



# Embedded Technicians: A New Approach to Emergency Communication

A Guest Editorial by Alan Dove N3IMU

**F**rom the 9/11 Commission to the local firehouse, emergency communication has been a big topic of discussion recently. The discussion centers mainly on the lack of communication between different agencies, and how that might be fixed. But with millions of dollars being spent on fancy new radio equipment and plans afoot to spend billions more, it is striking how little has actually changed on the ground.

New York City, the nation's largest city and the target of the 9/11 attacks, demonstrates just how serious the problem is. More than three years after the attacks, police and firefighters still have problems communicating with each other, and other responding agencies are still completely out of the loop. Despite some large dollops of porkbarrel spending scattered around the country, things are not much better elsewhere.

For the major urban areas where most Americans live, it is not clear that any amount of money can fix the problems.

Consider a "typical" urban emergency like a building fire. The fire department, EMS, and police arrive at the scene and begin doing their work, generally communicating on separate radio systems. Even if those can be linked, the linkage never includes the other agencies that show up: the Housing department, utility companies, Red Cross, and Salvation Army, to name a few. Local hospitals are also out of the immediate loop, even though they may have to adapt quickly to a mass casualty incident like a major fire.

It is easy to see the kinds of problems this can cause. For example, if a police officer is in the basement of the building as part of an arson investigation, and notices that several structural beams are starting to give way, how can he notify the other responders? In most cases, he will have to call another officer outside the building, who will call the police dispatcher, who will call up the police chain of command to the high-level liaison with the fire department, who will then call down that chain of command to inform the firefighters and, possibly, EMS workers on the scene. This takes precious minutes, and worse, it doesn't reach everyone who needs to know.

These problems are not hypothetical, as anybody who reads a newspaper should realize.

## Radio Linking

Instead of the up-and-down relay through different (and often antagonistic) chains of command in different agencies, vendors of radio equipment have started offering radio linking systems. As the sales pitch goes, these systems seamlessly integrate the existing radio gear from different agencies at the scene of a disaster, allowing them to communicate as if they were one agency, and eliminating all of the communication problems.

Dream on.

While several cities, including New York, have invested heavily in this type of technology, its flaws have already become apparent. In one

recent full-scale exercise, one of these big-ticket interlinking systems did precisely what it was supposed to do, but with unintended consequences. Police, firefighters, and other groups plugged their radios into the unit, a type of portable repeater link, and suddenly anything said on the fire department frequency could be heard by all of the police officers and other responders. Great.

The problems were that nobody knew how to control communication traffic through the system, or that a spurious signal or open microphone on any radio instantly blacked out all communication at the scene, for all of the agencies. As a result, the linking system paralyzed communication more often than it facilitated it.

Having paid for this expensive gadget, there is no doubt that the city will continue to use it, and that they will continue to have the same sorts of problems in real emergencies.

## Coordinated Systems

I can hear the response already: that linking systems is a temporary solution, so of course it is not perfect. Unfortunately, the elaborate, carefully planned systems that are on the horizon are not much better. One major problem is that these systems are expensive, so their purchase must be authorized by politicians – a group uniquely unqualified to evaluate advanced telecommunication systems. New York's original proposal for a high-tech statewide 800 MHz trunking system is a prime example of the results this can produce. That system would totally exclude coverage of the state's major urban centers, while relying on frequencies that will propagate poorly in the state's rural areas. Other than the vendor, it is unclear who would benefit from such a system.

## Hams to the Rescue?

These issues have been discussed extensively among amateur radio operators, usually in the context of gloating. If you have ever spoken to an amateur radio operator about emergency communication, you will have heard a sales pitch about the "only fail-safe communication system in the world," and how hams can solve the most severe emergency communication problems better than any professional system. This is, of course, a load of hokey.

I know this, because I am a ham radio operator, I have helped in emergency responses, and I have some formal (albeit highly specialized) emergency response training outside of my radio hobby. The average ham is not trained or prepared to be an emergency responder. At the actual scene of a disaster, most amateur radio operators are about as useful as housecats – and about as easy to manage.

To try to address this in the post-9/11 world, the amateur radio community has recently embarked on a crusade, browbeating its dwindling population of participants to get trained, get

prepared, and become more suitable for emergency response duty. This new religion preaches networking with local police, fire, and emergency management officials, training with those groups, and preparing a "go bag" with everything from spare batteries to a three-day supply of food for field deployment.

There are benefits to this approach, but it will never be applied by more than a tiny segment of the amateur radio community. Most hams are more concerned with erecting antenna towers in their back yards to boost their scores in radio contests, or communicating through archaic modes of operation. Ham radio is, after all, a hobby – nobody expects model railroaders to repair the subway system, so why should radio enthusiasts become emergency workers? There is also another sad truth that no ham radio organization points out: a huge proportion of amateur radio hobbyists fail to meet even minimal standards of physical fitness. They are far more likely to be a liability than an asset at a disaster scene.

The few hams who are dedicated to "em-comm," or emergency and public service communication, are mostly the kinds of people who would have ended up volunteering for disaster response anyway. They just happen to have an interest in radio as well. Unfortunately, this small subset of the ham radio community is completely inadequate to cover all of the communication needs in a real emergency. Even within this subset, we have other commitments, and are not professional emergency responders. If a large building caught fire in my neighborhood at 3:00 a.m., I would not receive or answer a call to help. I have to go to work in the morning, and putting out fires is the fire department's job.

Even with all of these drawbacks, though, the amateur radio system offers some tempting advantages for emergency communication. For one thing, hams have access to vast stretches of the radio spectrum; there may be congestion in one frequency band, but finding a clear frequency somewhere in the amateur radio allocations is never a problem. This is especially true for VHF and above, the frequencies most needed by public service agencies.

Besides all of the empty electromagnetic territory, hams enjoy a massively overbuilt infrastructure. In any major urban area, amateur radio operators with the entry-level Technician class license have access to dozens – sometimes hundreds – of different repeaters. Before the advent of cellular phones, many of these repeater systems were in regular use, but these days they mostly sit silent, waiting for traffic. More than a few have robust backup power systems, and even if those fail, other frequencies and modes are available to make the amateur radio system as close to fail-safe as an electronic technology can be.

## Building in Back-up

If professional and volunteer emergency

responders could tap into the enormous surplus capacity and durability of the ham radio system, they would never have a need for expensive add-on technologies. Police and firefighters need to communicate? Start an interagency net on that great ham repeater. Does the Red Cross need to talk to the hospitals? They can use the same repeater to keep the police and firefighters in the loop, or pick a different one. Is there a need for regional communication outside the local jurisdiction? No problem, just decide how far you want to communicate and pick an appropriate frequency and mode. Did the primary repeater for EMS radios just croak? Use a ham repeater to communicate with the hospital instead.

Of course, there is a catch. Fortunately, it is a very small one.

In order to use amateur radio frequencies, one needs an amateur radio license. But not every police officer, firefighter, Red Cross volunteer, or electrical utility worker would need to get licensed to make this system work for them. If only one firefighter in a battalion is a ham, he can relay information from the fire department's radio system to an emergency net on an agreed-upon amateur frequency. The same goes for a few police officers in each precinct, a handful of Red Cross volunteers, a few utility workers, and a few hospital employees. When a disaster develops, these people – who are already participating in the response professionally – could simply start their own communication net for interagency messages.

Let's return to our burning building to see how this works. The officer in the basement uses his police radio to call an officer outside, telling him about the collapsing beams. That officer, who

happens to have an amateur radio license, pulls a ham radio handheld unit off his belt and informs the amateur radio net of the situation. The firefighter-ham, Red Cross-ham, Salvation Army-ham, utility worker-ham, and housing department-ham all hear the information at the same time, because they are on the same amateur radio frequency. They then use their own agencies' communication systems to tell their people to evacuate.

Unlike commercial radio-linking systems, this one incorporates expertise as well as gadgets. Because their introductory ham radio licensing course taught them how the system works, all of these embedded amateur radio operators know how to fix common communication problems as they arise. They can instantly change hats to become radio experts, then change back into firefighters, police officers, or whatever else and continue responding to the emergency. Since these people are already emergency professionals, the traditional problems of using ham radio – nearly all of which stem from having untrained volunteers on the scene – disappear.

Emergency responders should start thinking of amateur radio as a category of technology, not as a group of eager nerds laden with radios. The Technician-class amateur radio license is not hard to get. It involves a 35-question multiple-choice exam that virtually anyone can pass with a bit of studying. There is no longer a Morse code requirement for the entry-level license. The exam fee is \$12, renewing the license every ten years is free, and a durable, high-quality handheld radio suitable for emergency work runs about \$250 brand new. Training is free. Best of all, this technology can be implemented at the lowest levels of agencies.

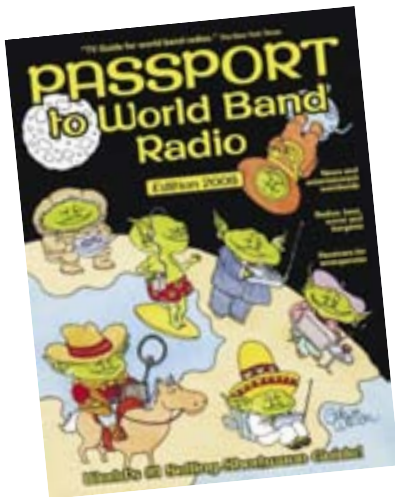
The top brass does not even need to approve it, just avoid obstructing it.

Amateur radio operators should start thinking of themselves as a group of teachers and consultants for emergency professionals, not as a group of superheroes who will fly in to save the day. Instead of building networks with police and emergency management officials in order to get invited to the next disaster, build the network in order to recruit students to the next licensing class. Stop badgering hobbyists to assemble "go bags," and focus on getting ten percent of your local firefighters through their Technician exams. Then, teach them how to use their new abilities in emergencies, running a few practice nets and inviting them to your events. Above all, start viewing ham radio as one tool in the emergency communication toolkit, not as the answer to all questions.

Alan Dove, N3IMU, is active in New York City Amateur Radio Emergency Service and Radio and the Amateur Radio Emergency Communications Service (ARECS). You are invited to visit the ARECS website at <http://www.nyc-arecs.org/> for more information and discussion on the above proposal.

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-Rachel Baughn, KE4OPD, editor



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