DHS Science and Technology Directorate

Next Generation First Responder Communication Hub

Communications Incompatibility

As technology advances, first responders are presented with a growing suite of increasingly sophisticated sensors and communication tools that provide vital, up-to-the-minute situational awareness about their personal well-being as well as their surroundings, location, and status of nearby responders. An array of communication systems and devices such as short-range voice radios, smartphones with broadband network access, and sophisticated multi-band voice and data radios are available to the first responder.

The number of available communication devices, their potential incompatibility between groups and jurisdictions of first responders, and the ever increasing amount of low-level data to process can distract, frustrate, and overwhelm the first responder. There still exists a need for an intelligent communications interface that interconnects the variety of sensors and electronics worn or carried by first responders with multiple communication systems.

Efficient & Effective Information Transmission

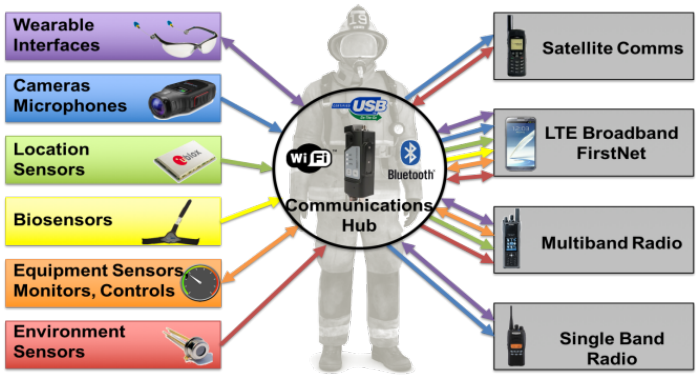
In response to this capability gap, the Department of Homeland Security (DHS) Science and Technology Directorate (S&T) is partnering with Integrated Solutions for Systems (IS4S) to develop a central device that efficiently, securely, and resiliently routes incoming and outgoing information to the chosen destination using the best available communication medium. The Next Generation First Responder Communications Hub improves efficiency and effectiveness of information transmission while removing the burden of constantly communicating low-level but critical data, thus allowing first responders to focus on the task at hand.

With network transitions handled by a self-organizing communication coordinator (SOCC), the Communication Hub will support large networks in multiple configurations. To handle access to known networks, the hubs will share a database of known access points and base stations. Each hub will compare visible networks to its database to identify networks for connection. The database can be shared as hubs connect, allowing the total number of networks available to an individual communication hub to increase at runtime. By sharing network connections and handling configuration automatically, the communication hub becomes even easier to use, enabling first responders to enjoy the benefits of better connectivity with little added effort.

At the transport layer, an adaptive Multipath Connection Manager (MCM) will be implemented to make the selection and network transitions transparent to applications.

In essence, the MCM serves as a bridge between applications monitoring sensors or sending messages and the layer handling the network connections and configuration.

Both the SOCC and MCM increase the scalability of the communication hub. Adding the SOCC will lower the barrier for adding new network interfaces and allow the Communication Hub to share its available networks with others. As new types of communication equipment using standard protocols become available, the hub can be updated to interface with those links and provide new communication links to the existing hub set-up. The MCM managing the transport layer provides an accessible interface between applications and the network. As new sensors are released with applications designed for the first responder, the Communication Hub will provide an interface to get that information across the network.



Testing with First Responders

Testing for the Communication Hub will focus on putting the device into the hands of first responders. DHS S&T will receive feedback directly from first responders, which can then be incorporated into development. Conducting practical tests will ensure that first responder needs are addressed. As the communication hub matures, it will be integrated with first responder equipment during testing and training exercises to exercise the software in live, simulated response scenarios. In addition, testing the communication hub software with network simulations will also ensure DHS S&T can support routing large networks of 50 or more instances, which are infeasible to test with hardware due to scale. As capabilities increase, these tests can be scaled up to introduce more complex network environments, increasing confidence in performance throughout a range of scenarios.

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To learn more about the Next Generation First Responder Communication Hub, contact SandTFRG@dhs.gov

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