

## White Paper on Firefighter Location Systems

Due to the emergence of products with claims about locating firefighters, MSA would like to provide you with an overview of the principles of operation and the safety considerations for such systems. We hope you'll find this information useful when making important decisions about selecting safety equipment.

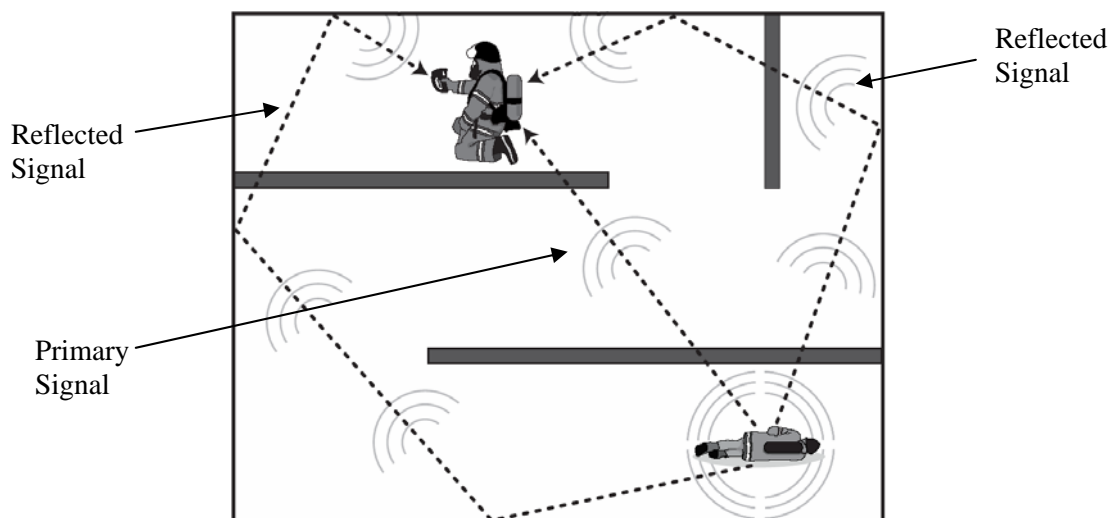
### Principles of Operation:

Two of the location system products on the market today, both integrated with an SCBA, are designed to serve rescue personnel as a homing beacon to locate a victim.

One system, based on an *ultrasonic signal*, claims to have a 120-foot-range line of site. Ultrasound travels well through small spaces, such as the gap under a closed door. However, it has virtually *no capability* to transmit through solid surfaces such as common drywall and building materials. Furthermore, the 120-foot range can be reduced significantly indoors, depending on the geometry of the open pathway between the rescuer and the victim. The ultrasound signal will also reflect from indoor surfaces (such as walls, floors, and ceilings) and create multiple signals (technically known as multi-paths). These confuse the search tool used by rescue personnel, who must then use a trial-and-error process to determine the correct signal to follow to the victim. In fact, reflected signals can lead the search tool *away* from the victim.

Another SCBA-integrated system currently available transmits a 2.4GHz radio frequency (RF) signal and claims to have a 900-foot-range line of site. This technology was used in early avalanche-style beacon systems to locate sportsmen, hikers, and skiers outdoors.

The 2.4GHz signal range is reduced when used indoors and does not travel well through gaps smaller than its 5-inch wavelength. It is considered to be poor at propagating through building materials. This technology also creates reflected signals that require trial-and-error methods to determine the primary signal to follow; it can take rescue personnel in the *exact opposite direction* of the victim. This technology cannot determine the building floor level where a victim may be located, since the signal reflects from all surfaces, including ceilings and floors. The diagram below shows an example of the presence and effect of reflected signals within a structure.

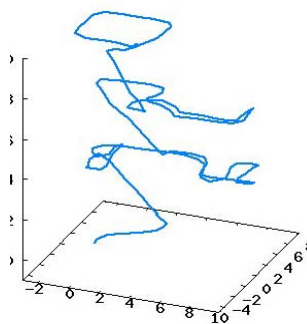


### Safety Considerations:

An important consideration with both technologies is the *trial-and-error* time required to differentiate between a *primary* signal and a *reflected* signal. Reflected signals can greatly mislead rescue teams and consume the valuable minutes available to find a victim. MSA has evaluated these technologies, which have been available for a number of years, and we have elected not to pursue them. We believe these types of products do not yet incorporate the enabling technology for reliable and effective *indoor performance* that is critical to the safety of both the victims and the rescue personnel.

In response to the needs of the fire service, MSA engineers are exploring a solution for indoor location that uses a modified version of inertial navigation technology. It is self-contained and does not rely on directional radio signals as homing beacons. Therefore, this system would not be subject to the misleading directional information associated with reflected signals.

In terms of user-interface, we believe that an effective location system should provide a three-dimensional display of the location, and, as an option, the path that firefighters traveled within a structure. The diagram below represents an example of a potential firefighter location solution, showing the real-time location and movement of firefighters, which could be viewed on an incident command screen or on a handheld device with rescue personnel.



### Summary:

Making decisions about new products and technology can be challenging. Our intent is to provide you with the facts to make an informed decision and choose the products that provide the greatest value and safety for your fire department.

We believe the homing-beacon technology marketed currently is not appropriate for locating firefighters. MSA strongly supports the need for a solution to locating firefighters indoors, and we are working diligently on a technology that we expect will provide fast, accurate, and easy to use location information.

Until this technology is available, we recommend that fire departments apply their resources toward proven accountability methods, enhanced incident command tools and compliant self-rescue products.

Sincerely,

Mike Rupert,  
Product Group Manager  
First Responder Products