FEMA

# TechNote

U.S. Department of Homeland Security

SAVER

System Assessment and Validation for Emergency Responders

The U.S. Department of Homeland Security (DHS) established the System Assessment and Validation for Emergency Responders (SAVER) Program to assist emergency responders making procurement decisions. The SAVER Program conducts unbiased operational tests on commercial equipment and systems and provides those results along with other relevant equipment information to the emergency response community in an operationally useful form. SAVER provides information on equipment that falls within the categories listed in the DHS Authorized Equipment List (AEL).

Information provided by the SAVER Program will be shared nationally with the responder community providing life- and cost-saving assets to federal, state, and local responders.

The SAVER Program is supported by a network of technical agents who perform assessment and validation activities. Further, SAVER focuses primarily on two main questions for the emergency responder community: "What equipment is available?" and "How does it perform?"

For more information on this and other technologies, please see the SAVER website or contact the SAVER Program Support Office.

Telephone: 877-347-3371
Fax: 443-402-9489
E-mail: Fema-ASKTS@fema.gov
Website: https://saver.fema.gov

Opinions or points of view expressed in this document are those of the authors and do not necessarily represent the view or official position of the U.S. Government.

This SAVER TechNote was prepared by the Space and Naval Warfare Systems Center, Charleston, for the SAVER Program.

SPAWAR Systems Center Charleston

## Property Tracking Systems

### Background

Property tracking systems facilitate and standardize inventory and asset management processes. These systems streamline and automate these processes, increasing overall efficiency and accuracy. The most common types of property tracking systems are based on barcode, memory button, radio frequency identification (RFID), and global positioning system (GPS) technologies. Barcode, memory button, and RFID property tracking systems use an embedded or affixed property identifier, an electronic reading device to scan and interpret the identifier, and database software to manage this information. Periodically (such as when a piece of property is moved), property identifiers are read to update their location information. The property tracking software can store the property's location history, cost, purchase date, record of maintenance, warranty, and other information. The information in the database can be analyzed, queried, and compiled into custom reports. GPS property tracking systems use satellite receiver devices attached to a piece of property to determine its location. The GPS-enabled device can upload the property's coordinates to a computer with GPS tracking software. The information can be stored in a database along with other information. Barcode, memory button, RFID, and GPS property tracking systems each have characteristics that can facilitate a variety of property management tasks that support emergency response activities.

### Barcode System

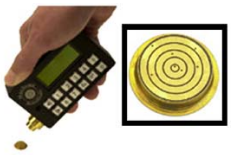
A barcode system typically consists of barcodes, a barcode scanner, and tracking software. A barcode is an encoded graphic image either printed directly on the property, or on a label attached to the property. Barcodes are available in one-dimensional (linear) and two-dimensional (2-D) formats. A linear barcode can contain up to 20 characters and the width of the graphic increases as more data is encoded. A 2-D barcode can contain up to 1000 characters and its height increases as more data is encoded. Most barcodes are durable; they can survive extreme temperature changes, high-pressure washes, and exposure to sunlight, as well as submersion in oil, alcohol, acid, and other solutions. The barcode scanner is used to capture and translate the barcode's graphic pattern into electronic information which is transmitted to a computer for processing.

**Barcode**

### Memory Button System

A memory button system typically consists of memory buttons, a probe to communicate with the buttons, and tracking software. A memory button is

an electronic data storage device that is attached to the property to be managed. Memory buttons are relatively small, yet they have a large storage capacity, ranging from 4 kilobytes to 1 gigabyte. They can be attached to almost anything, and are capable of withstanding shock, vibration, harsh temperatures, and moisture. The probe can read, write, and update the information stored on memory buttons. To communicate with a memory button, the operator uses the probe to touch the top of the button. The probe reads the button's memory and the information is displayed on the probe's screen. The information can be updated immediately using the probe's keypad, or uploaded to a computer and managed by the tracking software



**Memory Button**

## Radio Frequency Identification (RFID) System

An RFID property tracking system typically includes RFID tags, an RFID interrogator, and tracking software. The RFID tag is a micro-electronic circuit with an integrated RF antenna. The tag can be embedded directly into property, or within a label that is attached to the property. RFID tags come in many sizes, from ¼ inch to several inches wide. There are three types of RFID tags—active, passive, and semi-passive. Active RFID tags have an internal battery that enables them to transmit and communicate continuously with the interrogator. These tags can be accessed at distances up to 300 feet and have a storage capacity of 32 KB or more. Passive RFID tags draw power wirelessly from the RFID interrogator. Passive tags are normally smaller and have a shorter range and less storage capacity than active RFID tags. Semi-passive tags have internal circuitry that is used to monitor environmental conditions such as temperature and shock, or to temporarily store small amounts of data. Like active tags, semi-passive tags require a battery; however, they wirelessly draw power from the interrogator to transmit and receive data. The RFID interrogator is a radio frequency (RF) transceiver that reads and writes data to and from an RFID tag. Because the data is transmitted via RF, the interrogator does not require physical contact or visible access to the tag. Additionally, the interrogator can retrieve data from multiple tags at once, communicate with tracking software, and update the tags if necessary.

**RFID**

## Global Positioning System (GPS)

GPS tracking systems use information received from the global positioning satellites to determine a property's location. The systems are comprised of a GPS receiver-enabled device that is attached or affixed to the property, a data logger and/or wireless transmitter, and a computer with tracking software. A GPS receiver uses timing signals from multiple satellites to calculate its location. There are two types of GPS tracking systems—passive and active. Passive tracking answers the question, "Where has my property been?" Passive tracking uses a GPS data logger placed on or within the property to record its position at certain time intervals; this enables a location history to be established. Later, the data can be uploaded to a computer for analysis and mapping. Active tracking answers the question, "Where is my property now?" Active tracking devices use wireless transmitters (cellular, radio, and/or satellite) to send real-time position information to the computer, or to a subscription-based tracking service. A GPS system is often used to track vehicle movements. The vehicle's path, including speed and direction, can be plotted on a computerized map.

**GPS**

## Applications

Each property tracking system offers advantages and limitations for managing emergency responder's inventories. A combination of technologies may be necessary for a comprehensive property tracking system. The low cost of barcodes makes them useful for fire departments to track fire safety tools and other firefighting equipment, and for police departments to track and maintain accountability for items such as laptops. The ruggedized memory buttons are suitable for monitoring a wide range of equipment such as firearms, patrol boats, and fire trucks which are used in adverse conditions. RFID tags do not require direct contact for reading and updating, consequently, they are often used to track large inventories such as medical supplies and handheld radios. The tags can also be embedded into uniforms or boots worn by emergency responders. GPS systems are useful for tracking police vehicles, ambulances, and fire trucks so emergency vehicles closest to an accident, fire, or crime scene can be dispatched.