



Training, Not Technology, Seen As Key To 9/11

Five years after 9/11, government officials have still barely begun work on developing a unified form of communications that could link state, local, and federal agencies together in the event of a major disaster.

Mark Hachman - PC Magazine

Sept. 8 - Five years after the attacks of Sept. 11, a communications system tying together New York state, county and local emergency teams remains barely out of the planning stages, as industry and government struggle at the intersection of technology and bureaucracy.

A \$2 billion web of wireless communications – the Statewide Wireless Network – is scheduled to go live across the whole of New York in August 2010. Although New York City will be one of the first locales to be tested, the implementation is still in its planning stages, officials involved with the project said.

For several years, companies have been working to develop so-called "mesh networks," self-healing networks of Wi-Fi, cellular and dedicated wireless backhauls that can intelligently establish themselves and route data according to what repeaters are available.

The mesh networks are designed to serve as a glue tying together communications and data from a disparate set of agencies, all using different systems that must work together in an emergency.

For example, Marin County, Calif., uses an 800-MHz network to tie together its police, firefighter, and emergency workers. But its neighbor across the bay, Oakland, uses an incompatible 420-MHz network, preventing rescue workers from the two communities from talking to one another via radio, according to a wireless industry executive. Like VOIP systems from Skype or SunRocket, SWN and other similar networks use a "gateway" device to transform ordinary radio communications into data traffic, that can be routed to the appropriate user or group.

Establishing the SWN, which began work in 2000, and was fast-tracked after Sept. 11, is seen as an important step in modernizing the state's communications systems. M/A-COM, a division of Tyco Electronics, has been asked to deploy the system. But even after Sept. 11, the network will still not necessarily tie together all of the available response teams. The SWN was designed to tie together the state's resources, and not necessarily federal agencies.

"The network is being built for state agencies," said Rob Roddy, a spokesman for the New York State Office of Technology, which is overseeing the project. "Local governments can become partners, the same with federal agencies. They have the same ability to become a partner with the state, and to use the system in that area."

The problem, however, is that no single technology can be called a magic bullet.

According to the official Federal Emergency Management Agency's report on the reactions of first responders to the New York City, Pentagon, and Shanksville, Penn. accident scenes, it was the presence or lack of an organized command structure – and by extension, a communications structure – that helped

determine the success of the operations. Within New York City, a temporary command post set up within the lobby of the WTC 1 tower within four minutes was destroyed when the second plane hit WTC 2; the collapse of WTC 1 destroyed the more permanent command center housed in a building across the street.

By contrast, the quick establishment of a command structure at the Pentagon, combined with a network of radios issued specifically for the purpose of tying together the 60 or so agencies responsible for disaster recovery, was identified as a key success.

But according to FEMA, communications management is as important or more so than simply pushing information to first responders. In New York City, the knowledge that plane had collided with a skyscraper on Sept. 11 was clearly evident. Enthusiastic off-duty firefighters, retired police, and paramedics rushed to the scene, while radio dispatchers were either ignored or talked into routing crews to the site, adding to the confusion, the FEMA report says. But at the Pentagon, the FBI special agent assigned to the task as well as the head of the Arlington County Fire Department had previously met and jointly attended counter-terrorism training seminars, establishing a smooth working relationship.

"Part of it is technological and part of it isn't," said James O. Ellis III, the research and program director for the National Memorial Institute for the Prevention of Terrorism, a non-profit agency set up in the wake of the Oklahoma City bombing that has prioritized efforts to help first responders. "It's not a matter of people getting people talking to everybody else. At times, you don't want people to talk to everybody else." *Continued...*

Could mesh networks be the answer?

The SWN is just a small part of a nationwide program called the National Incident Management System, authorized by President George W. Bush in 2003.

NIMS sets down a standardized template for coordination of state, federal, and local first-response teams in case of a catastrophe. According to the project timetable, full NIMS compliance must be completed by Sept. 30, according to a self-certified checklist handed out to government agencies. However, NIMS received \$15 million of the \$28.9 billion in net discretionary spending for the Department of Homeland Security (DHS) that Bush authorized in his 2005 budget.

Of the eight principle sections of NIMS, two are dedicated to the communications infrastructure. But the requirements, where they are actually specified, are difficult. "Achieve interoperability and compatibility through the use of tools such as common communications and data standards, digital data formats, equipment standards [and] design standards," the design document says.

The DHS has funded two "pilot" programs of its unified communications strategy in Las Vegas and Louisville, Ken., earlier this year, under its SafeCom program. According to a SafeCom report, however, only the Louisville pilot actually used a set of public service radios in an attempt to model a unified system.

The scope of the problem common-communications providers must deal with is massive, according to Ellis. "In general you have to realize that in a crisis, there is limited resources, which includes spectrum packets or cell-phone packets," or network bandwidth, he said. "We need to realize that emergency responders' primary role is to save lives. But we can't underestimate that some of the best intelligence from accident scenes comes from people on the site: 'Help, we're stuck in the tunnel,' or 'The suspect looked like this.'"

Within a specific agency or city, managing emergency services becomes more manageable, and municipalities are turning to mesh to not only provide wireless broadband to its citizens, but also provide a dedicated infrastructure for its first responder teams. In New York City, a mesh-like system was one of the few to survive the 9/11 attacks.

"One of the [first] few [mesh] systems was a system called Ricochet," said Rick Rotondo, director of product marketing at Motorola. "It was a system that was built back in the early to mid 1990s, and people considered it the first mesh network. It worked very similarly to the mesh systems of today, where they had these transmitters that could hop to each other. The company had gone out of business. But when 9/11 happened, the executives from that company turned back on those nodes so that the emergency responders could use them."

Before the Homeland Security agency began funding communications infrastructure, the city of Anaheim, Calif., built an enterprise virtual operations center, which mapped fire or police response calls on a map of the city using data entered via the city's dedicated 802.11a wireless mesh network, according to John James Nicoletti, external affairs manager for the City of Anaheim.

Likewise, in Tempe, Ariz., a mesh network that will eventually cover 200 square miles is being built out by Strix Systems, which uses the mesh to transmit textual and graphical real-time information. Although cellular technologies are the most common for consumers, a wireless mesh is considered the most resilient, he said.

"On average of seven times a month someone knocks down a pole, but the network will continue to work...because it's self healing," said Kirby Russell, director of product marketing at Strix Systems.

However, there's no guarantee that a mesh would have survived 9/11, either.

"There would have been absolutely no way to test whether any mesh system by anyone on the planet, including Motorola, could have made a significant difference in 9/11," Motorola's Rotondo said.

"It wasn't just the number of people," Rotondo added. "It was interruptions in power, debris in the air, crowds, et cetera. I know that if anyone tells you their mesh system would have survived 9/11, they're lying, because nobody knows that. It was just too big of a disaster to be able to test it. However, there are some things about a mesh network that would give you a tendency to believe that it would have lasted longer would it have been a mesh system." *Continued...*

SWN designed for country, cities

In New York, the SWN is being designed for "in-street" coverage, meaning that police cars, for example, would be outfitted with the system, while handheld radios assigned to individual officers would not. SWN adjunct networks, such as those being tested within the tunnels of New York City, would provide additional flexibility for urban areas and emergency calls within skyscrapers or other buildings.

When using the system, users would have the option of communicating with a specific user or broadcasting to a select user or group of users, much like an email may be sent to multiple recipients.

A mobile unit demonstrating the advantages of SWN just completed a demonstration tour, Hutcheson said. SWN will consist of three systems, an 800-MHz OpenSky infrastructure for most of the state's densely populated areas, combined with a "P25IP" system for the Catskills and Adirondack mountain

ranges, plus a NetworkFirst network for tying together the legacy networks. SWN is being designed for as many as 65,000 state and local government users to use the system.

The Erie and Chautauqua counties are scheduled to receive the network first, said Dave Hutcheson, a spokesman for M/A-COM.

WiMAX, a technology touted as an answer to the need for wireless metropolitan broadband, wasn't chosen for SWN, although M/A-COM is exploring last-mile WiMAX solutions, Hutcheson said.

Meanwhile, companies like PacketHop are not only developing the mesh technologies, but a unified set of applications to facilitate the sharing of data. PacketHop's technologies include an instant-messaging application that does not require a server or network authentication, as well as a GIS application tool that can plot the locations of everyone connected to the network.

"What PacketHop solves is homeland security and first responder networks, in that when the network is no longer available, which happens all the time, they can still communicate using a standard UI with applications like our most popular one which is multicast video, a real-time video application used for video surveillance and video conferencing," said Michael Howse, president and chief executive officer of PacketHop. "So we can take multiple streams of video and distribute that around this dynamic mobile mesh network without clogging the network."

Has the analysis of the Sept. 11 attacks improved the capability of first responders to coordinate emergency response efforts? It's probably impossible to determine, Ellis said. Still, there have been positive signs: in the aftermath of Hurricane Katrina, a mesh network administered by MCI's SkyTel quickly re-established communications to FEMA workers.

"Any time you have a major disaster, it will place demands on the system," Ellis said. "Parts of the system will break down. There will be failures. Are there going to be problems? Yes, but the test will be can we recover from those."

"I think we are probably better prepared now, but communications is going to be a perennial issue," Ellis added.

And if the incredible complexities of establishing a common communications across state, local, and federal bureaucracies aren't enough, consider this: In February, NIMS consulting firm EMAC International issued an alert, identifying a new problem: the everyday terminology used by first responders themselves.

"In Washington, DC, if a police officer says 10-50, he or she is talking about a car accident," EMAC said. "Across the line in Montgomery County, Maryland, 10-50 means an officer needs help."

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