

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

In the Matter of

Improving 9-1-1 Reliability

Reliability and Continuity of Communications
Networks, Including Broadband Technologies

PS Docket No. 13-75

PS Docket No. 11-60

COMMENTS OF FAIRFAX COUNTY, VIRGINIA

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May 1, 2013

TABLE OF CONTENTS

| | | |
|------|---|----|
| I. | NEED FOR COMMISSION ACTION | 1 |
| II. | ROUTINE 9-1-1 CIRCUIT AUDITING..... | 3 |
| III. | ADEQUATE CENTRAL OFFICE BACKUP POWER | 5 |
| IV. | ROBUST NETWORK MONITORING CAPABILITIES | 7 |
| V. | IMPROVED PSAP NOTIFICATION WHEN OUTAGES AFFECT 9-1-1 SERVICE | 8 |
| VI. | CONCLUSION..... | 11 |

SUMMARY

In its January 2013 report titled *Impact of the June 2012 Derecho on Communications Networks and Services; Report and Recommendations (Derecho Report)*, the Public Safety and Homeland Security Bureau (the PS&HSB or Bureau) recommended that the Commission take actions to ensure (1) improved 9-1-1 circuit auditing, (2) adequate central office backup power, (3) diversity of monitor and control links, and (4) improved Public Safety Answering Point (PSAP) notification when outages potentially affect 9-1-1 service. The Commission's Notice of Proposed Rulemaking (NPRM) proposes four possible approaches to implementing each recommendation: (1) reporting, (2) certification, (3) reliability requirements, and (4) compliance reviews and inspections. The NPRM also proposes amendments to 47 C.F.R. § 4.9, which requires service providers to notify PSAPs, among others, in the event of certain outages that potentially affect 9-1-1 facilities.

The derecho-related 9-1-1 outages prove that relying solely on 9-1-1 service providers' voluntarily compliance with industry best practices is not sufficient. Therefore, Fairfax County supports the imposition of more specific requirements for circuit diversity and diversity auditing, central office backup power, and network monitoring. Fairfax County would look to entities such as the Communications Security, Reliability, and Interoperability Council (CSRIC), which includes not only industry but also public safety groups like the National Emergency Number Association (NENA) and the Association of Public-Safety Communications Officials (APCO), or the Alliance for Telecommunications Industry Solutions (ATIS) Network Reliability Steering Committee (NRSC) to develop additional, or stronger, best practices upon which the Commission can base such requirements, although we suggest some minimum standards. The County also supports requirements that service providers report and certify. The Commission

may wish to utilize site inspections or compliance reviews on a limited basis as an additional tool to independently validate and verify compliance with requirements or best practices regarding 9-1-1 circuit auditing, central office backup power, and route diversity. Site inspections and compliance reviews, used in a judicious and limited manner, should be used as a monitoring process if the expense is cost justified and beneficial to the public's interests.

Finally, Fairfax County supports the Commission's proposed amendments to the rule requiring service providers to notify PSAPs of outages, but we advocate additional amendments to clarify the rule and ensure that PSAPs are notified without delay.

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The County of Fairfax, Virginia, submits these comments in response to the Notice of Proposed Rulemaking to ensure the reliability and resiliency of the communications infrastructure necessary for continued availability of the Nation's 9-1-1 system, particularly during times of major disaster. The NPRM proposed four possible approaches to implement the PS&HSB's *Derecho Report* recommendations as well as amendments to 47 C.F.R. § 4.9, which requires service providers to notify PSAPs, among others, in the event of certain outages.

I. NEED FOR COMMISSION ACTION.

The 9-1-1 outage Fairfax County experienced after the June 2012 derecho was the longest and most severe 9-1-1 outage since Fairfax County implemented Enhanced 9-1-1 in 1988. For a seven-hour period beginning at 7:36 a.m. on Saturday, June 30, 2012, Fairfax County's 1.1 million residents had no access to 9-1-1. On the afternoon of June 30, sporadic, *incomplete* service was restored. Three days passed before 9-1-1 service was fully restored at 11:30 a.m. on Tuesday, July 3, 2012.

The one thing that the Bureau's *Derecho Report* made irrefutably clear is that relying solely on 9-1-1 service providers' voluntarily compliance with industry best practices is not good enough. It is vitally important that the Commission supplement the current voluntary approach with mandates that will improve the reliability of 9-1-1 services. The Bureau found in the *Derecho Report* that "[t]he proper implementation of CSRIC best practices could have prevented many of the derecho's most serious effects on communications networks, including 9-1-1 service outages."¹ Those CSRIC best practices were developed "on the basis of widespread industry participation" which the Bureau, reasonably, believed created a "strong presumption that providers would be inclined to implement them."² The presumption proved to be too optimistic. "[M]any providers failed to implement crucial best practices throughout the area affected by the derecho, which includes the densely populated National Capital Region."³ In fact, the Commission issued a number of public notices *before* the derecho struck, emphasizing the need for service providers to comply with those *industry-led* best practices.⁴ Nonetheless, lack of 9-1-1 circuit auditing, inadequate central office backup power capabilities and maintenance processes, and lack of diverse control and monitoring links, coupled with human error, directly led to the complete 9-1-1 outage in Fairfax County. While most of these areas of failure have "already been addressed in vital CSRIC best practices"⁵, it is manifestly clear that additional emphasis on applying lessons learned from the derecho to enhance and mandate certain CSRIC best practices is necessary. Relying solely on voluntary compliance does not work.

¹ *Derecho Report*, § 7.2, at p. 41.

² *Id.*

³ *Id.*

⁴ *Derecho Report* § 7.1, at p. 39.

⁵ *Id.*

II. ROUTINE 9-1-1 CIRCUIT AUDITING.

The *Derecho Report* found that “a diversity audit by Verizon, as called for in CSRIC best practice 8-7-0532, might have identified [certain] single points of failure and prevented the loss of service to the Fairfax County PSAP through additional redundant connectivity.”⁶ Therefore, Fairfax County strongly supports the imposition of requirements related to routine 9-1-1 circuit auditing. While existing best practices provide some general guidance on doing diversity audits, it is apparent that if left as an entirely voluntary approach, the undertaking of such audits by network operators will be seen as being of secondary importance and probably not take place on a regular periodic basis. As noted in the NPRM, Verizon has pledged to take corrective action to audit 9-1-1 circuits.⁷ Voluntary pledges, however laudable, should not affect whether the Commission mandates additional action. Fairfax County appreciates Verizon’s response to the *derecho* 9-1-1 outage and its commitment to audit its 9-1-1 network and to effect remediation of the network to improve diversity and eliminate single points of failure. However, the *derecho* outage vividly demonstrated the fallibility of relying on entirely voluntary approaches.

Network operators/service providers should be required to conduct such audits. International Standard Organization (ISO) 9001, an international standard for quality standard management, can lend some guidance to any Commission-directed efforts related to audits (using ISO STD 8.2.2 Internal Audit for a baseline). ISO 9001 does not establish specific frequencies of audits, rather “an audit shall be planned, taking into consideration the status and importance of the processes and areas to be audited.” As a general rule, 9-1-1 circuit routes will be relatively stable once a thorough diversity audit and any remediation to fix diversity issues is

⁶ *Derecho Report* § 5.4.1, at p. 29.

⁷ NPRM at ¶ 36.

undertaken. Given the relative stability of the circuit routes after any remediation, and assuming service provider process controls are in place to establish “lock downs” on the circuit routes (per service provider certification statements signed by a company officer), a suggested reasonable schedule for the frequency of diversity audits is every two years.

Several models for how to conduct diversity audits exist from which requirements specific to 9-1-1 circuit audits could be tailored. The experiences of organizations such as ATIS⁸ and the experience the Federal Aviation Administration has with its Leased Interfacility National Air Space Communications System (LINCS) network might shed additional light on best practice solutions or improved processes for assuring route diversity. ATIS has often applied its expertise in examining new processes and procedures to provide diversity assurance certification of routing in a more real-time manner for the telecommunications and financial industry environments. Independent audit firms to assist in assuring network diversity may be appropriate in certain circumstances. At a minimum, the audits need to cover 9-1-1 trunks to PSAPs and associated ANI/ALI (Automatic Number Identification/Automatic Location Information) links which serve the PSAP function.

Detailed information from the audits needs to be shared with the PSAP to which the information relates. An appropriate, understandable and complete level of detail showing an end-to-end route path at a summary level (a relatively simple block diagram can suffice) would enable the PSAP management officials to track route diversity at a summary level. The detail must allow the PSAP to have confidence that single points of failure do not exist within the 9-1-1 call/message routing pathways between the network operator and the PSAP delivery point.

⁸ <http://www.atis.org/>

Fairfax County agrees that such detailed network configuration information should be required to be treated by all parties as sensitive and confidential information.

Fairfax County also supports requiring the network operator to certify the results of the audit as a formal step in making the audit results available to the Commission. The scheme used for Consumer Proprietary Network Information under 47 C.F.R. § 64.2009(e) of the Commission's rules provides a reasonable model that could be adapted to this purpose. An officer of the telecommunications provider should be required to sign and file the certification including a statement that the officer has "personal knowledge" that the audit has been conducted in accordance with specified rules established by CSRIC or some other appropriate body, and that the service provider's operating procedures will ensure it remains in compliance with the rules or best practices the Commission establishes for such 9-1-1 diversity audits.

Finally, at a more fundamental level, network operators and service providers should be required to maintain a minimum specified level of physical diversity for their 9-1-1 circuits. CSRIC Best Practice 8-7-0532, which states: "*Diversity Audit: Network Operators should periodically audit the physical and logical diversity called for by network design and take appropriate measures as needed,*" provides a starting point, but additional details need to be added to this and other CSRIC best practices to provide more measurable standards for what comprises acceptable network diversity as well as an acceptable diversity audit.

III. ADEQUATE CENTRAL OFFICE BACKUP POWER.

Adequate central office backup power, specifically backup power systems that fully come online and support 9-1-1 call processing as outlined in the *Derecho Report*, is manifestly important to the ability to continue providing 9-1-1 service when commercial power is disrupted

during a storm or other natural or man-made disaster. Verizon has acknowledged that generator failures in its Arlington and Fairfax central offices after the loss of commercial power were the primary causes of the 9-1-1 network failures in Northern Virginia.⁹ The backup power arrangement in Verizon's Arlington central office contravened CSRIC best practice 8-7-5281.¹⁰ Moreover, Verizon failed to comply with its own maintenance and testing procedures for its generators "for at least several months."¹¹

In many cases, Verizon had significant backup power capabilities at central offices in terms of battery backup power that lasted for approximately eight hours. However, the first level of backup resources, primarily generators, had numerous problems with maintenance, load sizing and various other factors.¹² Mandating backup power equipment testing and maintenance, along with supporting documentation of same, is the most logical way to improve 9-1-1 reliability and provide an ongoing level of assurance that the appropriate best practices are being implemented and carried through on a routine basis.

Fairfax County cannot specify required standards for backup power, but it supports an active effort to establish a realistic standard that safeguards the public's interests. For instance, a redundancy standard of N+1, where components (N) have at least one independent backup component (+1) might be a minimum standard. N+1 redundancy would ensure system availability in the event of a component N failure. Alternatively, the standard could be expressed in terms of inherent availability (Ai), commonly represented as a percentage of availability of mission time (i.e., 99.67% availability). This could be stated in terms of whether multiple paths

⁹ *Derecho Report*, § 4.1.1, at p. 16.

¹⁰ *Derecho Report*, § 4.1.1.1, at p. 16.

¹¹ *Derecho Report* § 4.1.1.1, at p. 18.

¹² *Derecho Report* §§ 4.1.1.1 through 4.1.1.3, at pp. 16-20.

for cooling and power are required and even whether specific levels of fault tolerance (resistance to failure) such as the Uptime Institute's Tier I, II, III or IV definitions should be applied (which range from the lowest, Tier I, at 99.67% availability, to the highest, Tier IV, at 99.99% availability).

Fairfax County also supports the imposition of reporting and certification requirements regarding backup power. Network operators or service providers should be required to report and certify to the Commission, on an annual basis, the results of generator tests at central office sites or the equivalent mobile switching center (MSC) operations site for wireless carriers.

IV. ROBUST NETWORK MONITORING CAPABILITIES.

As outlined in the *Derecho Report*, visibility of the status of Verizon's network equipment throughout the National Capital Region was compromised, in part, by a single point of failure because the backup power source for the equipment monitoring capabilities was reliant on the same backup power resources provided by the central office.¹³ When the backup power systems in Verizon's Arlington central office failed, its network monitoring facilities also failed and Verizon's ability to ascertain the status of its network was severely compromised.

The Commission should require that network monitoring capabilities avoid or eliminate single points of failure and be supplied with adequate diverse backup power systems that are not reliant on the same backup power resources that are committed to the operation of the central office equipment. Problem determination and problem isolation are critical tasks during the early stages of any disaster. The ability to ascertain the health of the network (which components are operating or not operating) must be supported by implementing physically

¹³ *Derecho Report* § 4.1.1.1, at p. 18.

diverse monitoring links and reliable backup power capabilities to sustain the network monitoring until commercial power is restored. Fairfax County supports reporting and certification by an officer of the network operator or service provider on whether the monitoring links are robust and physically diverse and, if specific standards are imposed, that they meet the standard.

V. IMPROVED PSAP NOTIFICATION WHEN OUTAGES AFFECT 9-1-1 SERVICE.

As clearly stated in the *Derecho Report*, timely, clear, and appropriately targeted communications between 9-1-1 service providers and PSAPs is a key consideration during any disruption of 9-1-1 service. Communication to the PSAPs is paramount, as the public and elected officials turn to the PSAPs for immediate information on how best to respond to an emergency. Having recognized that communications with and to the PSAPs was significantly below expectations during the *derecho*, the Commission has proposed more detailed rules consistent with the recommendation about notice that the 9-1-1 Directors in the Metropolitan Washington Council of Governments (MWCOC) region adopted immediately after the *derecho*.¹⁴ Fairfax County supports the proposed amendments to 47 C.F.R. § 4.9 to require service providers to notify PSAPs immediately with all available information that may be useful to mitigate an outage and to deliver that information by telephone and in writing by electronic means.

However, to the extent the proposed amendments can be read to allow a service provider to withhold notification to the PSAP until the service provider has every element of the

¹⁴ See *Derecho Report* at Appendix B.

minimum information identified above (nature of outage, estimated number of users affected, etc.), the rule could be counterproductive. The initial notification needs to communicate *immediately*, based on the best available information, the impact of the outage on the PSAP (i.e., what is the problem the PSAP is likely facing based on the network problem that is occurring). The remaining minimum information should be provided as soon as possible, but the *best known broad brush picture of the situation should be communicated immediately* to the PSAP. The PSAPs understand that the initial reports might be vague and not entirely accurate, but getting some level of information immediately (but not in cryptic, jargon-filled phrasing) is better than not receiving any information. For example a message might only say “9-1-1 trunks are unavailable from the ABC tandem for an unknown reason. Investigation is underway to determine the extent of the outage.” Subsequent communications could fill in details as soon as more facts are known.

Additionally, the already-existing structure of the rule creates ambiguity about *when* the service provider must notify the PSAP of an outage. Service providers are required to notify the PSAP “as soon as possible” (which the Commission proposes in the NRPM to change to “immediately”), but in each case that obligation is expressed as a subsidiary to the requirement to notify the Commission within a specified period of time. For example, cable communications providers, satellite operators, wireless and wireline providers must notify the Commission within 120 minutes of discovering an outage that meets or exceeds the reporting thresholds. Interconnected VoIP service providers must notify the Commission within 240 minutes of discovering an outage that meets or exceeds the reporting thresholds. Fairfax County interprets the rule to require service providers to notify the PSAP as soon as possible (or, if the rule is

amended as proposed, immediately) *upon discovery of the outage*, not as soon as possible, or immediately, *after the Commission is notified*.

Accordingly Fairfax County suggests that in addition to the amendments proposed in the NPRM, the regulation should be further amended as follows with respect to each type of communications provider that is subject to the rule:

***** Potentially affects a 911 special facility (as defined in paragraph (e) of § 4.5), in which case they also shall notify, immediately upon discovering the outage, by telephone and in writing via electronic means, any official who has been designated by the management of the affected 911 facility as the provider's contact person(s) for communications outages at that facility. ~~and they~~ They shall convey all available information that may be useful to the management of the affected facility in mitigating the effects of the outage on callers to that facility as soon as such information is available, but unavailability of any piece of information shall not delay the requirement to provide immediate notification. This information shall include, at a minimum, the nature of the outage, the estimated number of users affected or potentially affected, the location of those users, the actions being taken by provider to address the outage, the estimated time at which service will be restored, recommended actions the impacted 911 special facility should take to minimize disruption of service, and the sender's name, telephone number and email address at which the sender can be reached.*****

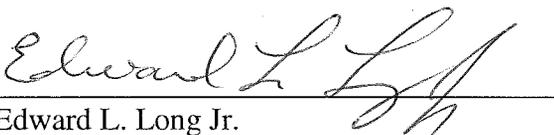
Finally, as noted in the *Derecho Report*, the 9-1-1 directors in the MWCOG region have been working with Verizon on how it should provide notice of interruptions and potential interruptions of 9-1-1 service to any or all PSAPs in the Washington metropolitan area.¹⁵ The MWCOG jurisdictions want to receive notice that exceeds what is required by 47 C.F.R. § 4.9, including, for example, notice when Verizon's central offices are operating on battery power. Verizon has worked cooperatively with the MWCOG jurisdictions to provide notice beyond what the law requires and Fairfax County expects that discussions with Verizon about enhanced notice for the MWCOG jurisdictions will continue independent of amendments to the rule.

¹⁵ See *Derecho Report*, Appendix B, item 2.

VI. CONCLUSION.

Fairfax County supports the Commission in its efforts to improve the reliability of 9-1-1 service by implementing more specific requirements for 9-1-1 circuit auditing, adequate central office backup power, and improved diversity of monitoring links, and by clarifying details on when and what level of detail must be communicated to PSAPs in the event of outages or potential outages. Fairfax County's service provider, Verizon, has taken measurable steps to address many problems that were encountered during the derecho. Verizon has implemented improved processes and procedures for reporting and backup power for central offices and network monitoring capabilities. Even so, the County considers it prudent for the Commission to articulate reliability standards and reporting and certification requirements for service providers and network operators to follow to sustain the momentum of the improvements the providers have undertaken. Ultimately, the deployment of Next Generation 9-1-1 is the best approach to improving 9-1-1 redundancy and reliability, but interim improvements are needed in the meantime. Fairfax County looks forward to continued involvement in these endeavors and opportunities to improve 9-1-1 reliability by providing further input to the Commission in all of its efforts.

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