

TECHNICAL WORK, SPECTRUM PLANNING NEEDED TO MAKE PEER-TO-PEER SOLUTIONS A REALITY

Urgent Communications

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Considerable effort is being made to get public-safety 700 MHz LTE networks deployed in pockets of the country today, in the hope that they can be linked together with similar networks nationwide to give first responders throughout the U.S. access to broadband capabilities.

Currently, the 700 MHz networks are being viewed as **data-only networks in the near term**, with mission-critical voice still being transmitted over LMR systems operating in traditional public-safety bands. However, many agencies — New York City's police department being the most outspoken — eventually want to **use LTE for mission-critical voice**, as well as for data.

Exactly how long it will take for this transition to occur is one of the hottest topics in the sector. Some, like NYPD, believe it can happen in the next three to five years. Others believe it will be at least 10 years, while others expect LMR to remain a mainstay for at least another 20 to 25 years, if only because agencies will not want to discard P25 systems that are being planned today until they have managed to get 15 to 20 years of service from them.

Meanwhile, many public-safety officials note that the LTE community is still trying to get commercial voice right, so it is nowhere near ready for mission-critical voice. But **push-to-talk LTE solutions have been demonstrated at trade shows**, so the technical capability certainly seems to exist.

Of course, push-to-talk over a network is one thing, but push-to-talk communication that works off the network is a critical feature for first responders, particularly for firefighters. Again, such peer-to-peer transmissions are possible from a technical standpoint — ad-hoc mesh technologies have been commercially available for years, and the military has invested significant resources to ensure that the approach can meet mission-critical reliability requirements.

Exactly what public safety's requirements are for peer-to-peer communications is something that hasn't been completely defined to date, and it's a "conversation that needs to happen," said Emil Olbrich, lead project engineer for the **Public Safety**

Communications Research (PSCR) program, which is a joint initiative of the National Telecommunications and Information Administration (NTIA) and the National Institute of Standards and Technology (NIST).

Many have expressed concern that standards bodies like 3GPP are so focused on standards that impact commercial-carrier networks that public-safety standards would not get appropriate consideration. Olbrich said the first-responder community faces a much more fundamental issue before it can even try to make its case before standards bodies.

“What are [public safety’s peer-to-peer] requirements? Is it just voice? Do you need to text? Do you need some telemetry?” Olbrich said. “We don’t have those requirements. So, for us to go to a 3GPP or anything, they’re going to come back at us and say, ‘What are your requirements? What do you need to do? What’s your end goal?’”

“We don’t know what that is. I’m not sure public safety does quite yet. We hear a lot of talk and a lot of marketing spiel, but we really need to peel that back by two or three layers to get to the tasks we really need to accomplish.”

Olbrich said there are several potential solutions, but it is difficult to evaluate which one is best without a full understanding of public safety’s peer-to-peer needs. For instance, if voice is the only peer-to-peer application needed, it could be accomplished over existing LMR narrowband channels with a minimal amount of standard work.

However, if first responders also want the ability to transmit data such as text, telemetry information, pictures or video in peer-to-peer mode, the solutions likely would need to look much different, Olbrich said. And the first issue that needs to be resolved is what spectrum would be utilized for peer-to-peer communications.

“Everyone talks about peer-to-peer mode, like it’s going to come out of thin air,” Olbrich said. “Regardless of the technology that you pick, if you have a network that’s deployed at 700 MHz already, you’re going to need spectrum to run your peer-to-peer network that’s running on separate channels. I think people miss that point often.”

Of course, the 4.9 GHz spectrum band was dedicated to public safety with the idea that it would be used to support on-scene, peer-to-peer communications. However, Olbrich questioned whether this spectrum would work well in tactical environments, because its propagation characteristics would not work well in certain situations,

because the signals would not be strong enough to penetrate inside buildings — a must for firefighters.

Olbrich noted that peer-to-peer communications could run on 700 MHz spectrum via technologies such as code-domain solutions, but there are drawbacks to that approach.

“There are some ways to do that, but that takes a lot of engineering, and it will likely take significant standards work,” he said. “We just need to figure out how we go about that, because once the choice is made and you go down that road, you’re committed.”

Olbrich said the PSCR meets weekly with representatives from the FCC’s Emergency Response Interoperability Center (ERIC) in an effort to promote reliability and interoperability. In addition, Olbrich said he is encouraged by the work being done by the National Public Safety Telecommunications Council (NPSTC) to tackle the requirements issues, but he notes that there is still a lot of work to be done.

Hopefully, this significant work can be done quickly and well, so investments by early public-safety broadband adopters are not stranded in the future.
