Bridging the Safety Divide: The Rural PSAP and Rural Wireless Carrier

By Mark Musick, Director of Product Management, Airbiquity

Five years ago, the FCC mandated wireless carriers to develop and deploy technology that provides location information for wireless 9-1-1 calls commonly known as Phase I and Phase II. To date, there is not a widely deployed system that can fulfill this mandate. The "Big 6" nationwide carriers (Verizon, AT&T, Sprint, Cingular, Voicestream, and Nextel) have chosen different solutions. Voicestream, Cingular and AT&T have chosen an E-OTD solution while Sprint, Nextel and Verizon have chosen an Assisted GPS solution. AT&T and Cingular have also selected an interim network-based solution for their TDMA & AMPS networks until they migrate their wireless services to GSM.

According to Kris Monteith, Chief, Policy Division, with the FCC Wireless Telecommunication Bureau, the Big 6 service approximately 75 percent of the US wireless subscriber base (presentation made at the APCO/NENA Wireless E9-1-1 Joint Forum, January 24, 2002). But what of the hundreds of small- to medium-sized carriers that service the remaining 25 percent of the country? More specifically, how does the geographic coverage of the Big 6 compare with that of the rural wireless carriers? How does this geographic coverage fit with the PSAPs throughout the US? It's a forgone conclusion that the Big 6 "own" the metropolitan areas and the applicable PSAPs, but what about the PSAPs servicing rural America?

Rural vs. Urban

To properly evaluate rural vs. urban, some basic metric is needed to establish what exactly differentiates a metropolitan area from a rural area. By using a county population as our yardstick, we can distinguish between urban and rural counties that have populations of greater than or fewer than 50,000, respectively. Certainly this is not scientific, but does provide an interesting place to start, nonetheless.

According to the 2000 Census, there are 3,134 counties in the US. Of those, 907 counties (29%) have a population greater than 50,000 people (urban), and 2,227 counties (71%) have a population of fewer than 50,000 people (rural). (See Figure 1.)

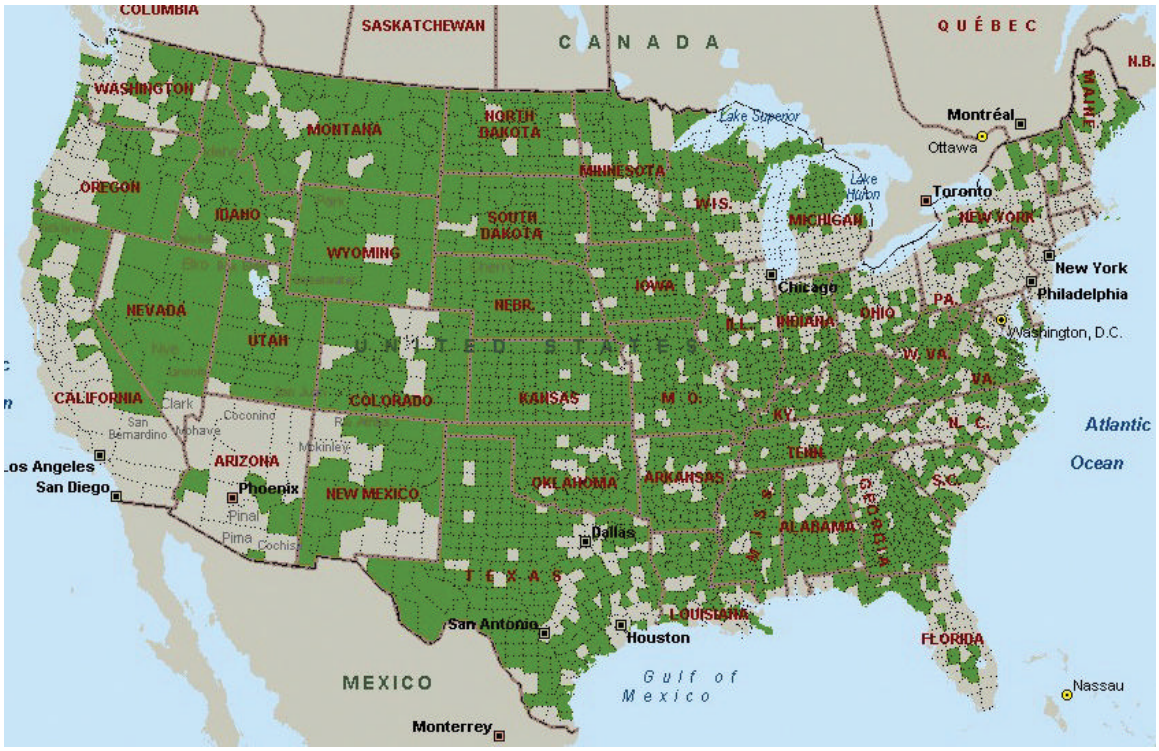

Figure 1: Counties with a population of less than 50,000 are indicated in green. Greater than 50,000 are in gray.

According to NENA, there are 7,500 PSAPs nationwide, of which 5,000 are primary and 3,300 accept wireless calls (presentation made at the APCO/NENA Wireless E9-1-1 Joint Forum, January 24, 2002). By overlaying the PSAPs onto the same map, undoubtedly the land mass of counties with fewer than 50,000 people cover the vast majority of the US and, as expected, that is where a majority of the PSAPs are located. (See Figure 2.)

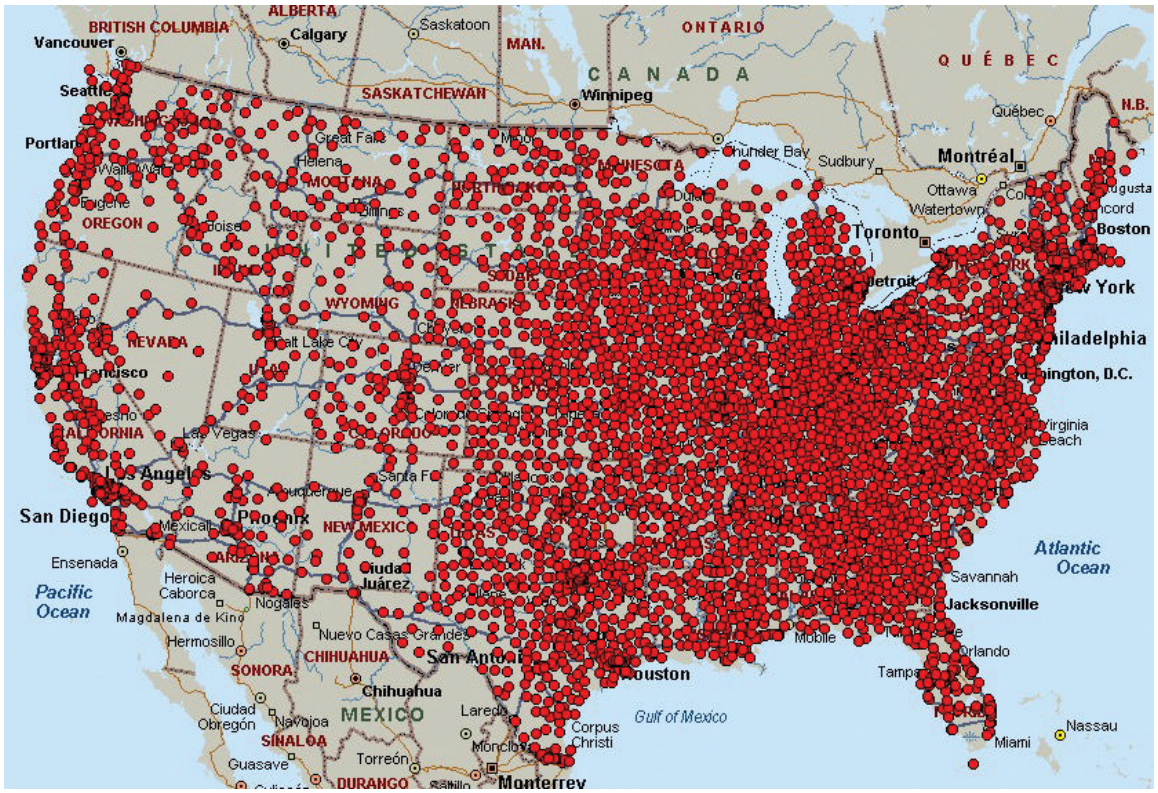

Figure 2: PSAPs throughout the US.

So what does all this mean? As users of wireless services, most people have a pretty good idea of the layout of the land in their local area. In the event they need to call 9-1-1, they can give the call-taker a general idea of their location. But head out of town along Interstate corridors and it doesn't take long before they don't have a clue as to where they are located. Herein lies the problem. The Big 6 has identified the location determining technology they intend to roll out and when they intend to deploy it to meet the Phase II requirements set forth by the FCC. (See Figure 3.) It is likely that the intention of wireless carriers is to start with their largest subscriber base, e.g. urban counties with highest concentration of subscribers. Locating 75 percent of wireless subscribers covered by the Big 6 is great when in San Diego, Chicago, New York, Seattle, Dallas or Miami, but that is not the issue.

The challenge appears when urban subscribers journey out of town for a business trip or take the family on vacation and have a need to be located when an emergency arises in these non-familiar surroundings. If the Big 6, with all their technological and financial clout, have delayed their Phase II rollout in metropolitan areas, imagine how long will it take the rural carrier to roll out a Phase II solution for rural America?

(Please see hard copy of magazine for Figure 3)
Figure 3: FCC Approved Deployment Summary Table of Six National Carriers, October 2001. Reprinted from Jim Goerke Presentation, APCO/NENA Wireless E9-1-1 Joint

Forum, January 24, 2002. For complete footnotes to this table, visit the NENA Wireless pages at www.nena.org.

Rural PSAP Issues in the Current Technological Upgrade Environment
Rural PSAPs are challenged today like never before by the Phase I and Phase II requirements. There's GIS to consider, 9-1-1 CPE and/or CAD systems to upgrade, implementation management and coordination to think about, network planning, cost reimbursement, installation and support. In addition, there are administrative, technical and training issues to ponder, which many rural PSAPs are not prepared to handle. With wireless 9-1-1 calls increasing from 18 million in 1994 to 50 million in 1999 (NENA 2001 Report Card to the Nation, Statistics for Year Ending December 31, 1999), and rising annually, along with the ongoing delays by the carriers to deliver Phase I and Phase II, one begins to have a pretty good picture of what the rural PSAP face.

Furthermore, AMPS and TDMA networks are still prevalent throughout the US, particularly where rural PSAPs are located, yet the major handset manufacturers have stated they will not produce a GPS enabled AMPS or TDMA handset. Alternative networked-based solutions are problematic for rural carriers because of their tendency to place cell towers in a linear fashion. All of this further impacts the rural PSAPs ability to serve the growing wireless subscriber base.

Rural Carrier Issues in the Current Regulatory and Technological Upgrade Environment
Today, rural wireless carriers are challenged in every aspect of their operation. The technology requirements to support digital service and the demand to move toward high-speed data services of 2.5G and 3G have forced long reaching decisions on the Big 6 carriers. Those choices strongly influence and quickly impact the rural provider in a variety of significant ways. What is the air interface of choice of the roaming partners? Can the small rural provider afford to upgrade to that technology? What are the cost implications of the other 2002/2003 regulatory mandates, i.e., CALEA, TTY, LNP, and of course Wireless Phase II? Regulatory compliance issues must be addressed immediately, and addressed by the system upgrade as a significant part of that upgrade. Hence the upgrade costs soar higher and higher.

In fulfilling Phase II of E9-1-1 for example, the carriers choosing CDMA have all selected a handset-based solution. So far, only one carrier (Sprint), in one state (Rhode Island), with one handset has delivered a solution. GSM carriers have all selected E-OTD (an assisted handset-based solution) with zero areas up and running. Lastly, TDMA carriers have punted, asked for waivers, and have finally selected a network-based solution that would break the bank of a rural carrier and would not meet the FCC mandated accuracy requirements. In the end, all of these implementations have a negative impact on small rural providers.

The small carriers do not have the resources, size or clout to influence the network equipment or handset manufacturers in economy of scale, in price, in delivery, in competition with the large carrier, or in waiver impact on the FCC Commission to meet

the mandated deadlines. E9-1-1 is the most requested feature from customers in a rural environment and yet the large majority of rural subscribers do not even have Phase I. On top of that, rural carriers are literally three to five years from having Phase II with the same solution as the Big 6 carriers.

Thinking Outside the Box

Certainly these issues may seem daunting; however, rural PSAPs are working together with rural carriers to take them on, knowing there are solutions available today with which they can move forward in solving the ongoing and increasing problem of wireless 9-1-1 calls. It will take persistence, creative thinking and an evaluation of alternate technologies and solutions to bridge the safety divide that exists in our country today.

Mark Musick is the director of product management for Airbiquity. He has more than 17 years experience in telecommunications, specializing in 9-1-1 public safety, call center applications and wireless. Airbiquity delivers GPS data to any wireless network, worldwide to enable the next generation of mobile safety, convenience, and productivity applications.