



**Homeland
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Science and Technology

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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. Located within the Science and Technology Directorate (S&T) of DHS, the SAVER Program conducts objective assessments and validations on commercial equipment and systems, and develops knowledge products that provide relevant equipment information to the emergency responder community.

SAVER Program knowledge products provide information on equipment that falls under the categories listed in the DHS Authorized Equipment List (AEL), focusing primarily on two main questions for the emergency responder community: "What equipment is available?" and "How does it perform?" These knowledge products are shared nationally with the emergency responder community, providing a life- and cost-saving asset to DHS, as well as to Federal, state, and local responders.

The SAVER Program is supported by a network of Technical Agents who perform assessment and validation activities and produce SAVER knowledge products.

For more information on the program or the assessed technologies, contact the SAVER Program by e-mail or visit the SAVER website.

E-mail: saver@hq.dhs.gov
Website: <http://www.firstresponder.gov/SAVER>

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Summary

Radar Systems for Through-the-Wall Surveillance

(AEL reference number 15IN-00-RADR)

Radar systems for through-the-wall surveillance are handheld units typically used by law enforcement personnel to detect individuals behind barriers, such as doors, walls, and windows. These systems enhance situational awareness in operations such as forced entry and hostage rescue when knowledge of the whereabouts of individuals is beneficial.

In order to provide responders with information on currently available radar systems for through-the-wall surveillance, the Space and Naval Warfare Systems Center (SPAWARSYSCEN) Atlantic conducted a comparative assessment for the System Assessment and Validation for Emergency Responders (SAVER) Program in July 2013. Detailed findings are provided in the *Radar Systems for Through-the-Wall Surveillance Assessment Report*, which is available at <http://www.firstresponder.gov/SAVER>.

Assessment Methodology

Prior to the assessment, six law enforcement personnel were chosen from various jurisdictions to participate in a focus group. The group identified evaluation criteria and recommended product selection criteria and possible scenarios for assessment.

After identifying evaluation criteria, the focus group assigned each criterion to one of four SAVER categories; no criteria were identified for the Affordability category. The focus group then assigned a weight for each criterion's level of



importance. Once the criteria were weighted, the four SAVER categories were assigned a percentage value to represent the level of each category's importance relative to the other categories.

Based on focus group recommendations and market research, the following radar systems for through-the-wall surveillance were selected for assessment:

- L-3 CyTerra, Range-R[®] Link; and
- Camero-Tech Ltd., Xaver[™] 100.

Six law enforcement personnel from various jurisdictions and with experience using radar systems for through-the-wall surveillance were selected to be evaluators for the assessment. The evaluators' experience with radar systems, combined with their experience in law enforcement, provided meaningful results for this assessment.

During the assessment, evaluators rated the radar systems for through-the-wall surveillance based on evaluation criteria established by the focus group. The assessment was separated into two phases: the specification assessment and the operational assessment. Evaluators assessed the systems based on vendor-provided information during the specification assessment. Hands-on experience during three scenarios—system familiarization, wall penetration, and hostage situation—served as the basis for the operational assessment.

Assessment Results

Table 1 displays the composite assessment scores as well as the category scores for each radar system for through-the-wall surveillance. Scores are based on a 5-point scale; higher scores indicate a more favorable rating by evaluators. The advantages and disadvantages of each radar system for through-the-wall surveillance, as identified by evaluators, are listed in table 2. To view how each radar system for through-the-wall surveillance scored against the evaluation criteria assigned to the SAVER categories, see table 3. For specifications, see table 4.

According to evaluators, radar systems for through-the-wall surveillance are primarily used to determine if there is movement behind barriers that obscure visibility. The specific location of movement and the number of targets is additional information that could be beneficial. Constraints in range and field of view can be compensated for by moving the system to various locations on the barrier. Portability and simplicity are favored. Although some systems might have advanced features or display detailed information, they might not be the best choice because of the additional cost and training required to effectively use these features. Both of the assessed systems were able to provide useful information regarding the presence of movement behind various barriers. They also had minimal display lag and could be easily read in all lighting conditions.

Responder agencies that may be considering the purchase of a radar system for through-the-wall surveillance should review the detailed findings in the *Radar Systems for Through-the-Wall Surveillance Assessment Report* and carefully consider each system's overall capabilities and limitations in relation to their jurisdiction's operational needs. All reports in this series, as well as reports on other technologies, are available in the SAVER section of the FirstResponder.gov website, <http://www.firstresponder.gov/SAVER>.

SAVER Category Definitions

Affordability groups criteria related to life-cycle costs of a piece of equipment or system.

Capability groups criteria related to the power, capacity, or features available for a piece of equipment or system to perform or assist the responder in performing one or more relevant tasks.

Deployability groups criteria related to the movement, installation, or implementation of a piece of equipment or system by responders at the site of its intended use.

Maintainability groups criteria related to the maintenance and restoration of a piece of equipment or system to operational condition by responders.

Usability groups criteria related to the quality of the responders' experience with the operational employment of a piece of equipment or system. This includes the relative ease of use, efficiency, and overall satisfaction of the responders with the equipment or system.

Table 1. Radar System for Through-the-Wall Surveillance Assessment Results

System	Composite Score	Capability (36% Weighting)	Deployability (24% Weighting)	Maintainability (9% Weighting)	Usability (31% Weighting)
Range-R® Link	4.4	4.3	4.4	4.2	4.5
Xaver™ 100	3.8	3.4	4.0	2.8	4.4

Table 2. Radar System for Through-the-Wall Surveillance Advantages and Disadvantages

System	Advantages	Disadvantages
 <p>Range-R® Link Composite Score: 4.4</p>	<ul style="list-style-type: none"> • Lightweight • Compact • Ergonomic • Filters out operator movement • No special tools required for battery compartment • Simple battery change • Easy-to-use dimmer • Simple intuitive control from system and remote display • Excellent penetration • Easy to use • Accuracy detects subtle movement • Rugged 	<ul style="list-style-type: none"> • None
 <p>Xaver™ 100 Composite Score: 3.8</p>	<ul style="list-style-type: none"> • Lightweight • Compact • Ergonomic • No special tools required for battery compartment • Excellent penetration • Rugged • Handle can be used to prop up system • The raw radar signal display in expert display mode provides additional data 	<ul style="list-style-type: none"> • Does not filter out operator movement • Battery compartment door comes off easily and is not tethered • Standard display mode was inaccurate for multiple targets beyond 39 feet

Table 4. Radar System for Through-the-Wall Surveillance Specifications¹

Specifications	Range-R® Link	Xaver™ 100
MSRP	\$8,760	\$15,545
Frequency range	3.18 to 3.42 gigahertz	3.0 to 10.0 gigahertz
Field of view	160 degrees	120 degrees
Primary power source	Four single-use AA lithium batteries	Two single-use AA lithium batteries (adaptor included) -or- Four single-use CR123A lithium batteries
Alternate power source	Yes	No
Battery runtime with continuous use	1.0 hour	1.5 to 3.5 hours (depending on battery type)
Water resistance	Waterproof: 1 foot for 30 seconds	Water-resistant
Operating temperature range	0°F to 125°F	-5°F to 131°F
Storage temperature range	-40°F to 160°F	-40°F to 158°F
Technical support hours	24/7	8:30 a.m. to 5:00 p.m., Eastern time Monday through Friday
Vendor-provided training	Training DVD included. Optional onsite training is available for an additional cost.	Optional onsite training is available for an additional cost.
Extended warranty	3 years	No extended warranty

Notes:

¹ Information was provided by manufacturers and has not been independently verified by the SAVER Program.

F = Fahrenheit

MSRP = manufacturer's suggested retail price