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.

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Hand-held Satellite Phones

Hand-held satellite telephones are mobile handsets that utilize satellites to communicate with landline, cellular, or other satellite phones. By communicating through satellites, emergency responders are able to coordinate rescue and recovery efforts in remote locations where there are no landline or cellular telephone networks or in areas where existing networks are overloaded or out of service during a disaster.

Emergency responders can purchase or rent a hand-held satellite phone from one of many service providers who charge fees for the phone's use. Calls can be routed through the United States and/or other countries covered by the service provider's network of satellites. Some service providers claim to provide global satellite coverage; however, their phones may not operate in embargo restricted countries.

Technology Overview

Most hand-held satellite phones look similar to a standard cellular telephone, but with a large, foldable antenna. The antenna transmits and receives radio signals to and from a service provider's network of satellites. U.S. service providers utilize multiple low-earth orbiting (LEO) satellites that orbit in fixed paths several hundred miles above the earth. When placing a call, the antenna transmits a signal to the service provider's closest satellite. The satellite processes and boosts the signal and, if necessary, passes it to other satellites until it reaches the coverage area of the receiving phone. If the call is made to another satellite phone within the same service provider's network, the signal may be transmitted directly from the satellite to the receiving phone. Calls made to all other phones are transmitted from the satellite to the service provider's earthbound gateway (ground earth station). The gateway—consisting of a satellite dish antenna and switching equipment—translates and routes the radio signal to the appropriate landline or cellular telephone network and, in turn, the receiving phone.

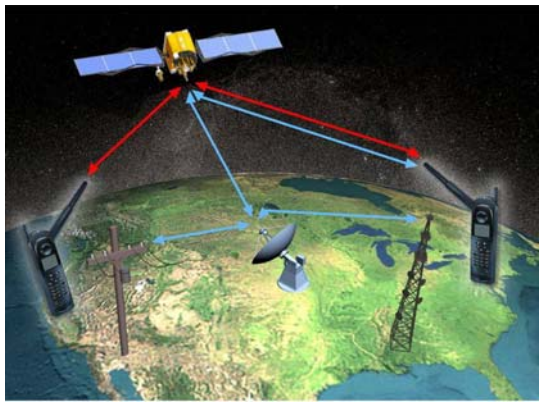

Figure 1. Hand-held Satellite Phone System

Placing and Receiving a Call

To establish and maintain phone service, the satellite phone's antenna and the service provider's network satellite must have a clear path to communicate. In most cases, the satellite phone user must be outdoors or near a window if indoors. To make or receive a call, the phone's antenna must be extended and rotated to a vertical position to search for and establish communications with a satellite. Once contact between the phone and a satellite has been established, calls can be placed and received. In general, calls are placed by dialing 1 or 00 followed by the recipient's phone number, including country and area codes. Actual dialing instructions will vary with service providers.

Phone Features

Like cellular phones, satellite phones utilize Subscriber Identity Module (SIM) cards and offer features, such as low battery and signal strength displays, call forwarding and barring, phone books, one touch dialing, password controls, voicemail, and text messaging. Hand-held satellite phones are battery-operated and some provide up to 4 hours of talk time and 36 hours of standby time. Many satellite phones have additional features that may assist emergency responders in rescue and recovery efforts:

- Global System for Mobile (GSM) communications compatibility enabling the satellite phone to also be used as a cellular phone
- Global Positioning System (GPS) displays of longitude and latitude coordinates
- Solar panels to recharge the battery
- Paging, low-speed data transmission, and faxing capabilities
- Water, shock, and dust resistant for use in rugged environments

Some service providers offer accessories such as a vehicle kit that allows hands-free operation while driving. Most offer a data kit that permits the phone to connect to a computer's universal serial bus (USB) port for accessing the Internet, e-mail, or data networks via satellite.

Cost Considerations

As of May 2008, there are only two hand-held satellite phone service providers in the U.S., Globalstar and Iridium. Each service provider offers a limited number of hand-held satellite phones that can be used with their networks. These phones can be rented or purchased from a variety of authorized dealers in the U.S. Purchase prices vary by dealer and currently range from $299 to $1495 depending on the phone's features. Dealers sometimes offer incentives or refurbished phones for cost savings. Rental rates are determined by the number of days leased and may be as low as $7 a day with a $1.69 per minute charge for each minute of airtime. Pre-paid SIM cards can also be purchased that provide a limited number of airtime minutes.

Calling plans offered by service providers differ in price and features. Some plans require service agreements of 1 to 4 years with activation fees up to $75. Thereafter, yearly or monthly fees apply and are based on the number of minutes included for the specified time period. Monthly fees can be as low as $65 for 30 minutes with a $1.29 per minute charge for extra minutes; yearly fees can be as low as $775 for 360 minutes with a $1.19 per minute charge for extra minutes. Some service providers charge roaming and long distance fees for calls made out of a certain area, and some charge additional fees for voicemail and data transfer. Service providers may allow incoming calls and text messages at no charge to the satellite phone user. Depending on the satellite phone provider, calls placed to a satellite phone user by a land line or cellular user may require the caller to pay long distance or international tolls.

Some service providers allow subscribers to place their phones in a "suspended service" mode if the phones are not going to be used on a continual basis. Doing so reduces the monthly service charges considerably. The phones can be returned to full service mode within 15 minutes of contacting the service provider.

Other Considerations

Placing a satellite phone call, even in the service provider's network, does not guarantee a good connection. Dropped or incomplete calls are common and can be caused by bad weather, obstacles between the caller and the satellite, and service provider network issues. The satellite phone market has been unstable, mostly due to the unreliability of some satellite networks and the cost involved in launching new satellites. Emergency responders are encouraged to thoroughly investigate each service provider's satellite network coverage area, locations of the ground earth stations, backup plan for failed earth stations, percentage of dropped calls, and calling plans when making procurement decisions.

Additional Information

First Responders Guide to Satellite Communications: Satellites as a Part of the Solution, Satellite Industry Association.
http://www.sia.org/frg.htm