



800 MHz – In Building Coverage

(Written May, 2001)

In our ongoing series of previews for the new 800 MHz Trunked Radio System – due out in 2003, we've been telling you about some of the new features of the system. In this article, we're going to tackle the subject that has been most controversial throughout the nation: In-Building Coverage. Although the new system will provide better in-building coverage than the current system, there are still some concerns about problems faced by other fire departments in the past several years.

In the current conventional radio system, if your portable radio signal does not penetrate the building, the dispatcher cannot hear you... but your radio can usually be heard by other portable radios within range. This process requires a "relay" of communications to get your radio message outside the building. This is a limitation of a conventional radio system, since the communications at the scene could be totally isolated, and firefighters may not be able to call for help outside of the team that is right at the scene.

In the new trunked radio system, portable radios do not communicate directly to one another. The supporting repeater (transmission site – as in the case of cellular phones) must first receive their communications and then repeat them back over the entire network so that other users can hear and participate in the conversation. This means that the infrastructure (repeaters & transmitter sites) supporting the user becomes very important in the design of the radio system. An underbuilt or improperly designed system is probably the leading cause of problems in trunked radio systems.

The City of Phoenix, along with much help from the Phoenix Fire Department's 800 MHz committee, has taken very deliberate steps to design this system for Public Safety use, in particular, for in-building coverage. The main goal for providing adequate in-building coverage is to ensure that a strong enough signal is provided throughout the coverage area. In order to do this, many complicated factors have been considered, including the number and location of sites, transmitter power, receiver quality, noise, and movement of the radio. Environmental factors are crucial, too... such as buildings, trees, bushes, mountains and the ground itself.

The signal strength is further enhanced to ensure that we have a strong enough signal to penetrate most buildings. The technical design team took input from Fire and Police, then divided up the city into areas with high density buildings

(such as downtown Phoenix), medium density buildings (industrial areas) and residential dwellings (single family homes). The team looked at nationwide figures concerning how much signal is lost when transmitting in and out of buildings with those density ranges. They adjusted those figures to increase the signal level even higher, to make sure that the best signal possible is provided for in-building penetration. The testing process will be extensive. Engineers from the city and the system's maker, Motorola will conduct tests for several months before the radio system is ever put into service.

No matter how well a system is designed, it is difficult to provide in-building coverage to all buildings. Some buildings will require special equipment that relay radio signals in and out of them. This process is called "building treatment." A significant plan has been included in the system contract for just this purpose. Many precautions and actions (including more extensive testing) will be taken to make sure that certain, critical buildings are covered.

The City of Phoenix has committed a significant amount of money to this project to make sure that there are enough sites and equipment to meet the requirements given by Police and Fire. Nothing is being compromised for the sake of saving money. Safety is the number one concern, and the new radio system will not be put on-line until every facet has passed critical tests.