



FirstNet

CASE STUDY

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Brazos County, TX Sheriff's Office: A FirstNet Early Adopter

Executive Summary

Over the years, Brazos County, TX Sheriff Chris Kirk had many ideas about how technology could improve his agency's operations. But the lack of a robust technology infrastructure was hampering his ability to implement changes. In 2018, the Brazos County Sheriff's Office (BCSO) became an early adopter of FirstNet, which opened up a range of new possibilities.

The BCSO is an example of how a medium-size public safety agency—with vision, leadership, and cooperation from other agencies—can use FirstNet to support its mission and priorities.

The early adoption process started at the top. Sheriff Kirk made technology a priority for his agency. Because he didn't have the technical know-how himself, he sought out someone with the knowledge and skills to undertake this initiative. He found those talents in-house, in Sergeant Josh Hearen. Together, they enlisted others to help, especially the county's Information Technology department. So when dedicated radio spectrum for public safety became available via FirstNet, the BCSO was ready and jumped at the opportunity.

From the beginning, Sheriff Kirk approached FirstNet as a mobile *data* network, to complement the agency's Land Mobile Radio system for mission-critical *voice* communications. The agency outfitted patrol vehicles with multi-use tablets and keyboards connected to FirstNet.

"We're using FirstNet in a variety of different ways. FirstNet is not one tool; it's many."

Brazos County Sheriff Chris Kirk

These FirstNet-enabled tablets are capable of accessing BCSO's Computer Aided Dispatch (CAD), Records Management System (RMS), and other BCSO data systems. FirstNet also supports live-streaming video, video conferencing, sharing of documents, and patrol vehicle location services.

The result is that FirstNet has improved BCSO's response to major incidents. During heavy flooding, live-streaming of dash-cam video provided incident commanders with situational awareness of road closures, water rescues, and other events.

FirstNet also supports everyday policing in Brazos County. For example, it enables deputies to participate in "virtual roll calls" from their assigned patrol zones, so they do not need to spend time traveling to a central location.

And the BCSO continues to experiment and innovate with FirstNet applications involving drones, license plate readers, and other emerging technologies.

Sheriff Kirk and Sergeant Hearen participated in two FirstNet meetings hosted by the Police Executive Research Forum. This report details their presentations and discussion at these meetings, as well as additional research.



Left: Sheriff Chris Kirk and Sergeant Josh Hearen at PERF's FirstNet Forum in Atlanta, on March 28, 2019.

Above: Sheriff Chris Kirk

About the Brazos County Sheriff's Office

Brazos County is situated in East-Central Texas, about 90 miles from both Houston and Austin. It includes the cities of Bryan and College Station, home of Texas A&M University, a large institution with more than 53,000 undergraduate students. The population of Brazos County is approximately 227,000, living in an area of 585 square miles.¹

The BCSO employs 102 sworn personnel, including 41 who work in the county jail, which has an average daily population of 665 inmates. The remaining sworn personnel are assigned to law enforcement duties. The BCSO has enforcement jurisdiction countywide, although it generally concentrates its activities outside of city limits where municipal officers cannot operate. In 2018, the Sheriff's Office handled 10,499 dispatched calls for service and recorded 49 violent crimes and 305 property crimes.² The agency has a fleet of 50 vehicles, including 27 patrol vehicles.

1. "Brazos County, Texas," *United States Census Bureau*, <https://www.census.gov/quickfacts/brazoscountytexas>

2. Crime in the United States, 2018. Federal Bureau of Investigation, Uniform Crime Report. Table 10: Texas. Available at <https://twitter.com/CommissBratton/status/1192495714196217857?s=20>.

BCSO is led by Sheriff Chris Kirk, a 38-year law enforcement veteran who is in his sixth term as Sheriff.³

How Brazos County Became an Early Adopter of FirstNet

The Brazos County Sheriff's Office experience demonstrates how a medium-size law enforcement agency can make extensive use of FirstNet's capabilities. BCSO experimented with mobile broadband technologies prior to joining FirstNet, and since joining the network, the agency has implemented a range of new applications.

Even before the official roll-out of FirstNet in 2018, the BCSO was able to operate on Band 14, the radio spectrum reserved for public safety, through a partnership with the Harris County, TX Information Technology Department. Band 14 is part of the 700 MHz public safety spectrum that the Federal Communications Commission licensed to

3. Sheriff Kirk plans to retire in December 2020, at the end of his current term. "Brazos County Sheriff Chris Kirk won't seek re-election." *The Eagle*. July 26, 2019. https://www.theeagle.com/news/local/brazos-county-sheriff-chris-kirk-won-t-see-re-election/article_70d84348-af63-11e9-b52a-3fb34d7b54e3.html.

the First Responder Network Authority specifically for use by public safety personnel.⁴ Harris County was one of a handful of jurisdictions that received a waiver to operate on Band 14 prior to the launch of FirstNet.

In 2013, Brazos County entered into an agreement with Harris County to test devices operating on the Harris County Band 14 network. A year later, Harris and Brazos counties agreed to relocate the network core to Brazos County because, unlike Harris County, it is located outside of a hurricane zone.

Using a grant from the U.S. Department of Homeland Security, the Brazos County Sheriff's Office installed 75 Band 14-compatible tablets in its vehicles. By 2015, Brazos County was operational on Band 14.

"Back in 2011, Sergeant Hearen attended a meeting in Harris County where they demonstrated the benefits of a Band 14 wireless network," Sheriff Kirk said. "This was prior to FirstNet. He brought the idea back and started talking to us about the benefits of this type of dedicated network. That's how we started with FirstNet."

After Texas opted into the FirstNet network in 2017, the BCSO began exploring whether it should fully transition to FirstNet. To help determine coverage and performance, the Sheriff's Office conducted a series of network tests during football games at Texas A&M University.

Kyle Field, the university football stadium, has a capacity of nearly 103,000, and another 40,000 people regularly tailgate outside the games. With that many people in a relatively small area using their smartphones and other mobile devices, the Sheriff's Office found that the speed and reliability of its devices operating on commercial carriers

4. "The 700 MHz Band is an important swath of spectrum available for both commercial wireless and public safety communications. The Band consists of 108 megahertz of spectrum running from 698-806 MHz and was freed up as a result of the Digital Television Transition. The location of the 700 MHz Band – just above the remaining TV broadcast channels – gives it excellent propagation characteristics. This allows the 700 MHz signals to penetrate buildings and walls easily and to cover larger geographic areas with less infrastructure (relative to frequencies in higher bands)." *700 MHz Public Safety Spectrum*. FCC. <https://www.fcc.gov/700-mhz-public-safety-narrowband-spectrum>.

were often negatively impacted. BCSO deputies would regularly experience interruptions and delays with calling, texting, and using laptops in and around the stadium.

The agency ran tests on FirstNet-enabled mobile devices, as well as devices on commercial carriers, during football games in the fall of 2017. Compared to the commercial carriers, FirstNet provided improved connectivity and faster upload and download speeds during these high-capacity events. Satisfied with the test results, the BCSO in January 2018 became the first public safety agency in Texas to join FirstNet.

"Having so many people in the stadium can overwhelm a system very quickly," Sheriff Kirk said. "We found that FirstNet is the answer to our connectivity issues during those types of events."

Innovative Uses of FirstNet

In using FirstNet, the Brazos County Sheriff's Office has focused on the *data-sharing capabilities of the network*—the ability to transmit reports, photos and other images, and to stream video. The agency continues to rely on its Land Mobile Radio system for mission-critical voice communications. Sheriff Kirk said this combination of technologies improves daily operations and the agency's response to major events.

Enabling a "Remote Office"

FirstNet has enhanced BCSO's daily operations by allowing deputies to remotely connect to key information systems from their patrol cars.

By putting tablets in patrol cars, docked and with a keyboard, deputies essentially have a remote office. From their tablets, they can access a range of information systems, including the agency's records management system (RMS), which it shares with the city of Bryan; computer-aided dispatch (CAD) data; jail records, which provide demographic and case information, as well as fingerprints and photos; and "most wanted" information from the local Crime Stoppers program.

In addition, deputies can complete and upload a variety of reports directly from their vehicles. In the past, deputies had to drive to the sheriff's office

to fill out many types of forms, costing them time and taking them out of their patrol zones. Using tablets connected to FirstNet, the deputies can reliably upload forms and reports from the field, remaining in the community and using their time more efficiently.

“What this has done for us is allowed our deputies to basically make their patrol unit their office,” Sheriff Kirk said.

Virtual Roll Calls

Another FirstNet-enabled application is the ability to hold “virtual roll calls.”

In the past, deputies had to travel to BCSO headquarters for briefings at the start of their shift, and then drive out to their assigned patrol zones after roll call. That was time-consuming and kept deputies out of the community.

Since the adoption of FirstNet, deputies can drive straight to their patrol areas. They launch the videoconferencing feature on their tablets and participate in roll calls, as well as other meetings and impromptu briefings throughout the day, while remaining in the community. And throughout the day, deputies can also upload live

feeds from their in-vehicle cameras and share documents over the network.

“When we do remote briefings, we can pre-load information on what we call ‘close patrols,’ or home checks, and other documents that we need to share with deputies in the field,” Sergeant Hearen explained. “Then we send the meeting invitation out, and deputies can sign in wherever they are. They just pull over in a safe location.”

“People like to see police cars in their neighborhoods,” Sergeant Hearen noted. “It’s great that the deputies can sit in a neighborhood in their patrol zone and basically go to the shift briefing, without having to physically go to the office.”

Given the large geographic size of Brazos County—nearly 600 square miles—being able to communicate and collaborate remotely is extremely beneficial.

Real-Time Situational Awareness

Video, especially live-streaming, involves far more data than audio files, photos, records inquiries, spreadsheets, and other types of data that can be transmitted over wireless broadband networks. As

Figure 1. Snapshot of a Virtual Roll Call

The screenshot displays a virtual roll call interface. At the top, there are five video thumbnails for participants: Robert Santaniero, John Pollock, Mike Stumpf, Jesse Ostigain, and Brian Bachmeyer. Below these is an 'Attendee List' showing the same names. In the center, a large video window shows a live feed of a patrol car. To the right, a dashboard displays incident reports with columns for Call#, Type, Location, Status, Time, Group, and Service. Below the dashboard is a 'Shift Log' with a list of messages and a 'Tasks for Today' section.

Call#	Type	Location	Status	Time	Group	Service
190440336	F1		Dispatched	00h 00m	SO	P
6			Dispatched	00h 13m	SO	P
190440322	999		Dispatched	00h 18m	SO	P
190440311	NOISE		Dispatched	00h 50m	SO	P
6			Dispatched	00h 08m	SO	P
JAL			Dispatched	01h 07m	SO	P
JAL			Dispatched	01h 18m	SO	P
190440194	POEC		Dispatched	01h 32m	SO	P
COURT			Dispatched	01h 53m	SO	P
JAL			Dispatched	02h 10m	SO	P
JAL			Dispatched	02h 20m	SO	P
6			Dispatched	04h 03m	SO	P
JAL			Dispatched	04h 55m	SO	P

Shift Log (Everyone)

- Brian Bachmeyer: yes, I can see it (02/13/2019 14:20)
- Robert Santaniero: powerpoint works, shared, all can see
- Robert Santaniero: some webcams work, some have issues
- Robert Santaniero: audio works
- Robert Santaniero: whiteboard works, shared photo, draw on it
- Robert Santaniero: this log works
- Robert Santaniero: can't select tasks/check off from the field (02/13/2019 14:34)
- Robert Santaniero: files download works (02/13/2019 14:32)
- Robert Santaniero: MDT not able to share screen? Dropdown says help

Tasks for Today

- Directed Patrol XXXX area

a result, video places extremely large demands on the capacity of those networks. With its dedicated, Band 14 spectrum, FirstNet has allowed BCSO to utilize a variety of video applications. For example, deputies can live-stream footage from their in-car cameras back to central command or to any other unit on the network. This has proven especially important during major incidents, when the public's use of wireless devices can strain the capacity of commercial networks.

The BCSO has found that sharing video can dramatically improve situational awareness, while conserving valuable radio time during critical incidents. BCSO has used video streaming in extreme weather events, armed barricades, and other high-risk calls. During one barricade situation, deputies parked their vehicles at each corner of the containment area and live-streamed video back to the command center, giving a full picture of the scene. That provided incident commanders with real-time intelligence that contributed to a successful resolution of this high-risk event.

During a major flooding incident, deputies parked their vehicles near roadways that were impassable, again providing real-time visual intelligence to the people managing the incident.

“We could see live video of a swift-water rescue taking place,” Sheriff Kirk said. “We saw the water coming up and what needed to happen. We don’t need input from deputies in the field as much as we would have without the video.”

The ability to reliably live-stream video provides commanders with better situational awareness than can be achieved via voice communications. During events where live-streaming was utilized, deputies reported a significant decrease in radio chatter, and channels were kept clear for urgent voice communications.

Location Services

FirstNet enables BCSO to better manage its patrol resources through automated vehicle locator (AVL) tracking. This allows patrol resources to be deployed more effectively.

Shift commanders can see in real time where each patrol car is located, and the condition and status of the vehicle, which also supports officer safety. Deputies can use the location services to identify other patrol vehicles that are on duty and determine how best to support calls and provide backup response when needed. This can be

Figure 2. Snapshot of Live-Streams from a Flooding Event



especially important during critical incidents when officer or public safety is threatened, and deputies may not be able to transmit their locations over the radio.

“At our patrol command center, we can pull up the location of all vehicles, make an operational plan, and push that plan out live to every patrol unit,” Sheriff Kirk said. “It’s broadened our capabilities for planning and has certainly made us more efficient.”

Accessing Video from Public and Private Partners

BCSO is looking to expand its ability to access real-time video by forming partnerships with other public-sector and private-sector organizations.

Currently, the Sheriff's Office has access to more than 800 cameras operating at the Brazos County Courthouse, jail, and other municipal buildings. Using FirstNet, footage from these cameras can be fed to the command center or units on patrol.

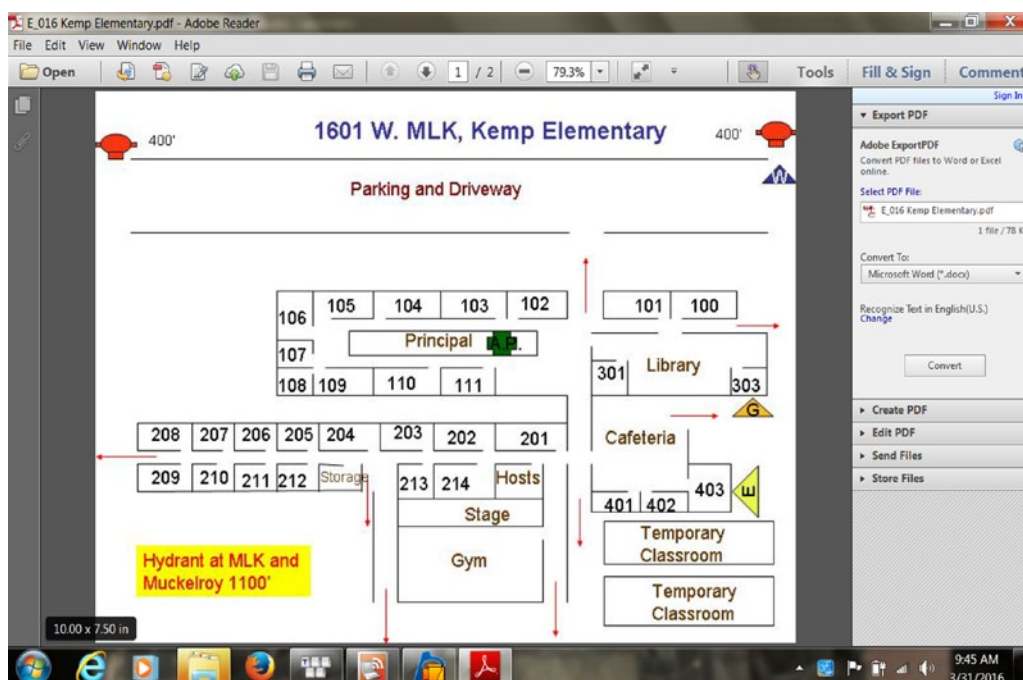
Now, BCSO is working to develop Memorandums of Understanding with the county's independent school districts to allow the Sheriff's Office to access and activate cameras inside the

schools. Streaming footage from inside schools will provide additional situational awareness and support police operations during criminal events such as active shooter situations, fires, or other major incidents that take place in the schools.

Currently, the Sheriff's Office has access to the floor plans of the schools. FirstNet enables the command center to send those plans to responding units during an incident. The goal is to eventually have interactive video streaming, with pan-tilt-zoom cameras and the ability to extract video recorded just prior to an incident. Recognizing privacy concerns, Sheriff Kirk said the planned MOUs will allow the Sheriff's Office to access school camera feeds only for specific purposes and during certain times.

In addition, BCSO is considering expanding its video network to any Internet Protocol (IP)-based camera system, both public- and private-sector. Through MOUs with organizations with IP cameras, BCSO can have real-time intelligence in response to alarm calls, mass gatherings, and other calls where live video could improve the response. Access to Band 14 over FirstNet enables BCSO to consider these types of partnerships.

Figure 3. Snapshot of School Building Floor Plans that Can Be Transmitted Over FirstNet.



Potential Future Applications

As FirstNet continues to grow and evolve, BCSO is looking at new ways to use the network. One of them is to push body-worn camera footage over FirstNet.

All BCSO deputies are currently equipped with Panasonic's Arbitrator Series Body Gen 3 Cameras. Sheriff Kirk said that Panasonic is creating a prototype camera that supports Band 14 direct-to-network transmission. The company is consulting with Brazos County regarding how the cameras would be used, how and where the video would be sent, and who would be allowed to view it. The BCSO will test the prototype unit when it is complete, with the goal of being able to live-stream from the body-worn cameras in certain situations.

BCSO also is beginning to utilize drones on FirstNet and hopes to do more with this technology in the future. BCSO's drones connect wirelessly, and video footage is posted on a secure internal site. BCSO is looking to expand its drone program for search and recovery efforts and tactical operations.

"We're working on using drones to find missing persons and support more types of tactical operations," Sheriff Kirk said. "The drone controller can wirelessly connect to our vehicles via FirstNet. Then, anybody at the command center or out in the field can look at what we're doing with the drone."

The BCSO is also exploring how FirstNet can support intelligence-driven interdiction efforts by combining information from various sources, such as automated license plate readers, in real time. "By analyzing all the data together, you increase your chances of interdicting drugs or human traffickers," Sheriff Kirk said. "That's the future, but in many ways, the future is here."

"You have to have that vision. You have to know that there are almost infinite uses for the bandwidth that comes with FirstNet."

Brazos County Sheriff Chris Kirk

Lessons Learned in Implementing FirstNet

As more public safety agencies join FirstNet, the experiences of early adopters can provide guidance on how to achieve a smooth transition. There were three key elements to the Brazos County Sheriff's Office implementation strategy:

- Strong vision and leadership from the top of the organization.
- Consultation and collaboration with key partners.
- Utilizing the right technology to meet agency needs.

Leadership is critical with any new technology, such as FirstNet, that can disrupt existing agency operations. Sheriff Kirk made a commitment to advance the technological capabilities of the Sheriff's Office, and he worked to ensure that the agency acquired the technology needed to take full advantage of FirstNet.

An important part of leading such a transition is identifying and empowering the right people to assist in the efforts. The combination of Sheriff Kirk's leadership and Sergeant Hearen's technical expertise was critical to the BCSO's implementation of FirstNet. Sergeant Hearen, who oversees Special Services in the Sheriff's Office, has remained the BCSO's point person on FirstNet.

Sheriff Kirk said it also is important to engage the agency's or jurisdiction's Information Technology department early on. The Brazos County IT department worked closely with the Sheriff's Office on researching and testing devices that could effectively operate on FirstNet, and on addressing network security concerns. The IT department understood network operations from a broad perspective and provided guidance on how to integrate FirstNet and the new technologies it enabled into existing systems.

Finally, it is critical for agencies to adopt technology that addresses their priorities and can also optimize the use of FirstNet with equipment and devices that have Band 14 and support the FirstNet SIM.

For the Brazos County Sheriff's Office, the focus has been on moving data—especially

video—over the network; mission-critical voice communications are still handled by the agency's Land Mobile Radio system. The BCSO also put a premium on keeping its personnel in the field, in their assigned patrol zones, as much as possible. For those reasons, the BCSO decided to outfit its fleet with tablets that could be docked in the vehicles and connected to keyboards.

This setup created "remote offices" for deputies, allowing them to access information and produce and upload reports remotely. It also supported innovations such as virtual roll calls and other video-enabled applications.

Conclusion

The Brazos County Sheriff's Office was the first public safety agency in Texas to officially adopt FirstNet. Since then, the BCSO has been a national leader in using FirstNet to advance the agency's mission and priorities.

FirstNet has enabled BCSO personnel to conduct meetings and roll calls via video, while keeping deputies visible in the community. It has improved efficiency by allowing deputies to access a wide range of information and submit reports remotely. FirstNet is also allowing agency supervisors and commanders to access live-

streamed video from the field as incidents unfold, and to better manage patrol operations by having real-time access to deputies' locations.

Future plans include integrating body-worn cameras and drones into the network. And as more public safety agencies locally and nationally adopt FirstNet, BCSO will benefit from even greater interoperability and information-sharing.

For More Information

To learn more about the Brazos County Sheriff's Office implementation and use of FirstNet, contact Sergeant Josh Hearen at (979) 361-4932 or jhearen@brazoscountytexas.gov.

Related PERF Publications

Beyond Signal Strength: Measuring Performance of Public Safety Mobile Broadband Networks (September 2019): <https://www.policeforum.org/assets/FirstNetCaseStudy.pdf>

The Revolution in Emergency Communications (November 2017): <https://www.policeforum.org/assets/EmergencyCommunications.pdf>



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