Pilot Highlights Need for Private LTE

A pilot 700 MHz band 14 network in the Colorado mountains offered important information and results for the future nationwide public-safety broadband network.

By Sandra Wendelken

Several themes were highlighted during a public-safety Long Term Evolution (LTE) pilot in the Colorado mountains in February: Public safety needs a private network for broadband, some rural communities might have greater needs for broadband than urban areas, and public-safety users quickly embrace LTE applications and devices.

Colorado state and local public-safety officials, working closely with industry suppliers, deployed a band 14 700 MHz LTE demonstration network during the 2015 International Ski Federation (FIS) Alpine World Ski Championships (FIS AWSC) Feb. 2 – 15 in Vail and Beaver Creek, two mountain ski resorts in the state. With approval from the First Responder Network Authority (FirstNet), the FCC granted a special temporary authorization (STA) to use the band 14 spectrum.

FIS AWSC is an international event that drew about 150,000 spectators. The event included about 800 international athletes, staff and coaches from more than 70 different countries. About 2,200 first responders and volunteers worked during the event. The primary race venue was Beaver Creek Ski Resort, 10 miles west of Vail in an area with lackluster wireless coverage.

"We were lucky to get a text out of the race finish area in the past," says Chief Dwight Henninger, Vail Police Department. "You could go to the top of the stands and maybe make a phone call."

On Feb. 11, public-safety officials and industry representatives gave the media and others interested a tour of the network, including a General Dynamics Mission Systems deployable cell on wheels (COW) located at the base of the Beaver Creek race site. Three hot spots — one in the spectator stands, one in the race command post and one in a temporary building for VIPs — were established using the deployable site.

The network carried video from an FBI 1-megapixel video camera at the race finish. Ashley Thorne, special agent with the FBI and technical lead for the event, came in during the 2013 planning phase to survey the landscape and existing infrastructure and communications. "We found this to be one of the most hostile areas for RF

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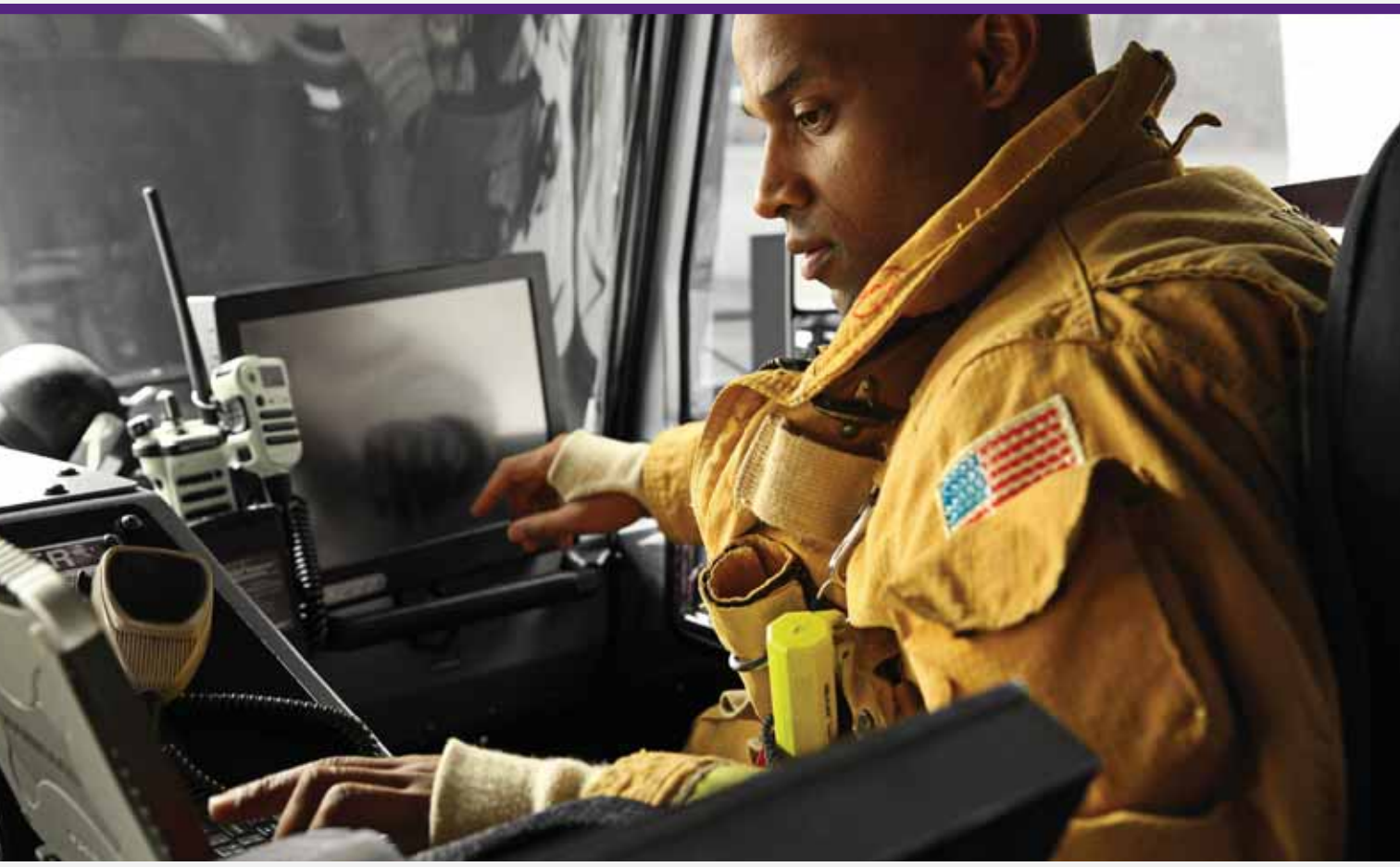

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A deployable cell on wheels (COW) provided coverage for the race venue.

"It was obvious which cameras were on FirstNet and which were on a commercial network. Those on Verizon had the screen blacked out eventually as more people came into the venue and got on their phones."

— Ashley Thorne, FBI

ever because every building is made of stone and because of the mountains between Beaver Creek and Vail," Thorne says.

Thirty-five Sonim Technologies rugged smartphones operated on the network. Each local public-safety agency had its own talk group with the devices, which have push-to-talk (PTT) functionality. The LTE devices were connected to the local LMR network as well. Nearly 100 devices, including consumer devices through the hot spots, operated on the system without capacity issues.

Deputy Kevin Kromer with the Eagle County Sheriff's Department says officials used the devices to manage capacity for the spectators and control the number of people in the stands. "We don't want to tie up the direct mode LMR network with chit chat about managing the stands," he says. "And the commercial networks in Vail are overloaded."

With local and international media and ski fans using bandwidth on the commercial networks, having a private public-safety broadband network with guaranteed capacity was a helpful tool, Kromer says. "We can provide a reliable network regardless of who is taking up bandwidth," he says. "We can tell these guys, 'You will have coverage.' "

Two applications were used on the Sonim devices. ESChat from SLA allowed public safety to perform

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Thirty-five portable devices with PTT and situational awareness applications, along with in-vehicle modems, were used during the event.

secure AES-256 encrypted PTT communications, along with real-time and historical (bread crumb) tracking. The DragonForce situational awareness app from Drakontas also was on the devices.

Jennifer Kirkland, a supervisor with the Vail Public Safety Communications Center, says dispatchers had the two apps on their dispatch consoles, and they could see the devices on a map, easily allowing dispatchers to locate the closest unit to an incident.

"We patched our radios in," Kirkland says. "We used it as a closest unit dispatching function, providing efficiency in dispatching and using resources in the field. It became very quickly relied on, because it was there and easy to teach people about and to use. One night we had 10,000 people at an event, and the commercial networks were loaded, and our network was fine."

Officials also used Mobile Pulse's broadband performance app to determine network speeds. The network averaged 25 Megabits per second (Mbps) downlink and 8 – 10 Mbps uplink in Beaver Creek.

The Beaver Creek race site was networked to the event command post in Vail. The town of Vail previously worked with Crown Castle to deploy a 29-site distributed antenna system (DAS), and four eNodeBs from General Dynamics were integrated into four of the DAS sites. The network uses 6 miles of fiber backhaul, and the remote core powering the network was located in Vail.

The FBI also had cameras in Vail. "It was obvious which cameras were on band 14 and which were on a commercial network," says Thorne. "Those on Verizon had the screen blacked out eventually as more people came into the venue and got on their phones. That was exciting to have our applications on our own band."

"The communications on this device has been guaranteed," says Deputy Chief Greg Daly with the Avon Police Department. He says his tactical operations officers picked up the portable devices without training

(Left to right) Antonio Steptoe, General Dynamics; Jennifer Kirkland, Vail; Ed Mills, FirstNet Colorado; Kevin Kromer, Eagle County; Richard Coleman, General Dynamics; Brian Shepherd, FirstNet Colorado; Jeremy Sandoval, Sonim; and Kim Coleman Madsen, FirstNet Colorado.

and quickly put them to use.

"We realize [band class 14 coverage] will likely be centralized around urban areas but we'd love to have it up here," he says. "We could put modems in a car and have coverage when we go on rural missions and to remote locations. We could set up a node in a vehicle, and I have coverage within a half mile."

In Motion Technology and CalAmp provided in-vehicle modems for the officials during the pilot. Kathrein donated antennas.

Brian Shepherd, broadband program manager, Colorado Office of Information Technology (OIT), says additional Colorado areas are interested in similar capabilities. "This technology is no longer something we can have in the future," says Shepherd. "It's something we need right now. Hopefully we can continue this process to make this network a reality, and that's our goal with this. We want to keep the momentum going."

"We are very excited about the opportunity," Henninger says. "I don't see [public-safety broadband] coming to a rural area anytime soon," he says. "I think we need it more because we don't have the spectrum and commercial network coverage and capacity that urban areas do. I'm appreciative to all the vendors who have jumped in to make this happen."

Industry suppliers donated all the products and software for the pilot. The STA expired Feb. 17, and the network is now off the air, but the infrastructure remains in place.

"Police officers might not be the first adopters for technology especially if it doesn't work as they thought it would," Henninger says. "But I've heard nothing but good things from them on this."

"It was remarkable how quickly the guys on the ground adopted this technology and embraced it and how impactful it could be," Shepherd says. ■

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