Homeland Security
Science and Technology

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. Located within the Science and Technology Directorate (S&T) of DHS, the SAVER Program conducts objective assessments and validations on commercially available 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 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. This TechNote was prepared for the SAVER Program by the Lawrence Livermore National Laboratory.

For more information on this and other technologies, contact the SAVER Program by e-mail or visit the SAVER website.

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4G Mobile Broadband Routers

Mobile broadband routers provide a means of connecting multiple devices to the Internet over a cellular network when a hardwired connection (e.g., Ethernet cable, digital subscriber line [DSL]) is not available. Previously, emergency responder vehicles were equipped with mobile modems to connect mobile data computers (MDCs) to the Internet, but these modems are only capable of connecting one device at a time via a hardwired Ethernet connection. Additionally, emergency responder vehicles had to be in proximity of an agency's Wi-Fi® before information from Wi-Fi capable devices could be transmitted. Mobile broadband routers can replace mobile modems and permit multiple devices to access the Internet as long as cellular service is available. Today's mobile broadband routers access the Internet using a mobile telecommunications standard called 4G (4th generation), which is one of the fastest technologies available today, succeeding 3G (third generation).

Technology Overview

As shown in Figure 1, 4G mobile broadband routers connect in-vehicle equipment, such as in-car-camera systems and MDCs, to the Internet over 4G cellular networks. Compatible equipment must be able to connect to a mobile broadband router via a wired or wireless connection.
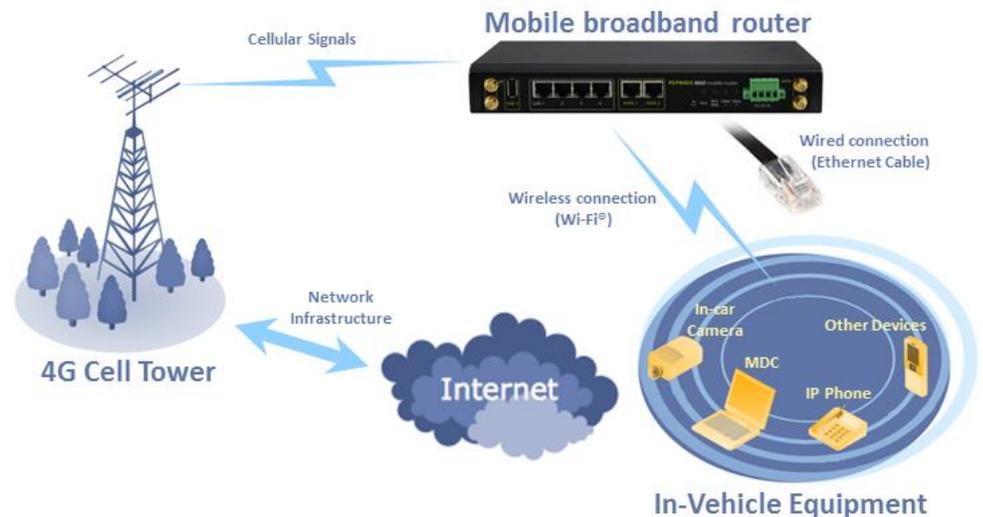

Figure 1. Mobile Broadband Router Connecting In-Vehicle Equipment to the Internet Over a Cellular Network

Image courtesy of Lawrence Livermore National Laboratory.

The most technically up-to-date, commercially available wireless communication systems are 4G cellular services. Often marketed as 4G long term evolution (LTE), this broadband wireless technology service features advanced signal encoding and transmission techniques that enable a significant improvement in high-speed data communication. Real-world performance on 4G networks ranges from 3 to 12 megabits per second (Mbps). By comparison, average speeds of only 0.4 to 1.5 Mbps can be expected on 3G networks. Although 4G networks currently cover only 20 percent of the U.S. geographical area, 98 percent of Americans live in these typically urban areas. A contract/data plan is typically required before 4G mobile broadband routers can be used with a cellular network, and they can only be used in areas covered by an appropriate cellular tower. When 4G service is unavailable, the router will attempt to connect to slower telecommunication networks in the area (e.g., 3G).

4G mobile broadband routers easily fit inside emergency responder vehicles, and are sufficiently powered by the vehicle's electrical system. They are either 'free-floating' (e.g., placed on the passenger seat) or mounted (e.g., part of an in-vehicle electronics rack). Leaving the router unmounted may be a better option if it is frequently moved between vehicles; however, mounting the router keeps it in place and aids in vehicle equipment being more organized.

Applications

Although the mobile broadband router simply connects devices to the Internet, it is this connection that makes possible a near real-time information flow among field personnel, data storage locations, and command centers. With the appropriate in-car camera system and software, field personnel can send a live video feed back to a command center. Another possibility could include field personnel retrieving fingerprints from a digital database and viewing them in their vehicles. Essentially, the advantages of a mobile broadband router increase as the amount of information that is available on a network increases.

Nationwide Public Safety Broadband Network (NPSBN)

When responding to national disasters, oftentimes communications are hindered because the cellular network is unavailable due to power or equipment failures, the network is overloaded with traffic, and/or emergency responders are responding in an area with limited or no network coverage. To address these issues and improve emergency responders' ability to respond to incidents, a nationwide wireless broadband network dedicated solely to their use is in development. Established by the Middle Class Tax Relief and Job Creation Act of 2012, the First Responder Network Authority (FirstNet) is responsible for building the first wireless broadband network for public safety, referred to as the NPSBN. This network will support mission-critical voice and data communications for emergency responders. The NPSBN will be based on 4G LTE technology and occupy the public safety section of the 700 megahertz (MHz) wireless spectrum (Band Class 14). It will focus on meeting emergency responder needs: bandwidth expansion and allocation, cyber security, coverage, and dependability. For additional information and updates on the project's status, visit FirstNet (http://www.firstnet.gov).

Summary

Mobile broadband routers are bridges between 4G cellular Internet signals and Wi-Fi and/or Ethernet compatible devices. A single 4G mobile broadband router can connect multiple devices to the Internet wherever cellular service is available. This mobile connectivity solution meets the needs of emergency responder agencies that are looking to implement any of the aforementioned technology applications. The following resources provide more information on mobile broadband routers, FirstNet, and 4G LTE technology:

- Alcatel-Lucent. *Las Vegas LTE Solution Trial Application Note*. https://mutualink.net/PDF/LTE_Trial_LasVegas_AppNote.pdf. Accessed December 2015.
- Department of Homeland Security. *FirstNet TechNote*. http://www.firstresponder.gov/SAVER/Documents/FirstNet-TN_0415-508.pdf. Published April 2015.
- Department of Homeland Security. *LTE for Mobile Phones TechNote*. http://www.firstresponder.gov/SAVER/Documents/LTE-TN_1113-508.pdf. Published November 2013.
- Federal Communications Commission. Broadband Performance. https://transition.fcc.gov/national-broadband-plan/broadband-performance-paper.pdf. Accessed December 2015.