Public Safety Audio Quality

Project Description

SNAPSHOT

When a firefighter's life is in danger, the ability to communicate a call for help and to warn others is essential. However, some background noises created by firefighting equipment, such as chainsaws and personal alert safety systems, can interfere with digital communication. Sometimes this interference is so severe that it can prevent a firefighter and the person talking with them from understanding each other at the most critical moments. To understand how background noise affects voice communications and to determine what technology improvements are needed to overcome any background noise issues, the Public Safety Communications Research (PSCR) program, on behalf of the Department of Homeland Security Office for Interoperability and Compatibility, has worked with practitioners to develop and implement tests that measure how digital radios operate in the presence of loud background noise.

BACKGROUND

The voice coder or vocoder is a hardware/software component in every digital radio, which uses a speech analyzer to convert voice into a digital signal and from a digital signal back to audio. While many emergency response agencies are using digital radio systems with success, field reports indicate that during light to moderate background noise, the digital radio system may distort voice communications. In loud background noise scenarios, the digital radio system may make voice communications completely unintelligible—potentially compromising mission-critical operations.

AN INNOVATIVE APPROACH

PSCR designs and conducts subjective listening experiments that enabled definition of performance parameters and associated values. Disseminating this information ensures that voice implementations by manufacturers will meet the operational needs of public safety officials, PSCR:

- Partnered with practitioners from various agencies to conduct numerous tests with three different communications systems in nine different noise environments.
- Tested each radio system/communications technology within each noise environment by requiring listeners to distinguish words spoken over the background noise of chainsaws, hose sprays, alarms, and other fireground sounds.
- Identified immediate behavioral, procedural, and technical steps agencies can take to avoid or minimize emergency response background noise.
- Spearheads a Telecommunications Industry Association (TIA) working group in order to affect change to industry standards. The working group is currently one of the organization's largest, with more than 100 participants.

VALUE TO PUBLIC SAFETY

Audio voice communications are essential to the success of emergency response operations. PSCR:

- Works with practitioners to identify the causes of and potential solutions for this critical communications problem found in digital radios.
- Defines, quantifies, and articulates public safety's audio requirements so that manufacturers can redesign systems to remedy this problem. PSCR serves as a technical advocate to represent the needs of public safety to the standards committees to ensure that newly-developed technologies improve the quality of audio communications rather than impair it.

RESULTS

A technical report was published in June 2008 describing the testing and results. The report, which is available at www.its.bldrdoc.gov/pub/ntia-rpt/08-453/:

- Notes that in some environments analog radios performed better than digital radios.
- Explains that in some environments no radios performed well.
- Is supplemented by a July 2008 report from the International Association of Fire Chiefs, which recommends operational changes for fire agencies using digital radios. The IAFC report is available at www.iafc.org.