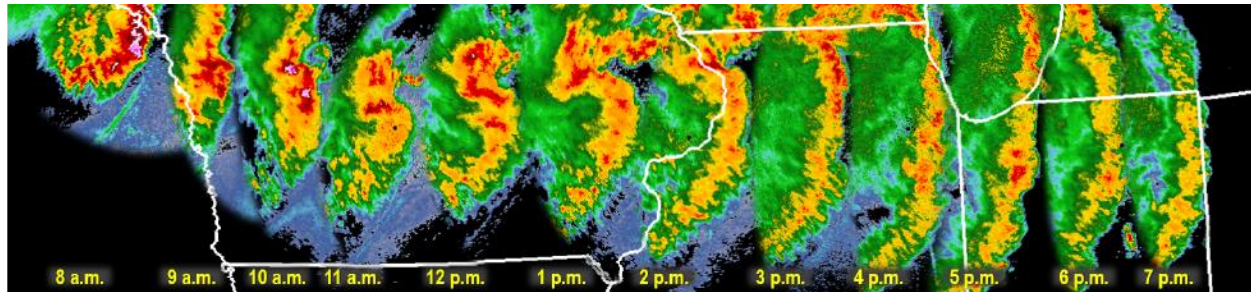


# COMMUNICATIONS DEPENDENCIES CASE STUDY: 2020 MIDWEST DERECHO



## EVENT SUMMARY

A powerful line of severe thunderstorms tracked across eastern Iowa and northwest Illinois on Monday, August 10, 2020. The most extreme winds, estimated at 110-140 mph, destroyed or damaged homes, trees, power poles, and fiber lines. The derecho was the costliest thunderstorm disaster in U.S. history. This case study focuses on public safety communications challenges in Iowa specifically.

## WHAT IS A “DERECHO?”

A *derecho* is a fast-moving band of thunderstorms with destructive winds. The winds can sometimes be stronger than those found in hurricanes and tornadoes, and winds are directed in one direction. A windstorm of this character that is longer than 240 miles with wind gusts of 58 mph or greater may be classified as a *derecho*.

On August 10, 2020, a significant geographic area in the U.S. Midwest (covering most of Iowa and parts of Illinois, Indiana, Nebraska, and Wisconsin) was affected by a powerful storm classified by the National Weather Service (NWS) as a *derecho*.<sup>1</sup> The storm weakened overnight and by August 11, the *derecho*'s path of destruction became the costliest thunderstorm in U.S. history.<sup>2</sup>

Storms initially developed in the early hours of August 10 in southeast South Dakota and northern Nebraska and intensified as they moved east into Iowa and eventually Illinois. Although the Storm Prediction Center (SPC) suggested only a 20 percent chance of severe weather two days prior, the storm significantly intensified swiftly, allowing little time for early warning.<sup>3</sup> At its height, the *derecho* produced winds up to 140 mph near Cedar Rapids, IA, causing extensive damage to homes, barns, apartment buildings, trees, and power poles, as well as notable damage to communications infrastructure such as above-ground fiber lines.<sup>4</sup> As the storm developed, the NWS updated its information to include a warning of Potentially Dangerous Situation (PDS) which allowed emergency managers in several jurisdictions to provide advance warning of severe weather to the public via sirens, although many were still unaware how powerful the storm would become.<sup>5</sup>

In addition, at the time of the storm public safety and emergency response agencies were operating under pandemic conditions, which involved some personnel working from home and/or under mandatory quarantine. In a few circumstances personnel lost home network connectivity and were

<sup>1</sup> National Weather Service, “Midwest Derecho – August 10, 2020, Updated: 10/8/20 12 pm,” last modified October 8, 2020, [https://www.weather.gov/dvn/summary\\_081020](https://www.weather.gov/dvn/summary_081020).

<sup>2</sup> Bob Henson, “Iowa derecho in August was most costly thunderstorm disaster in U.S. history,” *Washington Post* (Washington, D.C.), Oct. 17, 2020, <https://www.washingtonpost.com/weather/2020/10/17/iowa-derecho-damage-cost/>.

<sup>3</sup> Schnack’s Weather Blog, “2020 Derecho Event Summary,” *KWWL Television*, last modified August 17, 2020, [https://www.kwwl.com/weather/derecho/one-year-later-2020-derecho-event-summary/article\\_9c04fe19-997b-54b8-9b19-7d1adab6e730.html](https://www.kwwl.com/weather/derecho/one-year-later-2020-derecho-event-summary/article_9c04fe19-997b-54b8-9b19-7d1adab6e730.html).

<sup>4</sup> National Weather Service, “Midwest Derecho – August 10, 2020, Updated: 10/8/20 12 pm,” last modified October 8, 2020, [https://www.weather.gov/dvn/summary\\_081020](https://www.weather.gov/dvn/summary_081020).

<sup>5</sup> Rebecca Kopelman, “Emergency managers recount challenges, lessons learned during Iowa Derecho,” *KGAN*, last modified February 8, 2021. <https://cbs2iowa.com/news/local/emergency-managers-recount-challenges-lessons-learned-during-iowa-derecho>.

unable to then participate in the collective incident response. Between 12:30 pm on the day of the storm and 5 pm on August 26, 2020, the Cedar Rapids Joint Communications Agency responded to a substantially higher volume of calls than normal. Emergency dispatchers fielded some 14,100 non-emergency calls in total, the Cedar Rapids Fire Department responded to more than 2,000 calls for service, and the Cedar Rapids Police Department fielded more than 4,100 calls.<sup>6</sup> Some 911 calls were routed to different Public Safety Answering Points (PSAPs) in Iowa due to the volume of calls coming in. At one point in the incident, PSAPs had between 30-40 calls pending because they did not have the staff capacity to answer them quickly enough though eventually backlogs were resolved.<sup>7</sup>

The Federal Communications Commission (FCC) reported zero known outages impacting PSAPs in the disaster area.<sup>8</sup> One major factor influencing this outcome in Iowa was the use of the state's robust fiberoptic network, the Iowa Communications Network (ICN). The Iowa Statewide Interoperability Coordinator (SWIC) would also later confirm that the Iowa Statewide Interoperable Communications System (ISICS) platform experienced no outages with only a minimal service disruption as backup power and microwave communication backhaul links were automatically and quickly re-established to state-built assets during the storm.<sup>9</sup>

The Public Safety and Homeland Security Bureau (PSHSB) of the FCC announced the activation of the Disaster Information Reporting System (DIRS) in response to the derecho on August 12.<sup>10</sup> On August 13, the FCC reported 12.4 percent of cell sites in the affected areas were out of service. That included five cell sites that were inoperable because of damage, 90 out due to backhaul transport issues, and 115 cell sites out due to power. On the same day, local cable and wireline companies shared that 58,804 subscribers were without service.<sup>11</sup>

By August 19, the FCC reported that only 1.9 percent of cell sites were still out of service, including 26 cell sites down due to backhaul transport issues, and another 14 down due to lack of power.<sup>12</sup> Utility companies, aided by workers from surrounding states, worked to restore power to thousands of residents within a week after the storm. The Cedar Rapids area alone needed 3,400 above-ground power poles replaced.<sup>13</sup> Chicago Park District in Illinois reported 550 fallen trees from the storm and fielded more than 12,000 emergency tree calls.<sup>14</sup>

Commercial services experienced multiple challenges with service disruptions and outages; however, one carrier reported to the FCC that only 60 cellular network sites across Iowa remained out of service a week after the storm. In all, the storm caused minimal damage to cell towers; however, a common issue impacting commercial services was lack of available generators or battery power to sustain or recover cell sites and other assets that lost primary power during the incident, resulting in service disruptions. State and local government, alongside utility and commercial carrier entities, worked together to clear roads and restore power to downed sites, although public administrators involved noted challenges to coordination efforts in the beginning stages of the response due to lack of a shared or collaborative contact list.

<sup>6</sup> Kat Russell, "'Scary' time inside 911 center after derecho," *The Gazette* (Cedar Rapids, IA), Sep. 7, 2020, <https://www.thegazette.com/crime-courts/scary-time-inside-911-center-after-derecho/>.

<sup>7</sup> Ibid.

<sup>8</sup> Federal Communications Commission, "Communications Status Report for Areas in Iowa Impacted by the Midwest Derecho," August 19, 2020, <https://www.fcc.gov/document/midwest-derecho-communications-status-report-august-19-2020>.

<sup>9</sup> Iowa Statewide Interoperable Communications System Board, "Note from the SWIC," ISICSB Newsletter 1, no. 5 (September 2020): 2, accessed July 7, 2021, [https://isicbsb.iowa.gov/sites/default/files/documents/2020/09/september\\_2020\\_newsletter\\_final.pdf](https://isicbsb.iowa.gov/sites/default/files/documents/2020/09/september_2020_newsletter_final.pdf).

<sup>10</sup> Federal Communications Commission, "Public Safety and Homeland Security Bureau Announces the Activation of the Disaster Information Reporting System in Response to the Impact of the Midwest Derecho in Iowa," August 12, 2020, <https://docs.fcc.gov/public/attachments/DA-20-877A1.pdf>.

<sup>11</sup> Federal Communications Commission, "Communications Status Report for Areas in Iowa Impacted by the Midwest Derecho," August 13, 2020, <https://docs.fcc.gov/public/attachments/DOC-366163A1.pdf>.

<sup>12</sup> Federal Communications Commission, "Communications Status Report for Areas in Iowa Impacted by the Midwest Derecho," August 19, 2020, <https://www.fcc.gov/document/midwest-derecho-communications-status-report-august-19-2020>.

<sup>13</sup> Erin Jordan, "What should we do better in the next storm?," *The Gazette* (Cedar Rapids, IA), Aug. 31, 2020, <https://www.thegazette.com/subject/news/what-should-we-do-better-in-the-next-storm-20200831>.

<sup>14</sup> Kelli Smith, "Chicago still cleaning up debris, fallen trees from August derecho storm: 'The aftermath was felt across the city,'" *Chicago Tribune* (Chicago, IL), Sep. 11, 2020, <https://www.chicagotribune.com/news/breaking/ct-derecho-storm-chicago-trees-damage-20200911-ido5i2ne2rhu3dt5xt4i67h3xe-story.html>.

## LESSONS LEARNED AND KEY TAKEAWAYS

### Power Resiliency

Many of the communications challenges were associated with power resiliency, particularly interruptions to power supply to commercial assets.

Key Takeaways	Communications Dependencies Best Practice
Commercial carriers did not have adequate backup power for some cell sites, relying solely on battery power in some instances	Work with commercial partners before and during an incident to identify and understand power resiliency weaknesses
Commercial partners had not previously provided the appropriate level of information concerning power needs, points of contact, and power asset locations to public safety communications officials which made prioritizing response (e.g., clearing roads to access generators requiring refueling) difficult	As part of planning, training, and exercises, establish action plans to include contacting commercial partners directly to locate commercial power disruptions and enable prioritization of aid to ensure power resiliency
The Iowa Department of Public Safety had previously enabled remote monitoring of fuel tanks for generators at government-operated sites, which allowed for supervision of site power supply throughout the incident	Identify, understand, and monitor power dependencies and redundancies

### Points of Contact

Restoration of services was delayed due to insufficient contact lists.

Key Takeaways	Communications Dependencies Best Practice
When attempting to restore services, public safety communications personnel realized they did not have an adequate contact list when it came to working with commercial entities to identify downed locations and restore power or services	Establish relationships with commercial partners in advance so that major assets affected can be located and accessed quickly

### System Redundancy and Resiliency

Below-ground backhaul allowed for PSAPs to maintain continuity of services without interruption throughout the event. Additionally, state and local land mobile radio (LMR) capabilities withstood challenges to continuity of operations, largely due to thorough system planning.

Key Takeaways	Communications Dependencies Best Practice
One major success point was that none of the PSAPs in Iowa experienced downtime during the event, and public safety communications officials cited the presence of the statewide below-ground fiber network used for public safety and other public services as the main contributing factor	Establish network redundancy by utilizing multiple resilient networks
The statewide LMR system, ISICS, was able to automatically and quickly rely on redundant power and backup communication paths due to thorough secondary system resiliency and redundancy planning	Establish multiple backup systems for power (e.g., generators and battery power) and communication (e.g., buried fiber lines or other wireline connections, microwave backhaul)