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## \$120 million radio system ailing

*Phoenix firefighters are using old method*

**Josh Kelley**

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Over the past two years, Phoenix police and several other city departments have begun using a powerful new radio system, costing more than \$120 million, that was supposed to enhance communications, particularly in the aftermath of a major disaster or terrorist attack.

The goal for police and firefighters was to create a network that would allow them to talk to one another or to their colleagues from neighboring municipalities from anywhere in the Valley.

But Phoenix firefighters say the system has been plagued with transmission delays and lost signals in large buildings, critical issues that will take at least five years and an estimated \$50 million to resolve.

Officials from the Fire Department and Motorola, which built the system, say that firefighters, engineers and the city's technology personnel failed to adequately discuss how the new radios would work before the system was installed.

As a result, the city will ask voters in March for \$15 million to begin work on improving the system and to expand and maintain Phoenix's old radio system, which the city's 1,432 firefighters, and their colleagues from the 17 other departments dispatched by Phoenix, continue to use.

### Replacing system

Phoenix officials began exploring a replacement for the city's old radio system more than 10 years ago. The city hired consultants in the 1990s to assess its communications needs, and they recommended that Phoenix purchase a new radio system, much like the one later installed by Motorola.

The decision to buy the new radios was further prompted by the Federal Communications Commission, which announced plans to require that frequencies used by VHF radio systems be divided into narrower bands. That requirement, which is scheduled to go into effect in 2013, meant Phoenix's old radio system would have to be replaced or dramatically changed.

To purchase the new radio system from Motorola, Phoenix budgeted \$112.5 million, with \$91 million coming from a bond election in 2001, said Kris Sigfridson, acting head of the city's Information Technology Department.

Other cities whose firefighters are dispatched by the Phoenix Fire Department, contributed \$13.5 million, she said.

The Phoenix department's share of the system was \$35 million.

Sigfridson said that \$4.3 million set aside for new handheld radios will not be spent now because firefighters are still using the old radios.

### How they work

The city's old VHF radio system sends signals from one radio to another, much like a walkie-talkie. It has limited range and only a few channels, but signals are reliable.

The new system, an 800-megahertz digital trunked radio system, sends a signal from one radio to a repeater and then out to other radios. Capacity is much greater, allowing firefighters and police on opposite ends of the city to talk to each other.

Instead of the few channels available with the old system, the new radios have dozens of "talk groups," in which signals are delivered on the first available frequency within a pool of frequencies to reduce overcrowding.

Engineers crafted the new system to provide seamless communication among local, state and federal agencies, an important capability when responding to a major disaster.

Communications problems among police and firefighters hampered rescue efforts during the Sept. 11, 2001, terrorist attacks in New York and Hurricane Katrina in New Orleans, drawing calls for reform from congressional leaders and others, including U.S. Sen. John McCain, R-Ariz.

## Problems arise

Before the new system was brought online in early 2004, Phoenix firefighters tested the radios inside buildings, where firefighters are in the most danger during a fire. They found that the new system's radio signals were more easily disrupted inside large buildings and had worse audio quality than the old system.

Fire officials decided to stick with the old system, even though many of the city's other departments, including police, converted to the new system.

"We have right now the safest communications system in the country for our fire departments here in the Valley," said Division Chief Nate White, who oversees technical services for the Phoenix Fire Department.

"Should we move forward with this new technology when we don't have all the answers, or should we wait?"

White said Motorola did not adequately test or develop its technology before consultants recommended it.

"The testing that was done was not done in the actual settings," White said. "It was done with machines and through theory."

Phil Dobosz, systems integration vice president for Motorola's Western region, said his company did not fully understand how the Fire Department wanted its radio system to function. But it's not clear where the communications breakdown occurred, he said.

"I think we're all kind of wondering why it wasn't better understood upfront," Dobosz said.

White said the Fire Department and Motorola both failed to adequately discuss potential problems.

A Fire Department report cited similar radio problems in other cities, including New York, San Diego and Columbia, S.C.

In October during a symposium sponsored by the International Association of Fire Fighters, White warned colleagues to avoid making the same mistake of buying new radio systems that put firefighters at risk.

Alan Caldwell, senior adviser for government relations for the International Association of Fire Chiefs, said fire departments have found that new radio systems such as Phoenix's work well with proper engineering, installation and training of those who use them.

"Most jurisdictions find that it works just fine, but it's different," he said.

Mesa, which also dispatches Gilbert and Apache Junction firefighters, finished installing a new Motorola radio system last summer with the idea of creating a regional network with Phoenix.

Mesa Assistant Fire Chief Gary Bradbury said the adjustment to the new system has been minimal.

But unlike Phoenix, Mesa for years has used radios that send signals to a repeater before reaching another radio.

The Phoenix Fire Department is accustomed to direct radio-to-radio contact and must deal with mountains and tall buildings that cause interference, which is not a big factor in Mesa.

## **Complicating mutual aid**

Because Mesa and Phoenix firefighters are using different radios, a patch was added to the radio systems to ensure firefighters dispatched by both cities could communicate when responding to the same incident.

A battalion chief is assigned to monitor the radios when firefighters dispatched by Mesa and Phoenix work together.

And Mesa firefighters use radios from their old system, not their new radios, to respond in cities such as Tempe and Chandler where Phoenix dispatches.

For day-to-day operations, those fixes work, Bradbury said. But if a major disaster was to occur with hundreds of firefighters responding from multiple cities, they would be limited to only a few radio channels provided by the old system, he said.

The channels would likely become overcrowded, Bradbury explained, while the new radio system would have many more talk groups to use.

"We're limited back to what we've been limited to the last 20 years," Bradbury said.

Not so, said Phoenix Deputy Fire Chief John Maldonado, co-director of the city's Homeland Defense Bureau.

He said the patch system used in dispatch centers allows the Valley's firefighters and police to easily communicate with each other and federal officials during a disaster response, regardless of the radio systems they use.

Maldonado added that the response to a disaster would be primarily coordinated off one radio channel. Only support personnel would use other channels or talk groups, not those responding directly to the incident, he said.

Capt. Mike Worrell, who works under White in the Fire Department's technical services division, said the Phoenix Fire Department is also adding radios to each firetruck that will allow command staff to use the city's new radio system to communicate with police and federal agencies.

"We're ready for a disaster, more ready than we've ever been," White said.

## **Police make adjustments**

Phoenix's other departments, including the police, are pleased with the new system. Dispatchers can hear officers more clearly, the radios have a much greater range and they can be encrypted, said Jesse Cooper, communications manager for Phoenix police.

But the department did find a hitch.

Officers detected a delay of a second or less before a voice could be transmitted after pressing the talk button on the new radios, a potentially dangerous problem

particularly for officers on tactical teams that depend on instant communication, said Lt. Stan Hoover, who oversees the Police Department's Special Assignments Unit.

Police worked with Motorola to provide officers with a channel to which they can switch for direct radio-to-radio communication without noticeable delays, but dispatchers can't listen to the conversation or speak to officers.

Sigfridson said the Fire Department does not want to use radio-to-radio communication unless its dispatchers can hear what's going on inside a burning building, where firefighters work in low visibility and easily become disoriented.

In Phoenix, repairs and new equipment are needed to maintain and expand the VHF radio system, so fire officials requested \$15 million in bond money.

The City Council approved the request in November, and it will go to voters for approval during a bond election in March.

At least \$5 million will be used to develop a strategy for correcting the new radio system, Sigfridson said.

In 2011, the Fire Department plans to request an estimated \$46 million in bond money to pay for equipment, such as more repeaters, to adjust the new radio system, White said.

The goal is to have radios that use repeaters and direct radio-to-radio channels that can be monitored by dispatchers and automatically triggered when firefighters respond to a fire so they avoid switching channels inside burning buildings, White said.

Motorola is working with the department to adjust the system, Motorola's Dobosz said.

Sigfridson said she is hopeful a solution will be reached, "but, of course, firefighters are the ones that are the toughest to sell because they're the ones with their lives on the line."

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