

PSAC report: Priority, preemption issues on FirstNet likely limited to secondary users, not public safety

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[FirstNet LTE](#) sites should provide enough bandwidth capacity to serve the needs of public-safety users in almost all response scenarios, according to findings by a Public Safety Advisory Committee (PSAC) task team studying the topic.

Barry Fraser, chairman of the PSAC task team charged with studying quality-of-service and priority/preemption implications for FirstNet, said that the task team reached this conclusion after examining both day-to-day and disaster scenarios, in cooperation with technical experts from FirstNet and the [Public Safety Communications Research](#) (PSCR) program.

“We found very few—if any—scenarios or use cases that we felt would cause severe congestion on the network, based on public-safety usage alone,” Fraser said during the public portion of last week’s PSAC meeting, which was webcast. “That was a good finding, because the real concern you have is when you get network congestion, or congestion at the cell site.

“Looking at the amount of spectrum that we have and the resources that we will have available, I think rarely—if ever—will we get into a situation where we could amass enough public-safety users in one location, using one single cell tower, that would cause significant congestion.”

FirstNet is charged with deploying a nationwide broadband network for first responders using 20 MHz of 700 MHz spectrum, which approaches the spectrum assets that commercial wireless giants like AT&T and Verizon have in the band to serve a much larger user base than is anticipated for FirstNet. However, to make the FirstNet initiative financially viable, capacity on the network not used by public safety would be sold to commercial users, who would access the FirstNet system on a secondary basis.

Given FirstNet’s considerable spectrum assets, the proposed network should be able to be designed to provide needed bandwidth to both public safety and commercial users under normal circumstances. However, during times of emergency, many public-safety users could be

concentrated in an area near an incident, and there may not be enough bandwidth in a specific cell sector—or multiple cell sectors—to serve all needs of both public-safety and commercial users.

In such a situation, public-safety users would have prioritized access, with commercial users on the network being “throttled”—the process of degrading data speeds without losing connectivity—or being preempted, which would result in the user being moved to a roaming network using different spectrum or being disconnected entirely. By taking such actions, more bandwidth would be available to meet the needs of public-safety users near the incident scene.

Not only can LTE—the wireless broadband technology being deployed by FirstNet—accommodate such priority and preemption, it can be configured to execute it automatically, Fraser said.

“There are technical ways—dynamic settings, we call them—that allow the network to adjust itself. If you get up to certain levels where you start to get congestion, the network itself can be configured to adjust the bandwidths—to throttle back [lower] priority users and keep the high-priority users’ bandwidth open and available.

“That was good news, too, because these dynamic settings can run pretty much on their own, without anyone having to manually control the settings from the public-safety side.”

Dynamic settings also can be established to handle scenarios in which public-safety users need more bandwidth than is available within a cell sector, so they must be prioritized, but Fraser said the task team’s findings indicate that prioritization between public-safety entities likely would not be necessary.

“It’s good news for the ability of public safety to be confident that they will be able to use this network without any significant [bandwidth] problems,” Fraser said.

Although leveraging dynamic settings within LTE is the most efficient method to handle prioritization and preemption issues in the vast majority of scenarios, the task team

recommends that some form of override function exist to let public-safety officials address unusual circumstances, Fraser said.

“We do still think it’s important to have a failsafe—sort of a manual way of getting in and adjusting these dynamic configurations, if you get into the very rare situations where the dynamic settings aren’t good enough or aren’t working properly,” he said. “So, we have asked that that ability to manually override the dynamic settings be available to us, in case everything else goes south.

“We feel it’s important to have that ability, just in case. But I’m pretty confident that we’ll rarely—if ever—see public safety need to use that, just based on the work we’ve done so far.”

To reach its conclusions, the task team modeled several incident scenarios and projected public safety’s communications needs for each one. Then, task-team members worked with technical experts at [PSCR](#) and [FirstNet](#) to determine the overall bandwidth need associated with the response for each scenario—projections that Fraser acknowledged are not precise.

“That was a very interesting exercise; we came out of it with a much better understanding,” Fraser said. “It’s still kind of an exercise in trying to guess what might happen, because we’re not using a lot of these applications yet in the field.”

Fraser said he believes that additional study should be done regarding the impact that secondary commercial users will have on the FirstNet network, but [LTE](#) technically offers the capability to reallocate bandwidth to public safety “pretty much instantaneously and immediately,” if needed.

A more significant issue for public safety is ensuring that all responders at an incident are assigned roles and labels properly, so that any prioritization scheme dedicates available bandwidth properly, Fraser said.

“The framework we put together is based on assigning roles and labels and information about each user in the field,” he said. “If you don’t get those roles and the assignments correct in the

beginning, then the priority and quality of service won't work the way you want it to.

"It's going to be very important for local first responders and public-safety agencies to figure out those roles and assignments early on and make sure that gets plugged into the dynamic configuration, so the system works the way it's supposed to—on a daily basis and during major incidents."

FirstNet Chairwoman Sue Swenson expressed appreciation for the work that has been done to address priority and preemption issues, which many observers have feared could become an operational problem.

"I remember having this discussion a couple of years ago, and priority and preemption was just a concept," Swenson said during the PSAC meeting. "It's so interesting now to hear us talking about it now in terms of how to execute on it, so we've actually made a lot of progress in a short period of time."

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