Mission Critical Data

Mobile Mesh Networking in Ripon, California

MOTOROLA

Situation

"A lot of people view Ripon as main street USA," says Mayor Chuck Winn. Located on Highway 99, California's main north-south route, it's a small but growing city working to maintain its quality of life in a changing world.

"We have the lowest crime rate in San Joaquin County and I don't think it is by accident," explains Chief Richard Bull. It's because we make a lot of arrests that would have been missed if we didn't have the information going out to the police officers.

The Ripon police were using a cellular data service to give officers some limited access to data in the field – until the carrier discontinued the service. Ripon saw this as an opportunity to do better.

Solution

System: A Mesh Enabled Architecture (MEA) 2.4GHz Mobile Mesh Network. Designed for battlefield communications, MEA uses multi-hopping technology to allow client devices to become the network. Intelligent routing enables connectivity at high vehicular speeds, client ad-hoc networking and built-in position location capabilities.

In Ripon, the MEA mobile mesh network carries wireless broadband data, including real-time, high-resolution, full screen video transmitted from surveillance cameras located throughout the city.

Coverage area: 16 Intelligent Access Points and 36 wireless routers are used to provide infrastructure coverage across the 9 square miles that make up Ripon. In addition, 81 client devices can establish their ad-hoc network connections and seamlessly integrate into the infrastructure. If an incident occurs outside the city, responders at the scene will still be able to communicate with each other.

Users: Engineering department, public works, city administration, police and fire district.

Result

"We are very excited about the mesh network," says Mayor Winn. "We see it as an opportunity to increase our presence without necessarily having to hire more officers. As we get the system in place and as we get more departments on board, we can maximize its effect. That will be a positive thing for the entire city. I have had conversations with developers who feel they would want to re-locate in Ripon because of the sense of security they feel here."

"The mesh network has been very positive for the residents and the economy. It adds a multiplier effect to our police force, increasing our presence throughout the city."

— MAYOR CHUCK WINN, CITY OF RIPON, CALIFORNIA

True Mobility:
"In police work information is everything"

Ripon officers now have information at their fingertips no matter where they are or how fast they're driving." If you put an officer out in a car who cannot gain the proper information, it handicaps the officer and the police department," says Chief Bull. "We wanted something that if they're going 100 miles an hour we're not going to lose them and they're not going to lose us. It's got to stay connected even at high speeds."

"We basically do anything that we would do on our desktops in the office," says Sergeant Ed Ormonde. "Vehicle information, license registrations, stolen vehicle systems, wanted person systems, nationally or locally. We're able to pull up local history with our department, and all the state and county databases."

"Officers are able to plan based on what they're seeing, not second or third hand information. It gives us a margin of safety we've never had before."

— POLICE SERGEANT, STEVE MERCHANT

Stay in touch:
Mesh networks maintain seamless connections while users are moving, even at 250 MPH.

Live video puts more eyes at the scene

"We have a limited number of officers in the field," says Chief Bull. "Obviously we can't be everywhere at once, but the video cameras let us check into different locations. If you have the ability to go to 20 different places, you are 20 times more efficient than you were before."

"The mesh network allows us to watch in-car footage of our officers on traffic stops. I can tap into one of my partners on the other side of town and see if he's going to need assistance," says Sgt. Ormonde. It provides not only officer safety but it allows us to use our time more productively. As I'm driving and keeping an eye on the road I can also glance over and make sure that everything's going smoothly on his traffic stop. It gives you another set of eyes on scene."

Instant Networking: Anywhere/Anytime

Every user device in a mesh network acts as a router/repeater. Every radio, laptop, or PDA – is able to communicate with other devices. "If we take our emergency operation command center outside of town it will form its own wireless mesh network to where all the vehicles out there can communicate together," says Chief Bull.

The devices themselves are the network. "During testing we tried to get one unit out of range to test our backup plan," says Dan Brannon, Director of Information Technology for Ripon Police Department,"and other cars kept driving by and they would pick up. It was almost like you couldn't take it out of range." In effect, every additional user makes the network stronger.

Towerless infrastructure and self-forming capabilities make the network easy to deploy. "One of our concerns was how difficult this system would be to install," Chief Bull says. "We chose to have the majority of the work done by our public works department. What I found is that these devices are very easy to install. Any city should be able to do it."

Go anywhere:
Mesh devices set up their own connections for instant ad-hoc networking.
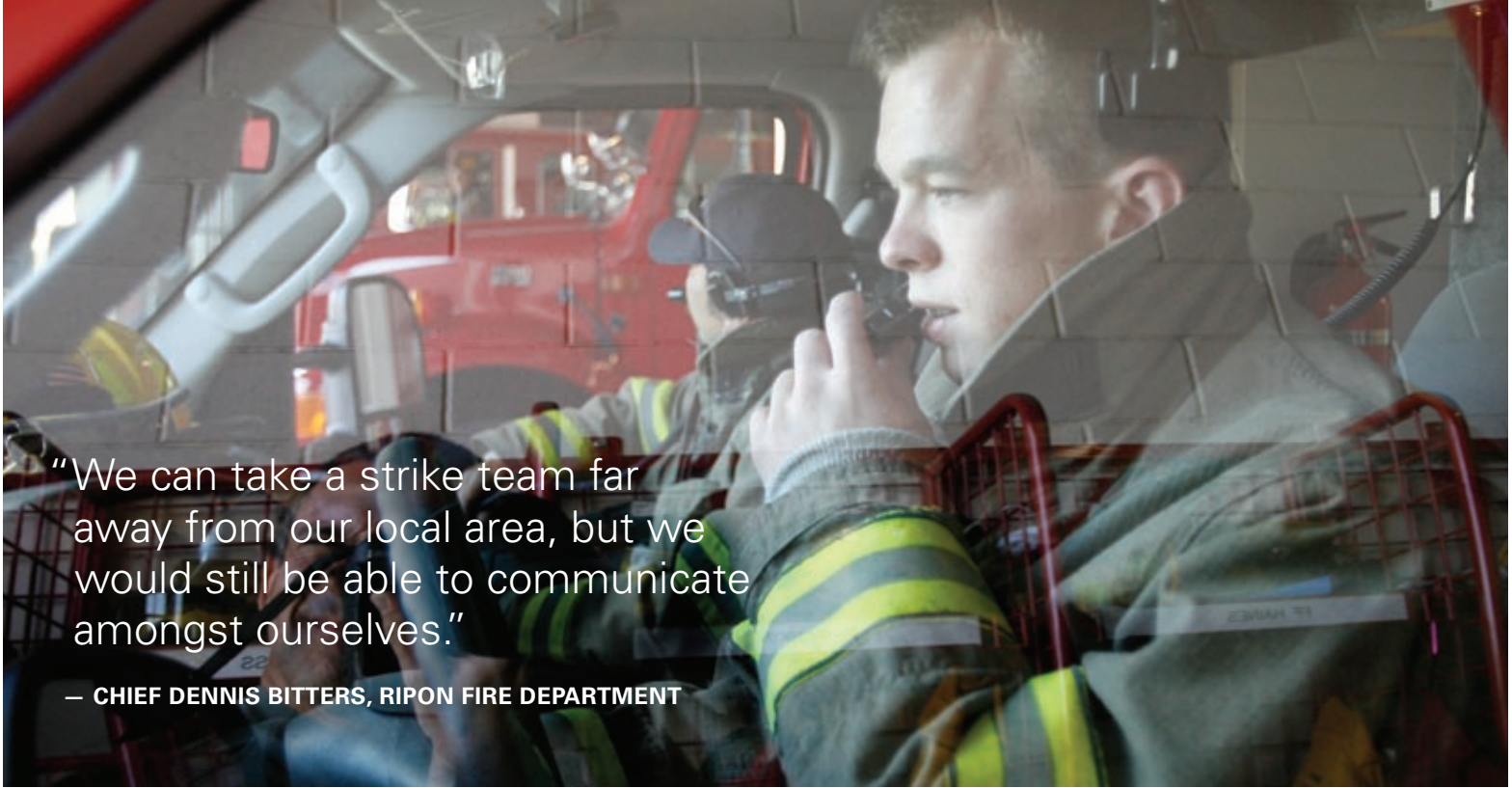
> "We can take a strike team far away from our local area, but we would still be able to communicate amongst ourselves."
>
> — **CHIEF DENNIS BITTERS, RIPON FIRE DEPARTMENT**

Fire District: Dealing in seconds and minutes
Self-forming, Self-healing, Intelligent Network

"We deal in seconds and minutes every day," says Ripon Fire District Chief Dennis Bitters. "So the faster we can move data, and the more reliably we move it, the quicker we can make decisions that are going to make the differences in peoples lives."

Data enhances incident management's ability to simplify and improve on-scene deployment and coordination. Knowing the position of particular hazards, location-based information such as floor plans, hazardous material contents, hydrant locations as well as location of exits, windows, and stairs can aid crews in rapidly exiting a building when the situation warrants it.

The value of instant networking is immediately apparent. "The system is self-propagating, self-healing, so wherever there are multiple units they can work together and always be connected," the chief says. "We can take a strike team go far away from our local area, but we would still be able to communicate amongst ourselves.

Finally, for the fire service, any solution must be mission critical. "The most important thing is the reliability," says Chief Bitters. "Because in the middle of moving map files or big data files or information that's critical to our operation we can't afford to not have that constant link."

"We were kind of being held hostage"

Chief Bull remembers the event that motivated Ripon to start looking at mesh technology. "We were using a cellular service that sent us a letter and said the system is going to be outdated, you are going to need all new equipment. That caused us to think about the fact that we were kind of being held hostage by the cellular phone companies. In looking to the future we knew we wanted video cameras. There were a lot of applications that we wanted to put out in the car and with cellular data there just wasn't the bandwidth to do it."

"We looked at Wi-Fi, but it didn't have true mobility, the ability to hop and actually mesh between access points. And some of the other unique capabilities, like the ability to set up ad-hoc networks, those features are unique to mesh," says Brannon.

Brannon says the mesh network is a big improvement. "With our cellular connection the speed just wasn't there to do any sort of remote administration. Now I can sit in my office and push all the updates I need."

Feeling more secure in the community

With cameras located throughout the city, the ability to monitor businesses when the alarm goes off provides the community with a sense of security. "All of our parks will be monitored 24 hours a day, 7 days a week," says City Administrator, Leon Compton.

It's comforting to know that if we were to press the alarm that the police could immediately begin viewing what was going on," says Danielle Pierce, assistant vice president at the Bank of Stockton. "I would think that any business or bank that's concerned about safety and security would welcome video surveillance to protect their employees."

Do it fast: Broadband speeds allow the network to carry multiple real-time video streams and vast amounts of data.

Robust Data Rates:
"Those precious moments before things go bad"

The mesh network enables faster access to all kinds of data. "In terms of speed, the increase is phenomenal," says Brannon. "Things that used to have lag time are almost instantaneous."

"A few seconds does mean a lot to us," says Sgt. Ormonde. "If we can get information 30 seconds before we arrive on scene it's so much more beneficial."

Broadband is essential for real-time video, which opens new opportunities for serving the citizens of Ripon. "Our vision is to be much more proactive with our community," says Linda Johnston, Communications Community Services Supervisor, City of Ripon Police Department. "We can view a situation while it's occurring – or before. The pre-emptive data gives us those precious moments before something goes bad to set up and be prepared for it."

She adds that, "We can be recording the whole time and have that as evidence for a future court case." Broadband allows for more detailed images. "We can zoom in and see the license plate. We can see the suspect and give a much clearer description."

Position Location:
Officer safety and dispatch efficiency

"The vehicle location system is really an officer safety feature," says Chief Bull. "It's also good for the whole community because it allows us to select the patrol unit that is closest to an incident to make sure he gets there first."

Leon Compton sees benefits throughout city government. "We know the location where all our cars are, police cars, garbage trucks, so if we have to dispatch somebody the dispatcher can look to see which is the closest."

In addition to tracking the location of each device, Ripon's network gives more people access to the city's GIS mapping system. "Before mesh, only the police department had access to GIS mapping in the field," says Linda Johnston. "Now public works will do live monitoring of our water wells and the sewer plant. Our engineering department will be utilizing the mesh system to not only access their Outlook emails but also planning maps, grade levels and sewers."

"In police work we have to trust our life to our equipment. Any cop on the planet knows Motorola means safety, security. When we have Motorola radios strapped to our side we know that radio is going to work."

— **SGT. STEVE MERCHANT, RIPON POLICE DEPARTMENT**

Know where they are:
Geo location is inherent in the mesh network; every user's location is pinpointed.

Public Works and Engineering

Public Works is using the mesh network for a variety of applications, including building maintenance, streets, water, sewage, facility maintenance, and vehicle maintenance. "We're using the mobile computing to monitor and control our wastewater and water production process. We can monitor and make any changes to the system parameters via the vehicle instead of having to go back to our office or going out to the well sites," says Ted Johnston, Public Works Director for the City of Ripon.

"Our building inspectors will have mobile computing in their vehicles also," Johnston adds. "Our plan is to have all the inspection records, plans and specifications scanned into the computer so they'll have it at their fingertips in their vehicles."

"You either have to work smart or long, and we don't have the money to work long because that just means you have to hire more people. So we're trying to equip all of our people with the latest technology so they can be much more efficient and we can do more with less," says Compton.

"You want to make sure the company who is here today is going to be here tomorrow. I don't have to worry about this company going away, I don't have to worry whether they're going to stand behind their product. I feel very confident."

— **CHIEF OF POLICE RICHARD BULL, RIPON POLICE DEPARTMENT**

"It is certainly a good investment which will benefit the residents throughout the city. I think we are getting the best bang for our buck."

— **MAYOR CHUCK WINN**

Over 65 years of understanding the needs of public safety

In today's world you need a partner who understands what mission critical is all about: the lives and well-being of your employees and the citizens they protect. That's why Motorola is a leading provider of interoperable communications systems for public safety and first responders. Our experience in the public sector, along with our skills, people, partnerships and alliances, allow us to build innovative, fully integrated technologies that help organizations like yours share vital information with ease and confidence. We've been doing it for 65 years, and we'll be standing by our customers for years to come.

We can help you introduce new technologies such as mesh networking in a way that does not disrupt your existing operations and allows you to continue leveraging prior investments. We are committed to bringing all of our knowledge and technical expertise together so you can focus on what you do best… to serve and protect the public.

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