickly react if contact is lost. The emergency call function will over-ride other traffic and immediately alert the command center to a dangerous situation and an officer in distress.

## Motorola Surveillance Solutions

### **The network and the Terminals**

Motorola TETRA Terminals and Networks fully comply with the TETRA standards, and have been tested to the most rigorous levels. The water resistance, shock resistance, battery life, ergonomic design of the Terminals have been put to the test by the most demanding police and enforcement agencies around the world over many years. 1 million Motorola TETRA Terminals have been shipped and improvements and new features are being added continuously.

A recent addition to the Motorola range of TETRA Terminals has been the MTP850Ex ATEX compatible radio which is optimized and proven for use in dangerous explosive atmospheric conditions. This will be an essential tool for enforcement and/or surveillance officers who have to operate in areas where explosive gases or dust are present including ships, petrochemical installations, or near pipelines.

Another significant radio product in the surveillance operation will be the Motorola CM5000 Gateway Repeater. This is a vehicle mounted radio which as a repeats DMO communication, extending the range of the talk group and improving in-building coverage. This means that the advantages of using a group call in an operation are enhanced, with easy connection to all the other team members. The gateway function further enhances the operation by connecting the DMO group to the command center in Trunked Mode (TMO) whilst the DMO group continues to communicate. Motorola's CM5000 radio can be deployed in a car or van, and it has the advantage of high power and more efficient antennas. Surveillance operations in rural or city locations will both benefit from the use of a gateway repeater such as the CM5000 with its high performance radio characteristics.

As well as the Terminals having full GPS and Emergency call functions, the Motorola Dimetra IP networks support further features such as Ambiance listening and Call-out. Ambiance listening enables the command center to switch on the transmitter on the radio without the operator having to initiate a call. The screen on the radio does not show that the radio is connected and the link remains open even if the radio is switched off. In a surveillance operation the officer could be in a compromised situation, with ambiance listening the command center could listen to the development of the situation without the knowledge of the suspects and track the officers location at the same time with GPS.

Call out messages can be sent by the command center to selected Terminals or talk groups, these messages take priority over all but emergency calls and the operator will see these displayed on the screen of their radio. The message must be acknowledged before other calls can be made ensuring that the operations center knows that the message has been seen. In a surveillance situation a significant event or change in the situation can be quickly and effectively communicated to the relevant officers in this way.

Collecting evidence for prosecution is aided by the Logging Recorder feature. The system can log and record the calls made on the radio network so the actual conversation as well as the time and date information can be presented in court.

Radios that have been compromised can be stunned or killed by commands from the control centre, once disabled they cannot be used until returned to authorized officers and locations.

Integrated Terminal Management is a powerful means to configure a set of Terminals with templates and other special features in readiness for a surveillance operation. This saves time and enables the radio manager to prepare the programming of groups of Terminals ready for future missions.

Easy selection of talk groups during an operation is assisted with the Current/Last Selected TG Toggle feature. The user can toggle between the currently selected TG and the previously selected talkgroup. The toggle function will be available as a one-touch feature (OTB). The toggle function will include DMO TG i.e. if the user is on a TMO TG and activates the toggle function and the last selected TG was a DMO TG then the radio will switch to the DMO TG. Another way of speeding-up access to talk groups is the ability to toggle between the currently selected TG and the previously selected talkgroup. This toggle function is available as a one-touch feature (OTB). The toggle function will include DMO Talk Groups i.e. if the user is on a TMO TG and activates the toggle function and the last selected TG was a DMO TG then the radio will switch to the last DMO TG.

Making calls to individual TETRA subscribers is quicker with the Individual Call Dialling Scheme. The user only dials the necessary digits (least significant) of the ISSI he is trying to call and the

radio fills in the remaining digits derived from its own ISSI. For example, if the ISSI of the caller is 4001050, he enters the digit 3 and so the resulting number is 4001053. Or if the ISSI of the caller is 4001050, he enters the digits 123 and so the resulting number is 4001123.

### **Video Surveillance**

Wireless technology offers remote monitoring, mobile video and high-speed transmission. By bringing video to more places, these solutions extend the reach of surveillance teams, allowing them to better monitor suspect areas, out of the way locations, or even special events.

As a result, wireless video systems are helping public safety professionals become even more effective in saving lives, reducing crime, and keeping neighborhoods safe.

The essence of a wireless video solution is speed and mobility. It's being able to set up an entire solution quickly and efficiently, for any purpose.

**The most visible part of a wireless solution consists of digital cameras connected by a broadband network. Serving as the "eyes" of a solution, cameras can be deployed in three basic ways:**

- **Fixed** – Cameras temporarily or permanently attached to buildings, traffic fixtures, light poles or similar objects, allowing you to monitor select areas around the clock.
- **Mobile** – Mounted in or on vehicles such as fire trucks, patrol cars or public transportation such as buses, subway cars or trains.
- **Portable** – Similar to fixed cameras—though not attached to a fixed object—portable cameras are deployed on tripods and run on solar power or batteries. They're made to be set up and taken down quickly for emergencies and special events such as parades or big events.

Once captured, an image is transmitted via a wireless broadband network. As neither the cameras nor broadband network are tethered to a wired infrastructure, wireless video solutions can be significantly more cost effective than older, wired CCTV systems. Simplicity makes them flexible and scalable, yet less expensive to plan, deploy, and manage.

TETRA is able to link to such systems and still pictures from these cameras can be sent over the TETRA network to officers in the field to be displayed on their TETRA terminals. In a surveillance situation this would be a significant time saving feature and could help to safeguard the officers.

### **Motorola Discreet TCR1000 Covert Radio**



The Motorola Discreet TCR1000 Covert radio is the next step in surveillance communications. This radio has been designed from the start for concealment, even under light clothing. The radio is very thin and compact, and a wireless ear-piece and concealed microphone connect the officer to the audio. The control unit is a tiny remote device which can be easily be held in the hand without being visible to others. As well as answering or starting a call the remote unit can select up to 10 talk groups and switch to whisper mode or send tones. By sending a pre-determined set of tones the talk group or command centre can be alerted to changes in circumstances in the operation. When the surveillance officer is in plain sight of the suspects he or she can still communicate without being seen or overheard. Whisper mode enable the officer to talk quietly when they are in a less

exposed situation but still need to keep their voice at a low level. These are vital extra facilities for the surveillance officer operating in an exposed situation.

In addition the performance of the radio is the same as the conventional Terminals, the output power is 1 Watt and special antennas help to extend range and ensure good in-building coverage.

### **Accessories add powerful capabilities for surveillance missions on all types of Terminals.**

Surveillance operations vary considerably and the equipment for communication must be flexible, rugged, and ready to go at a moments notice. Officers already in the field may be called upon to participate at short notice in surveillance duties, whilst others have time to prepare. Accessories which help to conceal conventional Terminals will help officers to join surveillance operations at short notice. Vehicle mounting kits can be used in unmarked cars, vans or motorcycles. Motorola has a wide range of accessories for use with both conventional Terminals such as the MTP850 handheld and the MTM800E mobile Terminals. In addition the TCR1000 Discreet Covert radio has been introduced with a full range of antenna, power, and concealment accessories to enhance its flexibility for surveillance operations.

The range of accessories is extensive and enables teams to arrange them to suit multiple positions and multiple scenarios. This means accessories such as Microphones, PTT.s, Radio Control and Audio or Tone control are able to be installed quickly and discreetly in vehicles in as many positions as required. Challenges such as Motorcycles are easily solved and the emphasis on simple practical installations assist the user in adapting to roles in a natural style, enhancing the overall covert appearance. Motorola work with multiple vendors to provide innovative and totally reliable accessories to suit every eventuality. The art of discretion is the ability to blend in.

The Motorola Discreet TCR1000 Covert Radio's Body-Worn accessory portfolio includes a number of vests and harnesses which make it easy to wear the radio comfortably and conveniently under clothing. Microphones and earpieces come in a number of variants to suit different clothing styles and skin colours.

Different antenna solutions are available for radio or body mounted applications. Ensuring that radio performance is maintained is critical to the surveillance operation.

Another key operational aspect is battery life, the TCR1000 Energy Accessory portfolio includes spare batteries, a travel charger, and an in-vehicle charger. Also an Extended Battery Module is available for long duration surveillance.

The Supporting Software for the TCR1000 includes the Customer Programming Software (CPS) and the CPS Lite which is used for talk group management.

## Summary

The surveillance operation shares many of the characteristics of other enforcement operations, but the requirements for concealment and ensuring officer safety place added demands on the communications system. TETRA Technology together with GPS Location and video solutions are designed to enable agencies to mount safe, secure and effective surveillance operations. TETRA is an open system and so inter-agency operations can be established, and the ability to work in Direct or Trunked modes provides very flexible, fast and responsive communications. Many additional features have been added to the TETRA system and this evolution will continue for many years to come.

Motorola has worked closely with Police forces and other agencies to understand the Surveillance mission, and build the ultimate radio for Covert officers, the TCR1000 together with an accessory portfolio for this and other Terminals. Building Technology that's Second Nature is the foundation of the Motorola approach to radio design. Motorola also ensures that all of its products are truly fit for the mission by extensively testing and re-testing the units during development to the highest standards, and the presence of 1,000,000 Motorola Terminals with TETRA operators bears witness to this. The networks too are integrated and tested before shipment to ensure fast and reliable set-up in the field. Quality underlines the end to end approach to TETRA Terminals and systems which Motorola makes its trademark in this Mission Critical business.





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