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DHS Science and Technology Directorate

Research on Personal Area Network Interference and Compatibility Issues for Public Safety Personal Protective Equipment

Research explores personal area network interference and compatibility issues

First responders have access to a rapidly growing array of wireless devices to help them collect time-sensitive, multifaceted data, including tactical and environmental information. Increasingly, designers are configuring these devices into wireless personal area networks (PAN) — body-worn computer networks integrating sensors, computers and voice and data communications devices.

The need to share data in real time with incident commanders and onsite responders has increased research into the potential effects of radio frequency (RF) interference. This interference can be especially pronounced when multiple PANs and other transmitting devices are operating in close proximity. Consequently, the risk is especially disruptive during large multi-agency response missions, when data collection and sharing are most critical.

Through the Broad Agency Announcement (BAA) solicitation and award program, the Department of Homeland Security Science and Technology Directorate (S&T) First Responders Group will fund Mercer Engineering Research Center (MERC) to conduct research to reduce this risk. MERC will draw upon its engineering research capabilities and expertise in cognitive engineering and human factor research in critical environments. It will also use the emergency preparedness testing facilities of Guardian Centers, one of the world's most advanced disaster response training centers.

Understanding the RF-rich first responder environment

DHS S&T chose MERC because of its RF system investigation and analysis expertise working with multiple Department of Defense partners and studying transmitter collocation on military aircraft. S&T is leveraging MERC's experience with complex RF environments to better understand the degradation that can occur when multiple transmitters are co-located within close proximity.

The scope of this S&T project is the study and analysis of similar effects on first responder voice, data and video wireless devices at critical incident sites. The study requires co-locating a sufficient number of first responders outfitted with necessary RF equipment within realistically sized and tactically accurate staged exercises.



KEYSITE SIGNAL ANALYZER AND MEASUREMENT APPLICATION FOR RF (CREDIT: KEYSIGHT TECHNOLOGIES)

To take full advantage of the exercises requires a test plan, including on-site equipment requirements and protocols for collecting, cataloging and analyzing data. The plan will guide the selection of appropriate RF measurement and analysis systems and determine the proper deployment and operation of the equipment during the exercises.

Several exercises are planned for FY 2015. All will involve large first response scenarios with mobile medical response units, state and local first responders, and National Guard participants. The MERC team has developed relationships with these groups and will conduct RF readings with their equipment as well as interview them afterward regarding their experience with RF interference during the scenarios.

Enhancing the ability of first responders to communicate in a cluttered environment

After all data is analyzed, the program will produce a final report that details how the measured RF environment would likely affect first responder systems of interest. The report will also recommend future architectural improvements and modifications to existing standards and protocols to reduce the risk of RF interference on PANs, and ensure proper functioning of electronic safety equipment. MERC plans to complete their testing and data gathering efforts by June 1, 2015 and submit the final report in August 2015.



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For more information on S&T's research on personal area networks, contact SandTFRG@hq.dhs.gov.

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