



WHEN DISASTER STRIKES, HAVE WHAT IT TAKES TO RESPOND

HOW EMERGENCY RESPONSE TEAMS WEATHERED THE WORST
STORM IN SHEBOYGAN'S RECENT HISTORY



WHEN CATASTROPHIC EVENTS OCCUR, emergency responders are put to the test more than ever. With natural disasters putting lives at risk, communities depend on the dedication of these brave men and women to ensure the safety of the public. In times like these, response teams must work together quickly and efficiently, with effective communication and preparation being paramount. During a series of tornadoes in August, 2018, Sheboygan County, WI demonstrated how important proper training, equipment, teamwork, and sheer dedication to the mission was in mitigating the impact of the county's worst storm in years.

On Tuesday, August 28, 2018, a series of severe thunderstorms had moved through central Wisconsin into Sheboygan County, with 19 confirmed tornadoes along the path and wind speeds of up to 125mph. With citizens in panic, the dispatch center was faced with record-high call volumes, and this was one of the first times Sheboygan County had really been put to the test, according to Kristine DeBlaey, Communications Manager at Sheboygan County Sheriff's Office.





THE CHALLENGE

Prior to the event, Sheboygan had undergone a four-year project to upgrade aging communications equipment and dispatch facilities. Previously, Sheboygan was utilizing a six site, 8-channel analog simulcast conventional trunked countywide radio system with two separate emergency dispatch centers - one for the city of Sheboygan, and one for Sheboygan County. At the time, both the radio system and dispatch facilities had shortfalls and inefficiencies due to aging technology, RF Coverage, and budget that would have ultimately been exposed in the case of large-scale emergencies.

LIMITATIONS OF EXISTING RADIO SYSTEM

The countywide radio system posed three critical threats: First, the network was designed with limited redundancy. With the radio network's microwave design and single hub-site, if any tower site were to lose power, it would mean the loss of power to at least one other site. If the hub-site, in particular, was to lose power, the entire radio system would be brought down.

Second, the back-up generators at each tower site would cause delays in communication and overall system integrity if they were to be used. If a site were to lose power, it would take 8 seconds for the backup generator to fully boot-up and restore power to the site. While only a matter of seconds, this short delay would cause a full reset to all of the site equipment, which would in turn create temporary system errors and coverage problems.

Third, the radio system lacked RF coverage along the southern county's lakefront, hampering communications with everyone using the system.

INEFFICIENCIES OF EMERGENCY DISPATCH CENTERS

In addition to the county radio system, Sheboygan saw areas to improve their dispatch facilities and emergency communications operations. With a separate facility for city and county-level dispatch, there was ultimately a lack of uniformity, and collaboration between the centers. This siloed approach often meant delays in response times for 9-1-1 calls outside of jurisdictional lines. All calls from cell phones were taken at the county dispatch. If the caller, however, needed emergency services inside city-lines, they would have to be put on hold while being transferred to the city dispatch.

THE SOLUTION

Recognizing these inefficiencies and potential threats, Sheboygan County decided to initiate a project to fully redesign and replace their countywide radio system, while consolidating city and county dispatch centers to allow for better coordination of workers in the event of emergencies.

A RADIO SYSTEM AS TOUGH AND HARDWORKING AS THE TEAMS THAT USE IT

Sheboygan's solution to a new countywide radio system was a migration to P25 technology. Their choice: a Motorola Solutions ASTRO 25 Simulcast Smartnet Trunking System with 8 channels and 7 sites. The new radio system included several design changes, most notably:

- Adding another RF subsite for greater coverage
- Designating a backup prime site
- Revamping the system's microwave link network
- Redesigning the sites' power usage to utilize a DC power system with backup batteries

The system upgrade and redesign added layers of redundancy and multiple fallbacks so that communication would not be lost in the case of tower damage or total microwave equipment failure. Adding an another RF subsite solved the coverage issue along the Southern County's lakefront, and also allowed for a complete, continuous microwave network, connecting each site tower to the next in a complete 'loop' shaped design. This design allows data and IP traffic to flow continuously in a clockwise direction, where if one site goes down, the traffic has the ability to reverse directions in the loop and reroute to the other sites in order to maintain connection.

Adding an additional prime site as a backup now meant the system's core would be geo-redundant, averting a full network collapse and total loss of communication should the main prime site shut down from weather damage or any equipment failure. Lastly, in the event that sites do, in fact, shut down, the changes to the sites' backup generators and power utilization now ensure that there would be no disruption in communication or detrimental reset to the site equipment when the generators kick in. Each site's primary equipment now uses a DC power system (instead of AC) with batteries at the site to provide immediate temporary backup power, without delay, while the more powerful backup generators boot up.

A CONSOLIDATED DISPATCH WITH A DEDICATED, MORE EFFICIENT TEAM

Sheboygan County and the City of Sheboygan decided to combine their emergency dispatch centers into a single facility, operated by the Sheboygan County Sheriff's Department. The project included adding a new layer of supervision and management, hiring new dispatchers, and implementing new dispatch protocols and training procedures. This hiring and training process was all part of building a stronger team with high morale. Great efforts were taken to foster positive relationships between all personnel, while encouraging open communication, and keeping dispatchers involved in higher-level decision-making processes wherever possible. The project was certainly an excellent example of cooperation between city and county government for the benefit of the residents, resulting in a more dedicated, more efficient dispatch center, that was better managed and better trained.



THE OUTCOME

THE DAY OF THE STORM

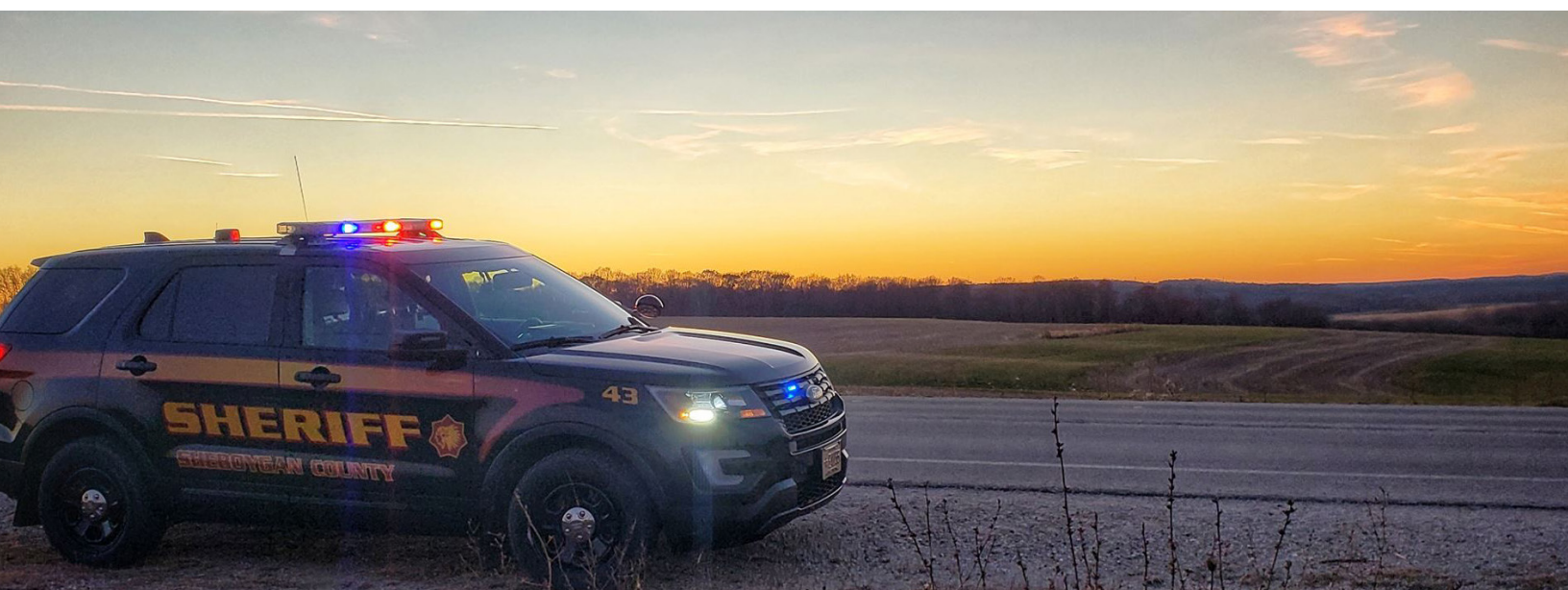
August 28th is a day most Sheboygan residents won't easily forget. It was a day that emergency response teams certainly remember vividly. During the event, 3 tornadoes were confirmed just within Sheboygan County. The storms tore through Wisconsin with great intensity, leaving behind miles of debris, downed trees, and damaged structures- and it all seemed to happen out of nowhere. Within only about an hour of warning dispatch, conditions in Sheboygan had reached severe levels and emergency call volume had ramped up drastically. While the day may have certainly put the county to the test, Sheboygan's emergency management and communications project helped ensure they were equipped with the right tools, the right staff, and the right procedures to withstand the worst and keep citizens safe.

SUCCESS FACTORS

Communication: The Foundational Piece To An Emergency Response

A key component that allowed dispatch and first responders to work effectively during critical moments was instant, reliable communication - a foundational piece to an effective response. "If you can't communicate, you can't initiate the resolution process. None of the operations can happen.", noted Kristine DeBlaey. The project to replace and upgrade the countywide radio system provided not only a countywide communication platform, but a robust, resilient one at that, built to withstand the harshest of conditions. The weather extremes during the storms were powerful enough to cause loss of the radio system's AC commercial power to six of the seven RF sites. However, because of the new radio system's well-planned design and level of resiliency, communication was never lost, not even momentarily. When commercial power went down, batteries provided the site equipment with enough power to stay running while the backup generators started up, restoring power to the rest of the equipment. As a result, there were no system errors, and no loss of radio coverage. Further, despite the harsh weather extremes, none of the RF sites experienced any major physical damage.

As part of the new ASTRO 25 radio system, Sheboygan's primary fault management tool, the Unified Event Manager (UEM), was especially helpful in the team's efforts to monitor and maintain the integrity of the radio network's infrastructure during the storms. The UEM gave system administrators a single interface to view the health of the system and notify technicians of any needed attention, greatly helping staff prioritize any maintenance activity during the event.



Dedicated Dispatch and Staff

The county's success can be largely attributed to having the right response procedures in place, paired with proper decision-making and a dedicated staff that was trained to handle anything thrown their way- a sure result of the combined dispatch project and rigorous hiring, training, and planning that came with it.

No one expected the severity of the storm to be quite what it was, or happen as quickly as it did. Between 5:00pm and 5:15pm, the dispatch center, staffed with just 5 workers, took 103 calls, more than a 2000% increase from typical call volumes. Before increasing the number of staff to 8, each worker was averaging 21 calls in the short 15 minute window - more calls than the entire dispatch center would typically see in a full hour.

Despite the workload, the dispatchers were prepared. Each was cross-trained to handle every type of call, and would rotate positions regularly. The workers displayed a great level of composure and teamwork in the process, with many dispatchers coming in on their day off and working through the night. While system technicians and crews were personally tending to each site during the torrential storm. In the midst of all the commotion, key management decisions were very much paramount to coordinate the dispatchers and first responders in the field, while managing the drastic level of radio traffic in order to keep it from overloading the system's channels.

This level of pride, commitment, and execution extended even beyond the dispatch center and first responders. On a regular basis, the county's technicians play a crucial role in guaranteeing the tools that emergency response teams depend are ready when needed. During the storm, more than ever, this crew showed a great level of personal responsibility and ownership in maintaining perfection and uniformity at each tower site. Despite the harsh and hazardous conditions, technicians traveled from site to site to assess and repair any potential site damage if needed to ensure the system's peak performance.

LESSONS LEARNED

A rapid response starts with early planning. While measures can, and should be taken when anticipating a storm, it is advised to be proactive and plan for the unexpected. As seen with the tornadoes in Sheboygan County, disasters can often come without much warning, reaching unpredicted extremes in no time. Ensure your radio system and fleet is fit to withstand catastrophe and avoid any system failure and loss of communication.

Having the proper procedures in place to prepare emergency response teams for such disasters is also critically important. Kristine DeBlaey advises having a defined, well-practiced communications plan. Prepare personnel for the unexpected, and conduct frequent training sessions to teach best practices and equipment usage during times of high call traffic. Ensuring the right preemption and priority protocols are in place, having additional repeaters separate from the primary system, and training responders when to transmit over the primary county system, and when not to, are three ways to manage radio traffic so that necessary calls can always get through, according to Kristine.

When disaster strikes, be prepared. As seen with Sheboygan County, a dedicated team with the right tools and procedures is critical for successful emergency management. Because communication is a foundational piece to initiating an efficient response, ensure the right equipment is in place and maintained to allow response teams to be their best. With this foundation in place, be sure response teams are well-trained with the right protocols and communications plan. In taking these steps and applying some of Sheboygan County's best practices, you can be better prepared and better connected in the moments that matter.

Sources:

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