



The Idaho National Guard visited INL in October to test a mobile 911 system that could be used during a disaster response. Here, Senior Airman Susan Barroso plays the role of 911 operator.

Mobile 911 system could be a lifesaver

by Roberta Kwok, *Research Communications Fellow*

It's everyone's first reaction when an emergency strikes: Dial 911. But what if no one picks up?

That scenario isn't as unlikely as it sounds. During Hurricane Katrina, dozens of 911 call centers in the area were out of service due to flooding, evacuation and loss of power. Most landlines weren't working, and 70 percent of the cell phone towers in New Orleans had failed. "The communications infrastructure completely collapsed," says Curtis Papke, an engineer at Idaho National Laboratory. "Even if you had cell coverage, there was no one at the 911 centers to answer the call."

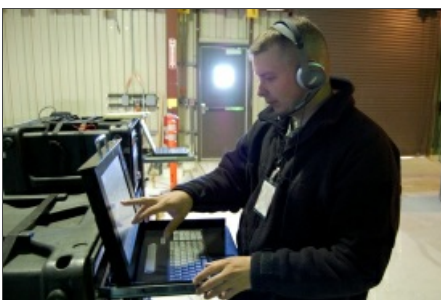
Papke's group has partnered with the Idaho National Guard and the company Qualcomm Inc. to find a possible solution. Using an off-the-shelf Qualcomm product, the INL team devised a mobile emergency response unit that can receive 911 cell phone calls when a disaster knocks out the usual call centers. The system essentially creates a portable, stand-alone cellular network, so people can call for help even when commercial carriers are down. During an October demonstration with the Idaho National Guard, INL engineers showed they could successfully connect 911 calls to the Guard's radio system, as well as receive pictures and GPS coordinates to help emergency responders find victims.

The idea for a mobile 911 unit came to Papke in the aftermath of Katrina, when emergency response teams began revamping their communication technology to prepare for the next major disaster. The National Guard focused on deploying a new system called the Joint Incident Site Communications Capability (JISCC) that would allow different types of responders, such as police, firefighters and medical teams, to talk on the same radio network. Cell phone companies began developing a way to transfer 911 calls to remote operators when needed, in addition to assembling portable towers that could be brought into a disaster zone to restore service.

But the improved technology didn't include a way for people to call for help when cell phone networks were down. This could become an especially critical problem after unexpected disasters like earthquakes or terrorist attacks, Papke says, when phone companies would be left scrambling to transport and set up their emergency equipment. "You still have the problem of grandma sitting on a roof dialing 911," he says. Instead of getting information directly from the victims, disaster responders end up doing random searches of the area -- an inefficient way to find people in distress.



A commercial device called the Qualcomm Deployable Base Station can create an independent cell phone network.



Sgt. John Aberasturi checks the National Guard's radio communication equipment.

With INL engineers Steve Schares, Juan Deaton and Dustin Bacon, Papke investigated the possibility of bringing 911 call receiving capability to the National Guard, which has units in every state and is usually one of the first responders on a disaster scene. The team settled on a commercially available product called the Qualcomm Deployable Base Station, a portable device about the size of a Xerox machine that provides a small, independent cellular network. The unit can pick up cell phone calls made within a 3- to 10-mile radius and -- thanks to some technical tweaks by Schares -- route the caller to the National Guard system. If the phone's GPS option is turned on, the equipment automatically detects the caller's location and uses software written by INL engineer Jason Wright to plot it on a Google Earth map.

The system won't have the capacity to provide service to everyone who wants to check on their family and friends, and it can only receive calls from mobile phones, not landlines. But it will at least provide a way for victims with cell phones to call 911, Papke says. "You've got a completely mobile emergency communication center that can roll into a disaster area," he says.

The team tested the technology in October with three members of the Idaho National Guard. In a

warehouse at the INL Site's Critical Infrastructure Test Range Complex, the Guard members hooked up their emergency response equipment to the mobile 911 system. Papke successfully placed a 911 cell phone call from the warehouse parking lot to Guard member Susan Barroso, a senior airman acting as emergency operator, who then connected Papke to another officer on the National Guard land mobile radio network. Within minutes, a laptop screen displayed a photo taken with Papke's phone and a Google Earth map with his GPS coordinates.

National Guard Lt. Col. Dean Hagerman said the system would be especially useful in rural or sparsely populated areas, which tend to be lower-priority for cell phone companies rushing to restore service in urban centers. After Hurricane Ike, for example, cellular service quickly came back in Houston but not in outlying counties that also were hit hard by the storm.

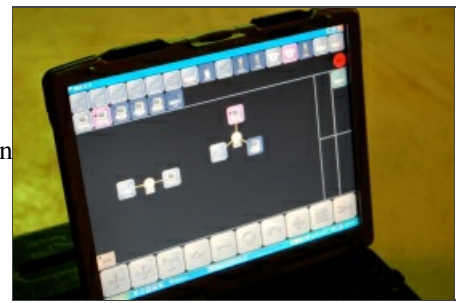


As part of the demonstration, INL engineer Curtis Papke calls 911 on his cell phone from the parking lot outside the warehouse.

"In a community like that, being able to bring that 911 capability is outstanding," Hagerman said during the October demo. "Since the Guard is usually one of the first groups to come in after a disaster, having this integrated into a Guard communication package makes it that much more valuable."

The team still needs to add a filtering step to screen out non-911 calls. And the current system requires a cell phone to be specially programmed in order to send pictures to the National Guard, so INL engineers plan to investigate the possibility of configuring the phone remotely when a victim calls. The team also wants to boost the number of calls that can be handled at once, increase the network's range with a better antenna and make the equipment work with more cell phone types. Eventually, the team hopes to conduct a statewide demonstration that will test the system more thoroughly and persuade the National Guard to adopt it.

"Ultimately, it will save lives and minimize suffering in a great disaster, simply because you've created a communications path for people to reach first responders when they need to," Papke says.



When a 911 call comes into the National Guard network, the operator can pick it up by pressing a button on the laptop screen.

[Listen to a podcast](#) from the demonstration or [read the transcript](#).

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