BEFORE THE NEBRASKA PUBLIC SERVICE COMMISSION

In the Matter of the Nebraska Public Service Commission, on its own motion, conducting an investigation into the 911 service outage occurring in areas of Nebraska served by Windstream and its affiliates.	)	Application No. 911-076/ PI-249
	)	ORDER ISSUING FINDINGS AND CLOSING INVESTIGATION
	)	Entered: July 9, 2024

BY THE COMMISSION:

The Nebraska Public Service Commission ("Commission") opened this docket on September 12, 2023, in order to investigate a multi-hour disruption of 911 service in southeast Nebraska that resulted from a system-wide telecommunications outage experienced by Windstream customers during Saturday, September 2, 2023 and Sunday, September 3, 2023. It appeared that a fire at a Windstream facility in Lincoln, combined with the failure of a backup generator and the depletion of backup batteries serving the same facility, led to a shutdown of Windstream service, including 911 service, to Windstream customers in southeast Nebraska for a period of several hours. During the outage, calls to 911 public safety answering points ("PSAPs") in the affected area were delivered either sporadically or not at all.

The Commission expanded its inquiry on December 5, 2023, after an additional disruption to Windstream services occurred on November 28, 2023. Initial reports regarding this disruption indicated that it primarily impacted delivery of 911 calls and non-emergency telephone services to PSAPs in the Southeast Region were impacted for less than one hour.

The Commission again expanded the above-captioned inquiry on January 23, 2024, after a service disruption occurring on January 13, 2024 affected delivery of both 911 calls and standard telephone services to the Southeast Region of PSAPs for a period of one to two hours. In addition, there were reports that traditional telephone service to certain state agencies, including State Patrol Dispatch facilities, was affected late in the evening of Saturday, January 13 through the afternoon of Sunday, January 14.

In conducting this investigation, the Commission conducted data requests, held a public hearing, and sought expert analysis from an outside expert.

E V I D E N C E

A hearing in this matter was held on December 28, 2023. Matthew Effken appeared on behalf of the 911 Department of the Commission ("Department"). Mary Vaggalis appeared on behalf of Windstream. Exhibits numbered 1 through 14 were offered and accepted at hearing. Exhibit 15 was entered as a late-filed exhibit.

David Sankey, Director of the Commission's 911 Department[1], testified on behalf of the Commission. Mr. Sankey stated that he received a call from James Almond, the Nebraska Public Service Commission's 911 Field Coordinator, on September 2, 2023 at approximately 6:40 p.m. informing him that Windstream Telecommunications Company ("Windstream") had notified the Cass County 911 Center that Windstream would begin shutting down their services and this would impact 911.[2]

Mr. Sankey went on to state that he received a call from Troy Harris from the Nebraska Emergency Management Agency ("NEMA") informing him that 911 services in the southeast region were disrupted.[3] Initial reports indicated, according to Mr. Sankey, that Windstream experienced a power failure in their data center in downtown Lincoln which impacted PSAPs in the southeast region that were connected to the Windstream selective router and Windstream network.[4] Mr. Sankey then stated he reached out to PSC commissioners and other officials notifying them of the circumstances and making arrangements to assist the southeast region in notifying the public of the 911 service interruptions.[5]

Mr. Sankey stated that at 8:30 p.m. he contacted Windstream Representative David Avery who told Mr. Sankey that water had entered the electrical room at the Windstream facilitate at 1440 "M" Street in Lincoln causing a fire and loss of commercial power to the facility during the evening of September 1, 2023.[6] Mr. Avery further informed Mr. Sankey that the facility was operating on a backup generator until mid-day on September 2nd when the generator failed and the facility began operating on back up batteries.[7] Mr.

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[1] Transcript at 8. In addition, Mr. Sankey provided pre-filed testimony which was received as Exhibit 15.
[2] Transcript at 9.
[3] *Id.*
[4] *Id.* at 10.
[5] *Id.*
[6] *Id.* at 10-11.
[7] *Id.* at 11.

Sankey further reported that Mr. Avery stated they were working on getting a replacement generator.[8]

Mr. Almond, according to Mr. Sankey, reported that approximately 17 out of the 20 PSAPs in the southeast region experienced disruption to either their 911 lines or their administrative lines, or both.[9] Mr. Avery reported to Mr. Sankey that commercial power had been restored at approximately 2:30 a.m. on September 3, 2023, and that services were beginning to power back up across the Windstream network.[10] Mr. Avery reported to Mr. Sankey that at approximately 10:00 a.m. on September 3rd, 911 services were mostly restored across the southeast region.[11]

Mr. Sankey also stated that on November 28, 2023 at approximately 2:00 p.m., he was contacted by Mr. Avery who reported that PSAPs in the southeast region were experiencing service disruptions.[12] Mr. Sankey reported that a few minutes later he also received a call from Troy Harris with NEMA who reported that he began receiving reports of disruptions to PSAPs across the southeast region and this disruption lasted about one hour.[13]

Mr. Sankey further confirmed that Commission rules require a formal report of 911 service disruptions be submitted within 14 days of a disruption, but Windstream did not submit a report for this service disruption until December 26, 2023. Mr. Sankey stated that the report summarized that the reason for the outage was a manufacturer bug that prevented switches from recovering automatically and that alarms were inexplicably suppressed.[14]

Mr. Sankey explained that the southeast region is a region of 16 PSAPs in the southeast part of the state with an additional 4 PSAPs that are served by Windstream in the East Central Region of the state, more specifically from the Missouri River to the Kansas border and from the Platte River west to the Hastings area.[15] Mr. Sankey stated that, during the evening, PSAPs reported that not only were wireline calls impacted, but their ability to receive wireless calls was impacted as well.[16]

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[8] *Id.*
[9] *Id.* at 11-12.
[10] *Id.* at 12.
[11] *Id.*
[12] *Id.* at 12-13.
[13] *Id.* at 13.
[14] *Id.*
[15] *Id.* at 14.
[16] *Id.* at 15.

Mr. Sankey stated that during the outages in September and the one outage in November, the ESInet and Core Services remained fully functional, and it was the ability to get calls to interconnection points that was impacted.[17]

Brad Hedrick, Regional President of Operations in Nebraska, Arkansas, Iowa, Minnesota, and Missouri[18], was called to provide additional information by Ms. Vaggalis.[19] Mr. Hedrick stated that Windstream is a privately held communications and software company headquartered in Little Rock, Arkansas that provides advanced network communications and technology solutions for consumers, small businesses, enterprise organizations and carrier partners across the U.S.[20] Mr. Hedrick went on to state that Windstream provides voice, broadband, entertainment, and security solutions that enhance the communication capabilities of consumers and businesses in Nebraska and has provided telecommunication services in Nebraska for almost 120 years.[21] Mr. Hedrick is based in Lincoln and has worked for Windstream since 1979.[22] Mr. Hedrick reported he is responsible for the installation, repair, and maintenance of services to residential and businesses within the region and government affairs and local community relationships.[23]

Mr. Hedrick then provided an overview of the September outage.[24] Mr. Hedrick explained that during the week of August 28, 2023, the City of Lincoln's landscape sprinkler system along Centennial Mall was cut by a third-party contractor completing work at Windstream's central office located at 1440 M Street which caused water to leak into Windstream's transformer room located in the basement of that building.[25]

Mr. Hedrick said the water leakage then caused a fire and a small explosion which resulted in a short to the ground wire on the main AC busbar which led to the loss of commercial power.[26]

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[17] *Id.* at 21.
[18] *Id.* at 28.
[19] *Id.* at 22.
[20] *Id.* at 28.
[21] *Id.*
[22] *Id.* at 28.
[23] *Id.* at 29.
[24] *Id.* at 30.
[25] *Id.*
[26] *Id.*

Mr. Hedrick explained that the system was designed for the site to automatically switch to the onsite megawatt generator without service interruption which occurred at approximately 11:13 p.m. Central Time on Friday, September 1, 2023.[27] The generator ran for approximately 13 hours until around noon on September 2, 2023, when the generator had a mechanical failure and stopped functioning.[28] The site automatically switched to its onsite battery backup power at that time and ran on batteries for another six hours while contractors continued efforts to restore commercial power.[29] The batteries then reached critically low levels, according to Mr. Hedrick, and the Windstream team decided to shut down one of three switches in an attempt to preserve power for the other two switches.[30] Mr. Hedrick explained that by preserving power, Windstream was able to avoid an equipment crash.[31]

Mr. Hedrick informed the Commission that the decision to power down one switch occurred around 6:00 p.m. on Saturday, September 2nd. Additionally, Windstream proactively notified PSAPs, the Commission, and the Governor's office of this decision.[32] At that time, Windstream believed the 911 impacts would be minimal because all 911 calls should have rolled to the second 911 selective router.[33] The switch shutdown began around 6:00 p.m. and fully shut down around 10:00 p.m. that same day.[34] Mr. Hedrick reported that Commercial power was restored at 1:40 a.m. on Sunday, September 3rd, and the powered-down switch was restarted approximately one hour later which initiated restoration of communication services.[35] Mr. Hedrick reported that the interruption in service lasted 4 hours and 27 minutes.[36]

Mr. Hedrick stated that during this period, customers who are served by the powered-down switch were unable to make or receive local, long-distance, and 911 calls.[37] However, Mr. Hedrick stated that only two PSAPs were unable to receive wireline and wireless 911 calls because they had already converted to the ESInet network which was only connected to one of the Windstream selective

[27] *Id.*
[28] *Id.* at 30-31.
[29] *Id.* at 31.
[30] *Id.* at 31-32.
[31] *Id.* at 32.
[32] *Id.*
[33] *Id.*
[34] *Id.*
[35] *Id.*
[36] *Id.* at 32-33.
[37] *Id.* at 33.

routers. All other PSAPs had trunks into both Windstream selective routers, and their calls rolled over as designed.[38]

Mr. Hedrick further explained that the generator failure was due to a loose thermocouple wire that caused the control system to register an elevated temperature, triggering a self-shutoff.[39]

Mr. Hedrick explained that Windstream conducted a thorough review of this incident to make any necessary network, policy, and procedural changes.[40] Mr. Hedrick stated that they identified three issues.[41] The first was to work with Windstream's facilities management vendor to establish a contract with NMC Cat in Lincoln to ensure there is a backup generator readily available should a generator be required in the future.[42]

The second change Mr. Hedrick stated was that Windstream replaced the automatic transfer switch that controls whether commercial power or the generator is the primary AC source.[43] He further explained the automatic transfer switch provides that either a stationary generator, a portable generator, or commercial power may function as the primary AC source.[44]

The third change Mr. Hedrick identified was that the ESInet provider now has trunking into both of the selective routers providing redundancy for all PSAPs.[45]

Mr. Hedrick went on to discuss the November 28, 2023 outage.[46] He explained that on Tuesday, November 28th around 1:00 p.m. Central Time, "Windstream's IP core network experienced a brief network instability event which created something akin to a ripple effect across points in Windstream's backhaul network."[47] Mr. Hedrick went on to state that this event caused two switches in the Lincoln central office to become isolated and required a restart.[48] He further explained that while the backhaul network automatically recovered, the two switches in Lincoln did not, resulting in all traffic, including 911 calls, to fail.[49]

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[38] *Id.*
[39] *Id.*
[40] *Id.*
[41] *Id.* at 34.
[42] *Id.*
[43] *Id.*
[44] *Id.*
[45] *Id.*
[46] *Id.*
[47] *Id.* at 34-35.
[48] *Id.* at 35.
[49] *Id.*

Mr. Hedrick stated that Windstream started to receive customer reports, including at least three PSAPs, which prompted Windstream to investigate because no network alarms were triggered.[50] Mr. Hedrick said that during their troubleshooting, the metaswitch SS7 links were restarted which resolved the issue resulting in an outage in the Windstream Southeast Nebraska network which lasted one hour and 10 minutes.[51] According to Mr. Hedrick, Windstream determined "that the failure was the result of a manufacturer bug that prevented the metaswitch from recovering automatically."[52] He further stated that the alarms they rely upon to notify Windstream of a service interruption, were suppressed; Therefore, Windstream did not receive notification of the interruption.[53]

Mr. Hedrick stated that due to the network alarm suppression, the information that Windstream relies on for meeting their reporting requirements were not immediately available, and therefore, Windstream was not fully aware of the extent of the outage until the problem was resolved.[54] He also asserted that it took several weeks to determine the root cause and the full impact of the outage, causing an "isolated delay" in Windstream's outage reporting.[55] Mr. Hedrick asserted that the alarm suppression contributed to Windstream's failure to meet the 14-day notification requirement.[56]

Mr. Hedrick also confirmed that Windstream completed a review of the events of the November outage and identified actions Windstream were taking.[57] The first change was that all impacted devices were restored to critical alarm status which will ensure timely outage reporting in the future. [58]

The second change Mr. Hedrick identified was that the IP backhaul network feeding the Lincoln switches needed a design update because the design at the time of the outage included a single point of failure.[59] Mr. Hedrick stated that Windstream has

[50] *Id.*
[51] *Id.*
[52] *Id.*
[53] *Id.* at 35-36.
[54] *Id.* at 36.
[55] *Id.*
[56] *Id.* at 125.
[57] *Id.*
[58] *Id.* at 36-37.
[59] *Id.* at 37.

undertaken a network redesign to provide a diverse network that is expected to be completed early April 2024.[60]

In addition, Mr. Hedrick stated that Windstream is investigating operations to replace the existing equipment to address the manufacturer bug.[61]

Mr. Hedrick explained in response to a question regarding the meaning of "network instability incident" that,

> "due to a transport layer link that the core IP network was riding on that caused a momentary blip in the network. And when it was transferring – most of the transport networks have redundancy built into them so that if one side is impacted, it automatically switches to the other. That can cause a brief blip in the core IP services that are riding on that. And during that blip, it impacted the—what we call SID tran links. They're – they carry the SS7 network traffic... those links were impacted by this blip and did not automatically self-restore. And that's we had to go in and manually reboot those links so traffic would begin to be routed"[62]

Mr. Hedrick stated that Nebraska's switching network is comprised of six host switches, all located in Lincoln.[63] The network contains four significant rights connecting the northeast, northwest, southwest and southeast areas of Nebraska and each interconnects the main switch points and carries voice and data.[64]

Mr. Hedrick stated that Windstream has been converting their entire network to an IP based network over the past four years, and the southeast region of Nebraska has been migrated to IP.[65] Windstream has identified that they had a single point of failure in that region, and that is what is being redesigned.[66] Mr. Hedrick stated that the redesign involves 12 devices and covers 1600 network routes that all must be reviewed and determined what changes need to be made and those changes need to be verified and audited to ensure any changes will not create any new issues.[67]

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[60] *Id.*
[61] *Id.*
[62] *Id.* at 39-40.
[63] *Id.* at 41.
[64] *Id.* at 43.
[65] *Id.* at 44.
[66] *Id.*
[67] Id.

Mr. Hedrick explained that the term "backhaul" is another term for transport and is a physical connection. The network in the southeast region is all IP with most connections being either 100 or 400 gig connections. Windstream is upgrading the network so that all connections will be 400 gig.[68]

Mr. Hedrick explained that Windstream's IP switch is a metaswitch, which is a voice-over IP switch and one of the six switches in Nebraska.[69] Mr. Hedrick stated that Windstream has customers directly off that metaswitch that use voice-over-IP services, and this is how the links are integrated from other switches, the SS7 links are integrated to get into the IP network.[70]

Mr. Hedrick further stated that there are two switches that house the 911 selective routers which are very large pieces of equipment.[71] The switches are a combination of electrical equipment that allow connections to be made so a call can be routed from one point to another.[72] Mr. Hedrick stated that the switch that was involved in the September outage impacted approximately 13,000 telephone lines.[73]

During the outage, Windstream recognized that Gage and Otoe counties, which had already transitionedtransitioned to the IP network, were only connected into one selective router at that time. The switch that was powered down was the switch to which they were connected. Windstream has since worked with a provider to ensure that Gage and Otoe counties are now connected to both selective routers.[74]

Mr. Hedrick, in response to a question, further identified what the AC busbar is.[75] He stated that it's a large, thick, heavy piece of copper that extends across rooms and is how electricity flows from one piece of equipment to another.[76] Mr. Hedrick stated at the time of the hearing, that Windstream was using power cable instead of the busbar.[77] Mr. Hedrick asserted that the busbar is

[68] *Id.* at 45.
[69] *Id.* at 46.
[70] *Id.*
[71] *Id.*
[72] *Id.* at 47.
[73] *Id.*
[74] *Id.* at 49.
[75] *Id.* at 53.
[76] *Id.* at 53-54.
[77] *Id.* at 54.

manufactured by Siemens in Germany and their lead time for manufacture and replacement is one year, but they are expediting this replacement.[78]

Mr. Hedrick further described what happened with the failure to the megawatt generator.[79] He stated that while the generator should have lasted for days, the thermocouple wire into the control system was loose, causing the generator to think it was overheating even though it was not. So, the generator automatically shut itself off.[80] The generator had run about 13 hours before it shut down.[81] Mr. Hedrick confirmed that the last routine maintenance was performed on the generator of issue in 2018, but that routine maintenance would not necessarily have identified this issue.[82] Mr. Hedrick stated that the generator has ran less than 700 hours out of a lifetime of 10,000 hours according to the manufacturer.[83] He also stated that Windstream will put in a different automatic transfer switch so that there will be three connections--commercial power, a stationary generator, and a quick connect system that a portable generator can be plugged into for power.[84]

Mr. Hedrick confirmed that they did receive the generator from Des Moines which was then hardwired into the existing automatic transfer switch, after taking the stationary generator out, and was then operational and providing power.[85]

Mr. Hedrick then discussed the battery back ups which should last 8 hours and, in this case, lasted longer once they powered down one of the switches.[86] Mr. Hedrick stated that because the outage occurred on a Saturday, and the switch that would be powered down primarily served Windstream's Centrex services--state, government, and University subscribers for which operations are closed on Saturdays--Windstream reasoned the shut-down would be safe.[87] This particular switch is a DSM-100. The outage was limited to that switch and all other landline phones could make calls, including 911 calls, except those on the Centrex switch.[88] The

[78] *Id.* at 54-55.
[79] *Id.* at 61-63.
[80] *Id.* at 62.
[81] *Id.* at 63.
[82] *Id.* at 64.
[83] *Id.* at 65.
[84] *Id.*
[85] *Id.* at 67.
[86] *Id.* at 68.
[87] *Id.*
[88] *Id.* at 74.

exception to that were the Gage and Otoe County PSAPs previously mentioned.[89]

Mr. Hedrick also discussed the process of shutting down the switch which involves powering down different modules--480 modules in total--gradually until the entire switch is powered down.[90] Mr. Hedrick stated that, prior to this incident, the switch had never been powered down, and it took time to power it down.

Mr. Hedrick also stated that even though the switch was powered down gradually, some cards would still be impacted and require additional troubleshooting.[91] He explained that each card is a large piece of equipment that slides into a shelf on the switch itself.[92]

Mr. Hedrick also confirmed that all services were restored and running normal by 11:40 a.m.[93] However, the power outage was four hours and 27 minutes in duration and not all services were restored after that period.[94]

Mr. Hedrick confirmed that the impact of the outage included 72 enterprise customers, considered large businesses; 13,177 retail subscriber lines, which includes residences and small businesses; and 51 wholesale accounts, which includes wireless carriers who buy services from Windstream.[95] Mr. Hedrick further confirmed that this outage was a larger telecommunications outage rather than just a 911 outage and that there was no impact for the 52,000 customers on the other host switches.[96]

Mr. Hedrick stated that Windstream used their internal confidential network mapping to determine whether a PSAP was impacted by the outage.[97] If their map showed that a PSAP was not served by the powered down switch, it was presumed they were not impacted.[98] Mr. Hedrick explained that administrative lines within PSAPs do not utilize the selective routers and are routed with all other wireline calls.[99] Mr. Hedrick further explained that

[89] *Id.*
[90] *Id.* at 76-78.
[91] *Id.* at 82.
[92] *Id.*
[93] *Id.* at 83.
[94] *Id.* at 83-84.
[95] *Id.* at 84-85.
[96] *Id.* at 85-86.
[97] *Id.* at 93.
[98] *Id.*
[99] *Id.* at 94.

selective routers have direct trunks ("circuits") that bypass the local switch and that is how 911 calls are routed to a PSAP.[100] Wireless calls would have gone through Selective Router 2 which had direct trunking to the PSAP that bypasses the local switch.[101]

Mr. Hedrick also confirmed that throughout Windstream's written responses specific to the impact the outage had on PSAPs, they listed their contacts with PSAPs occurring on September 1st, but clarified that date should be September 2, 2023.[102]

Following Mr. Hedrick's testimony, and all exhibits were received, no further evidence was adduced, and the hearing was closed.

OPINION AND FINDINGS

The evidence indicates that Windstream had insufficient engineering and administrative procedures along with failing to conduct ongoing reviews to maintain adequate and reliable access to 911 services. This is indicated by Windstream's failure to timely address inadequate redundancies, failure to establish sufficient back up power, lack of testing of backup power equipment, and alarm system. While the efforts of Windstream to evaluate and correct the issues that caused the outages discussed during the hearing is appreciated by the Commission, the Commission finds there is sufficient information to further consider whether violations of 291 Neb. Admin. Code §§ 5-002.02D, 5-002.02H, 5-002.03A have occurred and therefore opening a complaint in this matter may be warranted.

O R D E R

IT IS THEREFORE ORDERED by the Nebraska Public Service Commission that this investigation shall be closed.

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[100] *Id.* at 105.
[101] *Id.*
[102] *Id.* at 102.

ENTERED AND MADE EFFECTIVE at Lincoln, Nebraska, this 9th day of July, 2024.

NEBRASKA PUBLIC SERVICE COMMISSION

COMMISSIONERS CONCURRING:

Chair

ATTEST:

Executive Director