



## Locate, manage and protect with SafePoint™

**SafePoint is the first and only radio locating system created to protect the most valuable part of the public safety equation – its people.**

**SafePoint** is the only commercial-grade two-way radio location system designed for locating mobile and portable radios utilizing Time Difference of Arrival (TDOA) technology rather than GPS. **SafePoint** is easy to maintain and manage, it is stable, accurate, requires minimal management time/overhead and is available anywhere and anytime. The **SafePoint** system utilizes existing allocated radio frequency spectrum, can survive faults and attacks, and can be trusted with all types of sensitive communication.

**SafePoint** fosters information sharing, exchange and communications interoperability among individuals and agencies. Benefits include incident command system management; augmented mission critical resources; scene perimeter management; and a portable system for disaster preparation.

**SafePoint**, a resource management system developed by Locus Location Systems of Melbourne, FL, allows any emergency response agency dispatchers or field supervisors to zero in on radio transmissions without modifications to the radio or the radio network.

**SafePoint**, as a resource management tool, facilitates nearest unit dispatch, on-scene incident management, case reconstruction and radio diagnostics.

**SafePoint** works with both shared and private trunked radio system networks and is able to locate mobile or portable radio transmissions even inside most buildings and vehicles, as well as in smoke, rain and dense foliage – situations in which GPS (global positioning systems) technology often falls short. **SafePoint**'s received signal far exceeds the power of the standard GPS satellite

signal, permitting it to penetrate more easily through obstructions.

**SafePoint** is currently in use by Police, Fire/EMS, and public transportation departments, providing a more "personal" solution.

### **Locate. Without GPS.**

It is well known that a GPS device works poorly inside buildings and through other obstructions. The GPS antenna requires a clear line of sight to lock on to at least three satellites before it can calculate its position in latitude and longitude, and typically will take up to two minutes to calculate the first location. GPS performance is also hampered in automobiles with tinted windows, in heavy smoke, or in atmospheric conditions like torrential rain.

Additionally, with GPS, even after signal lock is achieved, the location information is not yet in the hands of the dispatcher or in the radio network database. That requires an additional communication channel between the radio and the network, over which the location information is passed. In other words, the GPS knows where it is, but "home base" does not, unless that location data is transmitted there.

### **SafePoint Works With Existing Radio Systems.**

The key with **SafePoint** is that it is based on existing trunked radio systems. **SafePoint** can detect and locate transmissions without the addition of any device on a mobile or portable radio. **SafePoint** receivers overlay the radio network's infrastructure, typically by attaching the sensor to the network antenna system. This "painless" installation works with existing networks and without modification to the radio infrastructure and all the radio handsets on the system. So no additional radio resources are utilized – **SafePoint** simply works as an overlay to the existing radio system.



### **SafePoint Enhances Security of Personnel.**

By identifying and securing the radio unit location based on radio transmissions, **SafePoint** provides radio system security to any Public Safety or Public Service agency.

**SafePoint** locates personnel assets and resources in the field based on their radio transmissions. In tracking radio signals, **SafePoint** can identify unauthorized users on public safety communication systems. It can also identify interference, making it difficult for terrorists to disrupt a public radio system.

Features are designed into the **SafePoint** system for officer and radio user safety. **SafePoint**'s tracking capabilities cannot be disabled by anyone in the field, as is the case with GPS. A GPS radio can be covered, used inside a heavily tinted window or disabled mechanically. **SafePoint** cannot be disabled in the same way; when radios are in use, **SafePoint** is tracking the signal.

An additional feature of **SafePoint** is the ability to determine the position of any radio in the system at any time through polling. **SafePoint** provides a "polling server" interface to the trunked radio system. This allows dispatchers and users to display the latest location on radios being tracked.

### **Use SafePoint in Natural Disasters.**

**SafePoint** is currently operational on mobile data terminals in south Florida and was highlighted on The Weather Channel during its hurricane coverage in September 2004. A Lieutenant from the Palm Bay Police Department was interviewed by a meteorologist as preparations were underway for Hurricane Frances. As he explained, **SafePoint** was being used by his department as a resource management tool, helping officers handle the routine calls for service during any typical day as well as the added activity such as "investigating incidents which are happening specific to the hurricane: price gouging, traffic jams at gas stations, and people fighting over wood."

The geo-location software in the **SafePoint** system allows the Watch Command Officers to pinpoint their employees' location on a navigational map, with mobile radio units and portable radio units being displayed as different kinds of icons – police car icons and handheld radio icons. In the event of a natural or man-made disaster, **SafePoint** can provide location visualization of mutual aid agencies in emergency operations. In this instance, as a resource management tool, **SafePoint** permits multiple agency and multiple frequency interoperability during an incident. With the mapped display at hand, if a call for support comes in, Command Officers can dispatch the nearest officer to help, for the most efficient use of resources and personnel.

### **Department of Homeland Security Recommends a Transportable System.**

At the recommendation of the Department of Homeland Security, a transportable system is under development. The design objectives for the transportable system include:

- Ability to have a system that can be quickly transported to an incident;
- Ability for the system to be set up and operational in a set period of time;
- Ability for the system to manage/track the radio resources and assets at the scene.

### **Case Reconstruction is Easy.**

Latitude, longitude, radio location by logical ID and/or by group ID, and customizable icons for each radio are shown on the **SafePoint** TrackerX software. All historical radio location data may be viewed with **SafePoint**'s TrackerXTractor reporting software. The TrackerXTractor software is the end-user graphical interface for extracting and viewing radio location data from the **SafePoint** system.



As mobile and portable radios are located, they are stored in a Microsoft SQL database. TrackerXTractor Software allows the user to query the SQL database and display this historical data on a mapping display. Map display features, such as zoom pan, print and place highlight, are incorporated tools to help pinpoint radio transmission locations. The query process is menu-driven and designed for administrative use in incident reconstruction with an Internal Affairs Department investigation or for training purposes.

### **How SafePoint Works.**

With **SafePoint**, “hyperbolic trilateration” calculates the location of a mobile or portable radio after the radio’s signal is received by at least three fixed **SafePoint** receiver sites. This approach (instead of the GPS method of receiving signals from three satellites) uses the radio’s regular transmission, which is picked up by three or more ground-based receivers (**SafePoint** Advanced Digital Receivers – ADDIRs). The received signal information is then processed and sent to a central site where Locus Location System’s Time Difference of Arrival (TDOA) technology is used to calculate the radio’s position.

At the Central Processor Site, a Central Analysis Processor (CAP) performs the calculations, determines the radio location, and stores the data in a database. The information can then be presented on the **SafePoint** Tracker X mapping application, or on a local CAD display.

### **How to Integrate SafePoint and a Trunked Radio System.**

Since the SafePoint system operates as an overlay to an existing radio system, there are no custom or nonstandard hardware or software connections required between the existing land mobile equipment and the SafePoint system equipment. SafePoint software monitors the inbound control channel messaging to determine the time of arrival of the transmission at each antenna site, as well as the Message Type, Radio ID and Talkgroup ID of the transmitting radio. The TOA (Time of Arrival) information (received by at least three ADDIRs) is

used to calculate position; while the transmitter’s radio and Talkgroup ID and/or message type (i.e., emergency message) is used to track individuals according to preset filtering definitions.

The SafePoint ADDIR system consists of remote receive site equipments, comprising an RF Tuner, and a Host PC, with a TCP/IP link via either dial-up modem or Ethernet connection to a Central Processor Site. It may be advantageous to share a receive antenna at any sites where the ADDIR is co-located with a LMR repeater or receiver site. This would be accomplished by tapping off the antenna system and providing the cable interface to the SafePoint ADDIR. The Central Processor Site consists of the Central Analysis Processor (CAP). Connected to the CAP are Windows-based PCs (TrackerX), which provide for monitoring of the tracked radios.

Multiple agencies can share the same **SafePoint** infrastructure, and display only their department’s radios. Additionally, the **SafePoint** system is designed to allow multiple protocols and/or frequencies to co-locate in the same ADDIR and CAP. This means that in the event that a geographic area has both SMARTNET/SmartZone and EDACS trunked radio systems, the same **SafePoint** infrastructure equipment can be deployed to track both kinds of radios/users.

### **Performance Specifications of SafePoint.**

The performance of the **SafePoint** system is dependent on a number of parameters, including: location of the receive sites; received signal strength at three or more receivers; amount and severity of noise and multipath.

A properly designed location system will provide the advantages of position determination without modifying existing user equipment or fixed equipment. Both RF coverage *and* geometric placement of receivers contribute to overall performance. Locus Location Systems typically quotes systems to meet or exceed the cellular E-911 specification for network-based location systems: performance of <100 meters 70% of the time and <300 meters 95% of the time.



The TDOA-based position location estimation provides accuracy within the geographic area of the three or more deployed receive sites. Position prediction accuracy decreases outside the bounded area of the receiver sites (in particular, directly behind a receiver that is on the outer perimeter of the multiple site receive area). This prediction accuracy variation is known as “Geometric Dilution of Precision” or “GDOP” for short. The **SafePoint** system is designed with fault tolerance, in that any single point of failure in the receive portion of the system will not cause a catastrophic failure to the system, though it may impact overall performance for units within range of the failed site.

#### **Additional Solutions in Development.**

##### Multi-floor In-building Location:

A proof of concept is currently being evaluated in the lab to detect and display in-building signal location. This application would be able to decipher where the transmission is emanating from, down to the building floor and quadrant.

##### Location and Proprietary Transmitters:

The **SafePoint** technology allows the ability to locate any RF transmission. This includes proprietary signals, such as those used for tracking vehicles or people, cellular devices and public WiMax signals.