

**Before the  
FEDERAL COMMUNICATIONS COMMISSION  
Washington, D.C. 20554**

In the Matter of	)	
	)	
Improving 9-1-1 Reliability	)	PS Docket No. 13-75
	)	
Reliability and Continuity of Communications	)	
Networks, Including Broadband Technologies	)	PS Docket No. 11-60

**COMMENTS OF FRONTIER COMMUNICATIONS CORPORATION**

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## SUMMARY

The scale and scope of the derecho provided significant challenges that affected 9-1-1 communications immediately following the storm, particularly in West Virginia, where the effects of the derecho were unprecedented. To that end, Frontier committed after the derecho to undertake several efforts to augment its network; Frontier provides a status update on each commitment through these comments. Frontier is committed to using the lessons learned from the derecho to strengthen the reliability and resiliency of its entire network, with a particular focus on ensuring the viability of emergency communications.

The Commission's *Notice of Proposed Rulemaking* asks whether reporting requirements, certifications, or reliability requirements combined with compliance reviews and inspections, would best meet the Commission's need to implement the *Derecho Report's* recommendations. Frontier believes that its actions post-derecho to strengthen its network for 9-1-1 resiliency suggest that the Commission may not need to take any formal regulatory action at this time.

If, however, the Commission feels that it must proceed with affirmatively ensuring that carriers are complying with network reliability and resiliency standards, Frontier submits that certifying compliance with best practices would promote the most efficient use of scarce resources. Frontier also uses these comments to provide specifics about its auditing and diversity procedures as well as its backup power plans. These procedures demonstrate that the Commission must conduct a cost-benefit analysis of any future requirements beyond the current best practices because any such requirements will also have substantial associated costs.

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**I. INTRODUCTION**

Frontier Communications Corporation (“Frontier”) hereby submits the following response to the Federal Communications Commission’s (“Commission” or “FCC”) *Notice of Proposed Rulemaking* seeking comment on approaches to ensure the reliability and resiliency of communications infrastructure in order to protect the availability of the Nation’s 9-1-1 system, particularly during times of major disaster.<sup>1</sup> The *NPRM* seeks comment on implementing the recommendations found in the Commission’s *Derecho Report*,<sup>2</sup> which was issued on the heels of the June 2012, derecho storm. The scale and scope of the derecho provided significant

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<sup>1</sup> *In re: Improving 9-1-1 Reliability*, PS Dkt. Nos. 13-75; *Reliability and Continuity of Communications Networks, Including Broadband Technologies, Notice of Proposed Rulemaking*, FCC 13-33 (rel. Mar. 20, 2013) (“*NPRM*”).

<sup>2</sup> FCC PUB. SAFETY & HOMELAND SEC. BUREAU, *IMPACT OF THE JUNE 2012 DERECHO ON COMMUNICATIONS NETWORKS AND SERVICES: REPORT AND RECOMMENDATIONS* (rel. Jan. 10, 2013) available at: <http://www.fcc.gov/document/derecho-report-and-recommendations> (“*Derecho Report*”).

challenges that affected 9-1-1 communications immediately following the storm, particularly in West Virginia, where the effects of the derecho were unprecedented.<sup>3</sup>

As the largest communications service provider in the state of West Virginia, the derecho revealed areas of improvement for Frontier in network resiliency. As Frontier commented in response to the Commission's *Public Notice* immediately following the derecho, "Frontier is committed to using the lessons learned from the resulting power and network outages in West Virginia to strengthen the reliability and resiliency of its complete network, with a particular focus on ensuring the viability of emergency communications."<sup>4</sup> Frontier's experience from the derecho paid off nearly immediately as the parts of its network affected by Superstorm Sandy performed extremely well in a severe stress situation.

Frontier takes its obligations to protect the public safety very seriously. Frontier believes its experience with network resiliency following the derecho has been instructive and offers these comments to encourage the Commission not to adopt overly rigid requirements but instead to continue working closely with service providers to ensure that network resiliency best practices are implemented.

## **II. FRONTIER IS FOLLOWING THROUGH ON THE COMMITMENTS THAT IT MADE AFTER THE DERECHO TO ENSURE NETWORK RESILIENCY**

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<sup>3</sup> See Comments of Frontier Communications Corp., PS Dkt. No. 11-60, at 2-3 (filed Aug. 20, 2012) ("West Virginia Governor Earl Ray Tomblin explained that '[t]he storms were unlike any weather event we'd ever faced, and they affected nearly every family and business in West Virginia. People across the Mountain State had damage to structures and lost food, wages and medicine.' The storm caused "unprecedented power outages and damage," with the effects lasting for weeks. Indeed 688,000 West Virginia customers were without power immediately following the storm and one week later nearly 200,000 customers still lacked a reliable source of electricity.") ("Frontier PN Comments").

<sup>4</sup> *Id.* at 7.

Following the derecho Frontier committed to study further certain aspects of its network infrastructure to ensure that it is sufficiently resilient to support life-saving 9-1-1 communications during times of major disasters. The *NPRM* questions what specific remedial actions that service providers affected by the derecho have made since the storm.<sup>5</sup> Frontier is pleased to provide the Commission with the following update on the significant steps that Frontier has taken to bolster network resiliency for crucial 9-1-1 facilities. In its Frontier PN Comments, Frontier identified the following actions it would take to ensure future resiliency; the status of complying each of those commitments is indicated below the commitment.<sup>6</sup>

- Enhancing preventative maintenance plans to include proactively testing its backup modems monthly.
  - Frontier has added monthly testing of backup modems to its performance maintenance plans.
- Performing quarterly checks via dial-up modems on host offices to ensure network reliability.
  - Quarterly tests are in place as part of the overall preventative maintenance plan.
- Reviewing Frontier’s network to determine where additional redundancy would be feasible.
  - Frontier has completed a study of its West Virginia network to determine where additional redundancy is feasible. Providing further redundancy is a resource-intensive exercise and Frontier is continuing to explore how it can include redundancy designs in its capital plans as it moves forward in West Virginia and across its footprint.
- Adding additional remote access to Points of Presence (“POPs”) to ensure increased visibility into the network.
  - Frontier has updated its corporate network diversity, providing protection to the management network that the Network Operations Center (“NOC”) uses to access equipment in the central offices (“COs”). This process is ongoing.

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<sup>5</sup> *NPRM* at ¶ 19.

<sup>6</sup> *Id.* at 6-7.

In April, for example, Frontier had its Clarksburg, WV, circuits configured and available to provide fail-over diversity if it lost upstream Multiprotocol Label Switching (“MPLS”) path from Charleston, WV, to the MPLS core.

- Prioritizing the 9-1-1 center sites and facilities for generator back-up.
  - A team of employees, consisting of representatives from Frontier’s E911, NOC, and local operations divisions, completed a Priority Site List for the state of West Virginia. In this process, locations are flagged as “critical priority locations for public safety” within the internal NOC monitoring systems and are also shared with the local operations teams. As Frontier’s largest state of operations, Frontier has used the lessons learned from its West Virginia process as a “test bed” for development and improvement for the Priority Site Lists across its entire footprint.
- Revising and augmenting Frontier’s generator plan.
  - Frontier has reviewed and updated its generator plan as part of its overall performance maintenance plan and also has policies for generator usage in emergency situations. For Base Unit Central Offices Frontier is in compliance with CSRIC best practice 8-7-5281 and has a single stationary generator with a single fuel source.
- Establishing alternate dial-up access to key switches and exploring other backup options.
  - The modem pool for alarm reporting is in production for West Virginia. In the event of a local area network (“LAN”) failure, alarms will appear in Frontier’s network operations management system via the modem pool. Alarms received through the modem pool will be enhanced with a note in the summary field indicating that the alarm has come in via dial-up. This notation will allow the team to identify that the LAN connection is not the avenue that is being used to report the alarms. This added feature provides a redundant path for the monitoring of alarms.

Frontier realizes that no communications services are more critical than those to 9-1-1 centers to save a life. Accordingly, as the status updates provided above demonstrate, Frontier has proven itself a committed partner in working with the Commission to augment network resiliency procedures.

**III. CURRENT USE OF BEST PRACTICES ARE NOW PROVING SUFFICIENT FOR RESILIENCY BUT IF THE COMMISSION MUST TAKE ACTION TO ENSURE IMPLEMENTATION IT SHOULD DO SO BY REQUIRING COMPANY CERTIFICATIONS**

The Commission seeks comment on the best method for ensuring that communications providers are complying with the best practices and requirements necessary to ensure network reliability. The Commission asks whether reporting requirements, certifications, or reliability requirements combined with compliance reviews and inspections, would best meet the Commission's need to implement the *Derecho Report's* recommendations.<sup>7</sup> Frontier believes that its actions post-derecho to strengthen its network for 9-1-1 resiliency suggests that the Commission may not need to take any formal regulatory action at this time. Instead, because carriers like Frontier have embraced the lessons learned from the derecho and the changes have shown successful in Superstorm Sandy, Frontier believes that the only step that the Commission need take at this time is to jumpstart a dialogue of post-derecho lessons-learned and best practices that can be applied by carriers based upon their individual network designs. The Commission has a long history of encouraging best practices<sup>8</sup> and carriers will continue to provide the Commission substantial information detailing their network performance via the Commission's DIRS and NORS systems.<sup>9</sup> Frontier has a vested interest for its customers in taking all steps practicable to protect the resiliency of the 9-1-1 systems operating on its network.

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<sup>7</sup> *NPRM* at ¶¶ 24-31.

<sup>8</sup> *See, e.g.*, Comments of Verizon, PS Dkt. No. 11-60, 14 (filed Aug. 17, 2013) (“The lessons of the Derecho call for that same balanced and iterative approach to promoting network reliability – the process of reporting and “learn[ing] from each other’s operational experiences” that has successfully “created an environment ... that has fostered reliability in telephone networks even as the number of competitive, interconnected networks has increased throughout the United States.”) (citing New Part 4 of the Commission’s Rules Concerning Disruptions to Communications, *Report and Order and Further Notice of Proposed Rulemaking*, 19 FCC Rcd. 16830, ¶ 15 (2004)).

<sup>9</sup> The Network Outage Reporting System (“NORS”) is “NORS is the web-based filing system through which communications providers covered by the Part 4 reporting rules submit reports to the FCC.” *See* FCC, Network Outage Reporting System, *available at* <http://transition.fcc.gov/pshs/services/cip/nors/nors.html>.

If, however, the Commission feels that it must proceed with affirmatively ensuring that carriers are complying with network reliability and resiliency standards, Frontier submits that the certification process of compliance with best practices would promote the most efficient use of scarce resources. Under the certification standard, the Commission would “require providers to certify periodically that their 9-1-1 network service and facilities comply with voluntary industry best practices, reliability requirements specified by the Commission or other standards.”<sup>10</sup> Frontier agrees that the certification process would “help ensure that senior management is aware of significant vulnerabilities in the 9-1-1 network and accountable for its decisions regarding design, maintenance, and disaster preparedness.”<sup>11</sup> Having senior management certify that the appropriate best practices have been applied would provide further impetus to make sure that the carrier is implementing best practices and that such implementation will not “give way in the daily press of business”<sup>12</sup> because senior management has the ability to shape the plans to ensure that implementing the best practices is *part of* the “daily press of business.” This is the case in Frontier, where senior engineering management has been directly involved in charting Frontier’s course forward for additional network resiliency for the 9-1-1 systems.

While secondary to the Commission’s current process of encouraging the use of best practices, the certification system is preferable over the other proposed implementation options because it is the most efficient use of resources. As these comments will explain, taking steps to ensure network resiliency and reliability in times of major disaster is a costly undertaking requiring a significant amount of resources. Accordingly, Frontier believes that the resources are

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<sup>10</sup> *NPRM* at ¶ 28.

<sup>11</sup> *Id.*

<sup>12</sup> *Id.* at ¶ 14.

best directed at improving reliability and resiliency in the network—not completing paperwork. Frontier’s history as a heavily-regulated ILEC provides it ample background to state that complying with reporting requirements generally carries significant cost and labor burdens. Engineering staff must divert their attention from ensuring the proper function of the network to complete forms that result in reams of data. That must then be distilled by additional compliance personnel into a reportable format. The Commission’s stated goal in this proceeding is to “ensure the reliability and resiliency of the communications infrastructure necessary to ensure continued availability of the Nation’s 9-1-1 system, particularly during times of major disaster.”<sup>13</sup> Frontier believes that it can best do so by allowing companies to devote 100% of their resiliency capital to the network itself, not a burdensome reporting process.

**IV. THE COMMISSION MUST PERFORM A COST-BENEFIT ANALYSIS TO DETERMINE IF THE COST OF COMPLIANCE IS FEASIBLE; RESILIENCY MANDATES WITHOUT SUPPORT WILL LIKELY PROVE UNVIABLE ECONOMICALLY**

Ensuring public safety is a priority for Frontier, as it should be for every communications provider, but the Commission cannot simply mandate its way to increased network resiliency without taking into account the real-world costs associated with complying with new standards. Below Frontier details its current practices with respect to routine circuit auditing and backup power. Frontier believes its sound engineering practices provide resiliency and reliability for its critical communications systems, particularly after implementing further procedures after the derecho. Additional requirements on top of Frontier’s current practices may be economically infeasible at a time when capital budgets are already stretched and the Commission has other competing goals, such as rural broadband deployment.

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<sup>13</sup> *Id.* at ¶ 1.

### **A. Frontier's Program for Routine Circuit Auditing Demonstrates the Need for a Cost-Benefit Analysis**

One of the *Derecho Report's* recommendations is for the Commission to require regularly scheduled auditing of 9-1-1 circuits; accordingly the Commission seeks comment on how carriers are currently conducting routine 9-1-1 circuit auditing.<sup>14</sup> It is crucial that the Commission has an accurate picture of the significant time and costs that are associated with auditing 9-1-1 circuits and Frontier hereby provides information to the Commission for its analysis based upon Frontier's experience.

Frontier has a team performing diversity reviews on network elements within central offices and outside plant fibers. This team performs diversity reviews of E9-1-1 circuits, and when it identifies diversity violations it notifies regional engineering; in turn the regional engineering team works to create diversity solutions. When performing the diversity reviews for network elements the team verifies that there are no common switch ports, channel banks, Digital Cross Connect Systems (DCS), Fiber System Shelves/SONET elements, M13 multiplexers, or relay racks. When performing diversity reviews for outside plant, the team verifies that there are no common intermediate offices and also that there is 25' of separation once the plant is beyond 500' from the central office wall. The results are documented in PowerPoint drawings and filed in an Access database.

With respect to timing, Frontier estimates that diversity reviews take approximately:

- 24 hours per End Office
- 8 hours per public safety answering point (PSAP)
- 6 hours per ALI/ANI links
- 18,660 hours to review all of the above elements for Frontier's network

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<sup>14</sup> See *id* at ¶ 34.

CSRIC Best Practice 8-7-0532 addresses circuit auditing and advises that “Network Operators should periodically audit the physical and logical diversity called for by network design and take appropriate measures as needed.” Frontier notes that “periodically” is an imprecise term and should the Commission feel the need to adopt this best practice as a formal rule (which again Frontier believes is unnecessary given its current efforts in this direction) the Commission should note that in the case of Frontier, it would take nine full time employees to complete this audit on an annual basis assuming the employees had no other responsibilities other than to audit circuits.<sup>15</sup> The costs of dedicating nine full time employees exclusively to this task are so large as to outweigh the benefits to network resiliency; however using a reduced number of auditors that review the circuits over a longer time period makes more sense, both from an economic and practical perspective because circuits need not be audited annually. This example also demonstrates the benefits that the best practice provides through its flexible use of the term “periodically,” which allows carriers to adjust their staffing as appropriate to ensure that audits are completed but not in a manner which is unnecessary or economically impracticable.

Frontier recommends an audit period of three years. One argument that has been used in favor of more frequent audits is that, as the Commission notes, there are frequent circuit rearrangements that may alter the physical diversity.<sup>16</sup> Frontier is currently working to mitigate this problem by using the electronic design record system to properly flag critical circuits. Once all critical circuits are flagged and identified within the database, regional engineers that are planning changes within the network would review the system records and identify critical

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<sup>15</sup> This figure was calculated assuming a full time employee works 2,080 hours per year (52 weeks/year x 40 hours/week). 18,660 hours divided by 2080 equates to nine (8.97) employees worth of work on an annual basis.

<sup>16</sup> *NPRM* at ¶ 34 (“What steps are taken to ensure that physical diversity is sustained despite the circuit rearrangements that frequently take place in communications networks?”).

circuits that reside on facilities and/or equipment they are proposing to change. The regional engineers would communicate this information to the circuit design department and would contact the diversity team to perform diversity reviews. The diversity team would then identify any diversity violations and work with the regional engineering teams and circuit design teams to provide input and possible resolutions.

While diversity is the goal for critical circuits, the Commission must bear in mind that single points of failure are sometimes unavoidable in the current network designs. One such instance is when you have common intermediate offices and the only way to create diversity is by deploying new fiber, potentially at a cost of millions of dollars. One example of this Frontier has encountered is in West Virginia, where Frontier has determined that providing network element and outside plant diversity to one particular PSAP would require a 25 mile fiber build—a multi-million dollar project. Frontier serves over 800 PSAPs nationwide and could not afford to replicate costs such as these across its footprint.

The *NPRM* notes that “[t]he *Derecho Report* concluded that the benefits of implementing this recommendation will likely outweigh any additional costs, given the large numbers of customers that can be served successfully in emergencies by circuits that are diverse and the harms that could result from avoidable failures.”<sup>17</sup> Frontier fully appreciates the importance of its public safety obligations but it cannot ignore the economic realities that it simply cannot afford to bring diversity to every circuit at this time. Frontier is continually adding new fiber routes to its network organically but cannot afford to lay fiber in every case where there is a lack of diversity. If the Commission truly wants to provide diversity to every critical circuit it will need to make

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<sup>17</sup> *Id.* at ¶ 35.

significant resources available to carriers to do so; otherwise such projects are not part of a sustainable business model.

**B. Frontier’s Backup Power Processes Proved Reliable When Applied and No Further Regulations Are Necessary**

Backup power became an issue for Frontier in the aftermath of the derecho in no small part because the commercial power was unavailable over a vast area for literally weeks in some parts of West Virginia. Frontier will not recount its specific backup power challenges here<sup>18</sup> but with few exceptions its issues were generally not related to failures of generators or batteries. Accordingly, Frontier’s backup power plans performed reasonably well and Frontier feels that no further requirements are necessary at this time to ensure compliance of its now fully-tested system. Frontier provides details about its backup power policies below in response to the *NPRM*’s questions on the subject.<sup>19</sup>

Frontier has a performance maintenance plan that it follows for backup power, whereby it follows the backup power test procedures and records the results. The plan incorporates very specific and detailed AC generator, battery and DC power system standards, including testing the backup generators under an actual office load. Stationary generators are to be tested monthly with an annual “blackout” test also incorporated. Currently Frontier sets an internal standard of having three to four hours of backup power available at a site with a stationary generator and up to eight hours available for a site that requires a portable generator. These standards may vary depending upon individual state requirements.<sup>20</sup> Frontier’s policy for ensuring “critical

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<sup>18</sup> See Frontier PN Comments at 4-5.

<sup>19</sup> *NPRM* at ¶¶ 44-58.

<sup>20</sup> Fourteen of Frontier’s 27 states of operation have some sort of regulation or requirement with respect to backup power. Compare 170 IAC 7-1.2-18 (requiring switching offices or their equivalent in Indiana to have three hours of backup power available where a generator is present,

communications” at its facilities that serve critical communications (which, to Frontier means those that serve PSAP locations and those that contain critical 9-1-1 circuits and ALI links) is to have access available to an external generator if one is not already present and enough backup battery power to ensure a generator can be delivered there if a generator is not permanently installed.

During the *derecho* one of Frontier’s pre-placed generators at a Central Office failed and Frontier brought in a generator from out-of-state to replace it within a few hours (all of the other generators in the state were already in use). While this situation is far from ideal, it is not because Frontier lacked the proper equipment or procedures—in this case the generator simply failed as machines do from time-to-time—but Frontier was in a position to replace it as soon as possible. Frontier has already spent considerable expense to develop its backup power plan and additional mandates for backup power may also prove to be cost prohibitive without further support. For example the *Derecho Report* notes that “[s]ome Frontier remote terminals were not equipped with backup generators, and the vulnerability of portable generators placed at other sites led to additional difficulties supplying power to these facilities.”<sup>21</sup> As described above, Frontier plans call for adding portable generators to remote terminal sites and equips sufficient backup power to run the remote terminals until a generator can be added. If the Commission were to increase its backup power requirements to require generators at every remote terminal there is no way that Frontier could afford the expense.

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five hours of power available where there is no generator on site) *with* 16 NYCRR § 603.5 (directing New York carriers to “[b]e guided by accepted industry guidelines and best practices, such as the findings and recommendations of the FCC's Network Reliability Councils, relating to fiber optic, signaling, switching, digital cross- connect and power systems, 911. . . .”).

<sup>21</sup> *Derecho Report* at 16.

The *Derecho Report* makes clear that backup power issues were a major problem when judged across all carriers that were affected by the derecho. But it is certainly not true that the problems were uniform; for example Frontier does not use the “tandem” generator set that failed for Verizon.<sup>22</sup> The varied issues with backup power mean that companies should be evaluating their own networks and performance plans but heavy-handed one-size-fits-all regulation is not an appropriate solution given the costs involved with backup power equipment and procedures.

## V. CONCLUSION

Frontier is a willing partner for the Commission and strives to maintain the utmost network resiliency and reliability that is economically feasible. Since the derecho, Frontier has applied its own lessons learned to enhance its network resiliency and continues to evaluate all opportunities to do so; however there are costs associated with all enhancements and a finite amount of resources. Frontier encourages the Commission to fully consider any additional costs that its potential regulation could impose and their effect on total resources available for increasing network resiliency and reliability for critical circuits.

Respectfully submitted,

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<sup>22</sup> *Id.*