Final Report
9-1-1 Service Gaps During & Following the Derecho Storm on June 29, 2012

METROPOLITAN WASHINGTON
Council of Governments

FINAL REPORT of 9-1-1 SERVICE GAPS DURING and FOLLOWING the DERECHO STORM on JUNE 29, 2012

Metropolitan Washington Council of Governments
9-1-1 Telecommunications Network Steering Group

March 13, 2013

Final Report of 9-1-1 Service Gaps
During and Following the Derecho Storm on June 29, 2012

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EXECUTIVE SUMMARY

The 9-1-1 Emergency Call System is the vital link to public safety assistance across the country, providing the public access to police, fire and emergency medical services when in need. Residents and visitors in cities, towns and rural communities are confident that accessing 9-1-1 will result in saving lives and property. It is the public's expectation that the responsibility of public safety and local and state government officials is to ensure the fees and charges assessed for 9-1-1 service are used to provide continuous and reliable public safety service. The National Capital Region (NCR), as the nation's capital and a major urban center, must have a reliable 9-1-1 system.

Figure 1: Basic 9-1-1- Call Flow

Late on the evening of Friday, June 29, 2012, a severe storm (Derecho) hit the Mid-Atlantic region with unusually intense straight-line winds. The storm caused widespread commercial electric power and communications outages in Washington D.C., Virginia, Maryland and additional states. At approximately 7:30 AM on Saturday, June 30, 2012, the 9-1-1 centers in Fairfax County, Prince William County, Cities of Manassas and Manassas Park experienced a complete failure of Verizon's 9-1-1 and telephone service. Three additional 9-1-1 centers; Arlington County, City of Alexandria and Loudoun County experienced a partial failure of these services. Verizon's restoration of 9-1-1 service began at approximately noon on Saturday, but some of the issues continued for over five days until July 4th, 2012.

Metropolitan Washington Councils of Governments Response

While the states and federal government regulate telecommunication utilities, 9-1-1 connects people in need with local governments. Thus, the failure of this system as a result of the Derecho became an issue of great concern to the Metropolitan Washington Council of Governments (COG), an association of 22 local governments that represent over 5 million residents. In addition, there have been previous issues with 9-1-1 service, that have been brought to Verizon's attention by COG, as indicated in a letter to Verizon from COG dated July 21, 2011.

On July 11, 2012, at its regular meeting, the COG Board of Directors unanimously adopted R36-2012 Resolution to Encourage Steps to Address Verizon 9-1-1 Service Gaps During and Following the Derecho on June 29, 2012 which included the five items below:

- Cause of Verizon's 9-1-1 failure;
- Existing redundancy and backup capabilities;
- Vulnerability of newer technologies that required battery or back-up power, including home and business service;

- Opportunities for COG localities to influence and strengthen regulatory oversight and remedies at the state and federal levels;
- Verizon's communication and messaging to the public and local emergency response officials concerning 9-1-1 services.

COG formed a Steering Group of 9-1-1 Center Directors and other interested parties to address the five items in the resolution.

There were five formal proceedings that were initiated and COG and other authorities within the region provided input and comments related to the Derecho and its impact on 9-1-1 services.

1. FCC PS Docket No. 11-60
2. Virginia SCC Case No. PUC-2012-00042 FCC PS Docket No. 11-60
3. Virginia Secure Commonwealth Panel – 9-1-1 Sub Panel
4. Maryland Public Service Commission Case No. 9298
5. Maryland Emergency Number Systems Board (ENSB) Inquiry

Findings

The COG 9-1-1 Steering Group found that the loss of commercial power and the subsequent failure of one of the two backup generators in each of Verizon's Arlington and Fairfax Central Offices (CO) were the predominant causes of the 9-1-1 service outages. The Steering Group also noted that although both Verizon and the 9-1-1 centers maintain backup power systems, the failure of Verizon's backup generators resulted in significant impacts on the entire emergency call service system. In addition, the Steering Group found that many of the 9-1-1 centers' backup services, such as workstations, databases and computer servers, were provided through the Verizon Arlington and Fairfax locations and therefore also were also unable to receive emergency calls after the Derecho event. For access to 9-1-1 service for many businesses and individual cell phones, the Steering Group emphasized the importance of commercial and limited battery power along with the maintenance of cell phone sites. The Steering Group found that regional authorities should use the state and federal proceedings on the Derecho event to encourage the adoption of new rules that would require Verizon and other service providers to adhere to high operational standards. Finally, the Steering Group determined that Verizon should have implemented a much more robust public messaging effort following the storm in order to support and complement local governments' efforts to inform the public.

Recommendations

On July 19, 2012 the Northern Virginia 9-1-1 Directors (City of Alexandria, Arlington County, Fairfax County, Prince William County and Stafford County), and subsequently all of the 9-1-1 Directors in the COG Region, concurred on five recommendations which were accepted by Verizon and are in various stages of completion.

1. Adoption of the National Incident Management System (NIMS) Model (www.fema.gov/national-incident-management-system)
2. 9-1-1 Interruption Notification
3. Semi-annual 9-1-1 Outage Drill
4. Monthly update of contact list
5. Verizon Representative present in Emergency Operations Center (EOC), during an activation

In addition to the recommendations of COG 9-1-1 Directors, SCC and FCC staffs, there are several other recommendations from COG 9-1-1 Telecommunications Network Steering Group and 9-1-1 Directors that should be considered and are outlined below.

1. Federal and State Regulatory Authorities should strongly encourage Verizon and other 9-1-1 service providers to perform a comprehensive independent audit of **the entire** infrastructure, processes and procedures that support 9-1-1 service and related systems, to ensure the reliability and continuity of 9-1-1 service under any circumstance. Based on the results of these audits, comprehensive plans and strategies should be developed to immediately resolve any findings. The results of these audits and resolution plans should be made available to the 9-1-1 stakeholders.
2. It is highly recommended that Verizon and other 9-1-1 service provider should be proactively engaged with the local 9-1-1 center agencies to provide subject matter expertise and make recommendations to the 9-1-1 centers and their stakeholders to ensure reliability and continuity of 9-1-1 service. This should include, but not be limited to, network redundancy, 9-1-1 center equipment and systems, and best practices, and procedures. In addition, Verizon and other 9-1-1 services providers should encourage and participate in regional discussions between 9-1-1 agencies in relationship to network configurations and routing, to ensure network reliability, resiliency, for network back-up and redundancy. Communications providers need to recognize that their services, which are paid for by the public through 9-1-1 fees, are a critical capability in carrying out this responsibility.
3. It is critical that Verizon continue to review and update their communications and public notification plans with each 9-1-1 center's communicators and/or Public Information Officers (PIO) regarding the dissemination of emergency messages (using both traditional and social media) to the public during 9-1-1 outages. This process should also explore alternative methods to communicate with the public in case of widespread power and telephone outages. Verizon should coordinate with National Capital Region communicators/PIOs during any future outages, to inform the public, and amplify the 9-1-1 center-specific public messages and information.
4. Verizon should keep governmental authorities and the public informed of any service issues, the extent of the outage, and time for resolution, and coordinate appropriate alternatives for service continuity
5. Federal and State Regulatory Authorities should continue to evaluate the steps and actions of Verizon, related to this event, and through audits, to ensure Verizon has adequately resolved all issues and continues to improve their processes and infrastructure to ensure reliability and continuity of 9-1-1 service and that they implement the best practices that have been established within the industry.

6. COG members and localities should continue to work with their State and Federal regulatory authorities and Legislators to ensure, through proper oversight, best practices and procedures by establishing service level agreements to ensure reliability and continuity of 9-1-1 service.

By all indications during this event, the systems and processes in place by the public safety agencies in the COG region operated as designed, and the 9-1-1 centers remained operational and were fully prepared to provide service to the public. However, there are some items which need to be considered by local and state government officials to ensure future reliability and continuity of 9-1-1 services, which are as follows.

1. State and local 9-1-1 authorities should be encouraged to perform a full assessment of their current 9-1-1 systems and operations to ensure reliability and continuity of 9-1-1 service.
2. It is recommended that State and Federal regulatory authorities review current laws and regulations related to 9-1-1 service, to ensure they place emphasis on and favor public safety versus the 9-1-1 service providers or telecommunications providers. The interest of the public and public safety should come first over the interest of commercial providers.
3. State and local 9-1-1 authorities should work with their Legislators to ensure the funding required to support the current 9-1-1 services and future Next Generation 9-1-1 are adequate and available, and that the fees and funds collected from the citizens of their States for 9-1-1 services are dedicated and used solely for the purpose as intended for the implementation, operation and maintenance of 9-1-1 emergency telephone services and other supporting technologies as required by the Enhance911 Act of 2004(Pub. Law 108-494). In addition, the fees collected should be equitably distributed to the 9-1-1 authorities.

Next Steps

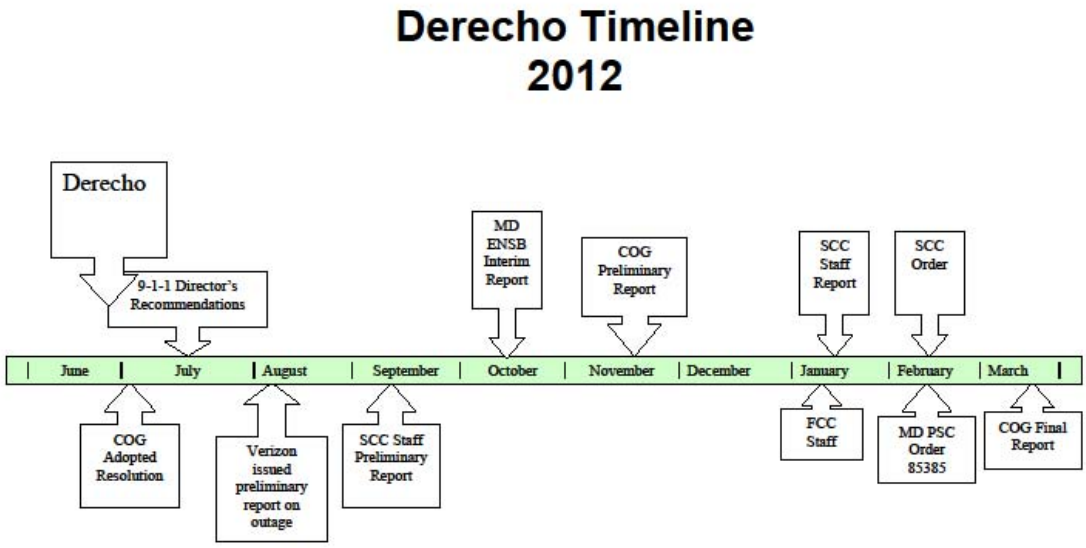
1. COG should formalize a committee of 9-1-1 Directors that can address specific issues related to 9-1-1 emergency telecommunications service for the NCR.
2. COG, with the assistance of the 9-1-1 authorities, should take the lead to work cooperatively in the development of a multi-year 9-1-1 strategic plan to include development and implementation of Next Generation 9-1-1.
3. 9-1-1 preparedness activities should be incorporated into regional emergency planning, training and exercises in coordination with local Emergency Managers and the COG Emergency Manager's Committee, who can provide the link to the Exercise and Training Operations Panel (ETOP).
4. COG's Information Technology Committee, through its role in regional homeland security planning should include 9-1-1 telephony services in the set of interoperable communications goals in the National Capital Region Strategic Plan and/or the Critical Infrastructure Protection (CIP)

Conclusion

The Derecho's impact on 9-1-1 services and the ensuing public and industry reaction has been one of the most significant events in the history of enhanced 9-1-1 services in the United States. It is conclusive that there were many areas in which Verizon could have performed better relative to their efforts to prevent the widespread outages and their initial response to the issues the Derecho storm created, overall operational resiliency, testing plans, and communications protocols with local 9-1-1 agencies. Questions still remain about the current reliability, age, and condition of the Verizon infrastructure which local governments rely on to provide life-saving 9-1-1 public services.

In the aftermath of the storm, Verizon has taken steps to address the issues of June 29, 2012. However, Verizon has a responsibility to follow-up on the additional recommendations of this and other recommendations made in the FCC hearings. Verizon must continue to evaluate their ongoing operations, processes, and best practices to mitigate the impacts of this type of event should it happen again. There is much Verizon must do to regain the confidence of the public safety community and citizens that their portion of the vital 9-1-1 communications service is highly reliable and sufficiently redundant to withstand all events and remain operational.

There were no identifiable issues for the local 9-1-1 centers during this event and all of their systems operated as designed. However, the public safety community must also be more aggressive in determining where less than optimal gaps exist, what improvements can be made and make plans for continuous improvements to meet service level expectations and solutions to new operational and technology challenges. State and federal government officials need to provide resources to the public safety community, and proper oversight, to allow the technology and human resources that are necessary to support the operations of the current 9-1-1 services as well as Next Generation 9-1-1 services.



INTRODUCTION

The 9-1-1 Emergency Call System is the vital link to public safety assistance across the country, providing access to police, fire and emergency medical services. Residents and visitors in every city, town and rural community are confident that accessing 9-1-1 will result in saving lives and property. It is the public's expectation that 9-1-1 is an ever-present capability, and the responsibility of public safety and local and state government officials is to ensure that the fees and charges assessed for 9-1-1 service are used to provide continuous and reliable public safety service. The National Capital Region (NCR), as the nation's capital and a major urban center, consisting of twenty-two local governmental entities with over 5 million residents, with a major regional transportation hub must have a reliable 9-1-1 system.

The Metropolitan Washington Council of Governments (COG) is the regional organization that has played a major role in public safety and emergency preparedness for more than 50 years. COG has addressed or assisted in the coordination of action following airline and rail crashes in 1982, the 2001 terrorist attacks of September 11, the Beltway sniper incident in 2002, Hurricane Isabel in 2003, "Snowmageddon" in 2010 and the East Coast earthquake in 2011. Because of the regional planning process initiated after the September 11 terrorist attacks, the region now has access to a Regional

Incident Communication and Coordination System (RICCS), which allows local leaders and emergency officials to coordinate on messages and actions before, during and after a regional emergency.

On June 29, 2012 however, an unusual storm - known as a Derecho, characterized by very strong, straight-line winds – caused widespread power outages and infrastructure damage that led to the failure of the 9-1-1 call system in much of Northern Virginia and adjoining areas. Elected officials across the region were concerned about the loss of 9-1-1 service and the impact of the failure across such a large area. The incident also revealed important areas for improvement in procedures utilized by Verizon related to backup power and 9-1-1 center and public notifications.

At its July 11, 2012 meeting, COG Board of Directors adopted two resolutions.

1. R35-2012 (Appendix 3) was a Resolution Directing After-Action Report on the Derecho Storm on June 29, 2012.
2. R36-2012 (Appendix 2) was a Resolution to Encourage Steps to Address Verizon 9-1-1 Service Gaps During and Following the Derecho on June 29, 2012. This resolution directed relevant committees to assess and identify actions required to address issues including: the cause of the 9-1-1 failures, the state of existing redundancy and backup capabilities, and opportunities for COG localities to influence the strengthening of regulatory oversight at state and federal levels. The Board also directed its committees to find ways to ensure improved messaging from Verizon officials to the public and local emergency response officials concerning the 9-1-1 emergency network service. In response to this resolution, COG formed a Steering Group of 9-1-1 Center Directors and other interested parties to address the five items in the resolution. COG also hired a consultant to assist in the preparation of this after-action report.

COG's 9-1-1 Telecommunications Network Steering Group met with Verizon officials for the first time on July 24, 2012 in Fairfax County's Emergency Operations Center. On this date, the Steering Group received an initial report from Verizon and voiced their immediate concerns. Because the Federal Communications Commission (FCC) had already begun an inquiry into several 9-1-1 failures around the country, an FCC representative was invited and attended the meeting. Officials from the Virginia State Corporation Commission, Maryland State Public Service Commission and Washington, DC, also participated. Officials responsible for each of the local 9-1-1 centers - called Public Safety Answering Points (PSAPs), attended this meeting and had an opportunity to articulate their concerns about the event and Verizon's practices.

On July 26, 2012, Verizon officials identified the failure of backup generators in their facilities in Arlington and Fairfax Counties as the key to losing both the 9-1-1 service itself, as well as the ability to view the status of the service (Telemetry) in many locations around the region. Subsequent to the July meeting, Verizon officials met with the local 9-1-1 center officials as a group on several occasions and with each one of the local 9-1-1 representatives individually. In addition, Verizon met with the FCC on several occasions, briefed various COG Committees, and had several meetings and conversations with COG's consultant.

The following are some of the actions by various agencies in response to this event.

- Verizon completed an initial review and analysis of the 9-1-1 outages and released a preliminary report on August 13, 2012.
- COG issued Preliminary Report of 9-1-1 Service Gaps During and Following the Derecho Storm on June 29, 2012 on November 14, 2012 (http://www.mwcog.org/uploads/news-documents/AlhZ20121203121759.pdf)
- The Virginia State Corporation Commission (SCC) released its Staff Report of Final Findings and Recommendations on January 17, 2013 (http://www.scc.virginia.gov/newsrel/c_911out_13.pdf)
- The Maryland Public Service Commission established Case No. 9298 and issued Order 85385 (http://webapp.psc.state.md.us/Intranet/Casenum/CaseAction_new.cfm?CaseNumber=9298)
- The Maryland Emergency Number Systems Board (ENSB) issued an interim report on October 23, 2012
- The Federal Communications Commission released its report Impact of the June 2012 Derecho on Communications Networks and Services Report and Recommendations on January 10, 2013 (http://www.fcc.gov/document/derecho-report-and-recommendations)
- Virginia Secure Commonwealth Panel – 9-1-1 Sub-Panel is preparing a report on the State of 9-1-1 Services in the Commonwealth to be released in the first half of 2013.

It should be noted that there are other reports, studies and inquiries that were conducted by various groups, outside of the impact on 9-1-1 by the storm, related to such items as power and electrical infrastructure and emergency operations and management.

The following information reflects the final report required by COG resolution R36-2012.

BACKGROUND

Late in the evening of Friday June 29, 2012, a severe Derecho storm traveled across the country and hit the Mid-Atlantic region with unusually intense straight-line winds. In its aftermath, the storm left widespread commercial power and communications outages in the Washington D.C., Virginia, Maryland and West Virginia area. Various news agencies reported that in excess of 1 million citizens were without power.

At approximately 10:30 PM on June 29, 2012 several area 9-1-1 centers lost commercial power. As designed, the affected 9-1-1 centers immediately switched to their various power back-up systems, and believed that this would enable them to continue handling emergency calls.

In the early morning hours of June 30, 2012 service interruptions continued to occur and many 9-1-1 centers in the region began experiencing sporadic issues related to 9-1-1 service, including calls without Automatic Location Information (ALI) and a significant decrease in the number of calls. At approximately 7:30 AM on June 30, the 9-1-1 centers in Fairfax County, Prince William County, Manassas and Manassas Park experienced a complete failure of the delivery of 9-1-1 and 10-digit emergency number calls. As of

the date of this report, Verizon has identified a total of 26 9-1-1 centers in Virginia and Maryland (Appendix 4) that experienced 9-1-1 service issues related to this incident. Some of these issues persisted for almost five days, up until the 4th of July, 2012.

It should be noted, although not of this magnitude, there have been other service-affecting events that have impacted 9-1-1 service in the past, which have been brought to Verizon's attention. One incident, as recently as October 22, 2012, occurred, when several of the PSAPs in the Northern Virginia area lost 10 digit emergency services lines. Also, see COG June 21, 2011 letter to Verizon and Verizon's response in the Appendices.

ANALYSIS

In COG Resolution R36-2012, there were five areas the Board of Directors instructed the 9-1-1 Telecommunications Response Steering Group to consider.

A. Cause of Verizon's 9-1-1 failure;
B. Existing redundancy and backup capabilities;
C. Vulnerability of newer technologies that required battery or back-up power, including home and business service;
D. Opportunities for COG localities to influence and strengthen regulatory oversight and remedies at the state and federal levels
E. Verizon's communication and messaging to the public and local emergency response officials concerning 9-1-1 services

Cause of Verizon's 9-1-1 Failure

On Friday June 29, 2012, at approximately 10:30 PM the Derecho hit the Mid-Atlantic region causing widespread commercial power and communications outages including in the Washington D.C., Virginia and Maryland area. Various news agencies reported that in excess of 1 million citizens were without power. Verizon reported there were more downed poles and the storm generated more commercial trouble tickets than Hurricane Irene, which impacted the east coast in August of 2011. They also indicated that power failures affected more than 100 Verizon locations, and that more than 1,900 network transport systems were damaged and/or failed. The report indicates that in most of these locations the power back-up systems worked as designed, but nine generators out of 136 failed to operate properly, including facilities in Arlington, Virginia where Verizon's network telemetry for the region is located, and Fairfax, Virginia which is the location of one of the regions 9-1-1 tandem switches. At each of these locations one of two back-up generators failed to start.

The loss of commercial power and the failure of the two backup generators may have been the predominant causes of the 9-1-1 service outage, but there were additional contributing factors that led to the failure and are outlined below.

1. The Derecho impact on the electrical infrastructure caused the loss of commercial power to the Verizon facilities located in Arlington and Fairfax, Virginia and elsewhere.
2. Two back-up generators that supported 9-1-1 systems and Verizon telemetry did not start. Verizon failed to either identify or resolve previous maintenance issues with these generators, such as air in the fuel lines or faulty automatic fail-over switches.
3. Verizon technicians dispatched to at least one of the locations (Fairfax) where the generators failed to start did not identify that the generator supporting the 9-1-1 infrastructure was not operating.
4. Both the Arlington and Fairfax facilities were supported by back-up battery supplies, but these batteries drained.
5. Verizon failed to successfully implement any mitigating action to restore these two generators prior to the battery back-ups expiration.
6. Once the battery supplies were exhausted both the telemetry and 9-1-1 systems at the Arlington and Fairfax facilities failed.
7. In addition, damage and failure of other 9-1-1 supporting systems within the Verizon network and infrastructure, such as ALI links, STPs and end offices, severely contributed to the 9-1-1 outage, although these were largely cascading effects of the loss of primary and backup power in Arlington and Fairfax.

Existing Redundancy and Backup Capabilities

There are three areas related to the 9-1-1 infrastructure that should be considered in the evaluation of existing redundancy and backup capabilities which are summarized below.

1. Power:

Verizon and other telecommunications providers and many of the 9-1-1 centers have designed and implemented backup power systems in most of their critical facilities that include generators and backup battery supplies in case of commercial power failure. In some cases they have worked with the local power companies to implement dual power sources from separate power feeds.

In the case of the Derecho on June 29, 2012, the 9-1-1 centers and telecommunications providers' backup power systems generally operated as designed and continued to provide required power until commercial power was restored. However, the generator issues experienced by Verizon had significant impacts on the availability and operation of 9-1-1 service.

2. Network:

In the report released on August 13, 2012, Verizon states, "Verizon designs its network to provide 9-1-1 services even during disasters…our 9-1-1 network designs include multiple levels of diversity and redundancy, as well as back-up power in critical facilities, to optimize resiliency during a crisis."

Additionally, the report indicates that 9-1-1 center-specific routing issues compounded the generator-starting problems. Verizon's 9-1-1 design provides multiple diversities or redundancies "inside the network." There are multiple tandem offices providing routing so that, if one fails, the calls to the failed

office are routed through the other(s). Verizon's ALI databases and links to each ALI database are redundant, as are Verizon's signaling systems, which route calls to their destinations. Verizon's analysis of the network impacts following the Derecho identified areas for improvement, especially with ALI diversity, with specific 9-1-1 center configurations.

Verizon has met with each individual local 9-1-1 center Director and continues to work directly with the specific 9-1-1 center to decide on improvements to address the issue of network configurations and call routing, but Verizon should also engage the 9-1-1 Directors on a regional basis, to evaluate these components, which could have an impact on various PSAPs that share common infrastructure or coordinate operations between agencies.

3. Local 9-1-1 Centers (PSAPs)

Most of the critical systems and facilities, including servers, workstations, and databases, within the 9-1-1 centers have redundant components that are designed to provide continuous service and mitigate any downtime. In addition, many of the 9-1-1 centers have backup locations where calls can be routed in the case of major outages or the loss of the primary 9-1-1 center. In the case of the Derecho event, many of the backup PSAPs 9-1-1 services were provided through the Verizon Arlington and Fairfax locations, and thus were also unable to receive emergency calls.

Vulnerability of Newer Technologies that Require Battery or Back-Up Power, Including Home and Business Service

Power for traditional and legacy telephone service for most residence and small businesses was supplied via the hard wire connection through the telephone lines and therefore the loss of commercial power often did not result in the loss of dial tone or telephone service. However, the near-ubiquitous presence of cordless phones – particularly by consumers – as well as power-reliant elements in the communications network such as digital loop carrier systems often has negated that benefit.

Certain more recent technologies such as Voice over Internet Protocol (VoIP) or Standard Internet Protocol (SIP) rely on a modem or router located on premise or within a computer. With the use of these technologies, the loss of power causes the loss of telephone service and access to 9-1-1 once the back-up battery provided by some carrier's drains. Some commercial or business telephone systems such as a PBX or VoIP systems might also require power to operate properly.

In addition, mobile telephone service during an emergency situation when multiple calls are being attempted into the public mobile network can cause network congestion and/or call blockage based on a higher than normal call volume, and or/sporadic cell tower signal loss. Also, the loss or failure of the mobile infrastructure, such as cell sites, during a severe storm or some other natural or manmade disaster, can impact the ability to make and receive mobile calls and therefore access to 9-1-1. It should be noted that the wireless network equipment are also reliant on power.

The public should be made aware of the benefits and limitations of their communications technologies and take these into consideration, as part of their advance preparation for severe weather events or in times of emergency. Citizens should know that if they lose commercial power when their battery supply

How to Communicate Before, During and After a Major Disaster

Before a Disaster:

How to Prepare Your Home & Mobile Device

- Maintain a list of emergency phone numbers in your cell phone and in or near your home phone.
- Keep charged batteries and car-phone chargers available for back-up power for your cell phone.
- If you have a traditional landline (non-broadband or VOIP) phone, keep at least one non-cordless phone in your home because it will work even if you lose power.
- Prepare a family contact sheet. This should include at least one out-of-town contact that may be better able to reach family members in an emergency.
- Program "In Case of Emergency" (ICE) contacts into your cell phone so emergency personnel can contact those people for you if you are unable to use your phone. Let your ICE contacts know that they are programmed into your phone and inform them of any medical issues or other special needs you may have.
- If you are evacuated and have call-forwarding on your home phone, forward your home phone number to your cell phone number.
- If you do not have a cell phone, keep a prepaid phone card to use if needed during or after a disaster.
- Have a battery-powered radio or television available (with spare batteries).
- Subscribe to text alert services from local or state governments to receive alerts in the event of a disaster. Parents should sign up for their school district emergency alert system.

During and After a Disaster:

How to Reach Friends, Loved Ones & Emergency Services

- If you have a life-threatening emergency, call 9-1-1. Remember that you cannot currently text 9-1-1. If you are not experiencing an emergency, do not call 9-1-1. If your area offers 3-1-1 service or another information system, call that number for non-emergencies.
- For non-emergency communications, use text messaging, e-mail, or social media instead of making voice calls on your cell phone to avoid tying up voice networks. Data-based services like texts and emails are less likely to experience network congestion. You can also use social media to post your status to let family and friends know you are okay. In addition to Facebook and Twitter, you can use resources such as the American Red Cross's Safe and Well (redcross.org/safeandwell) program.
- Keep all phone calls brief. If you need to use a phone, try to convey only vital information to emergency personnel and/or family.
- If you are unsuccessful in completing a call using your cell phone, wait ten seconds before redialing to help reduce network congestion.
- Conserve your cell phone battery by reducing the brightness of your screen, placing your phone in airplane mode, and closing apps you are not using that draw power, unless you need to use the phone.
- If you lose power, you can charge your cell phone in your car. Just be sure your car is in a well-ventilated place (remove it from the garage) and do not go to your car until any danger has passed. You can also listen to your car radio for important news alerts.
- Tune into broadcast television and radio for important news alerts. If applicable, be sure that you know how to activate the closed captioning or video description on your television.
- If you do not have a hands-free device in your car, stop driving or pull over to the side of the road before making a call. Do not text on a cell phone, talk, or "tweet" without a hands free device while driving.
- Immediately following a disaster, resist using your mobile device to watch streaming videos, download music or videos, or play video games, all of which can add to network congestion. Limiting use of these services can help potentially life-saving emergency calls get through to 9-1-1.
- Check Ready.gov regularly to find other helpful tips for preparing for disasters and other emergencies.

Source: FCC and FEMA
http://www.fcc.gov/blog/fcc-and-fema-how-communicate-during-and-after-major-disaster

customers may want to consider having an alternative method of communication, if they are using VoIP, cellular, or other non-traditional technology. Business should develop contingency plans and ensure all of their employees are aware of the procedures to follow in the event they may need emergency services in the event of a power failure.

Information for the public can be found on the preceding page from an article by the FCC and FEMA: *How to Communicate Before, During and After a Major Disaster* (http://www.fcc.gov/blog/fcc-and-fema-how-communicate-during-and-after-major-disaster)

Verizon has developed several documents to educate the public on how to prepare for – and what to do – with respect to communications in case of storms or other emergency events and examples have been included as Appendices to this report.

Opportunities for COG Localities to Influence and Strengthen Regulatory Oversight and Remedies at the State and Federal Levels

The COG localities provided comment and participated in several formal proceedings, outlined below, to influence regulatory oversight and seek remedies as it relates to the impact of the Derecho on 9-1-1 services.

1. Virginia SCC Case No. PUC-2012-00042
2. FCC PS Docket No. 11-60
3. Virginia Secure Commonwealth Panel – 9-1-1 Sub Panel
4. Maryland Public Service Commission Case No. 9298
5. Maryland Emergency Number Systems Board (ENSB) Inquiry

The COG localities should continue to participate in formal proceedings and use contractual relationships with service providers to encourage the implementation and adherence to regulations, requirements, and best practices that require Verizon and other 9-1-1 service providers and telecommunications carriers to adhere to strict service level agreements, standards, and processes to prevent outages and respond to outages and adverse conditions that impact 9-1-1 service and detail penalties in the event of non-compliance.

Verizon's Communication and Messaging to the Public and Local Emergency Response Officials Concerning 9-1-1 Services

Public messaging was needed not only from the local public information officers (PIOs) supporting the 9-1-1 centers, but from the utility itself. As part of the overall system of disseminating information to the public, Verizon needed to be part of the many voices with the common message that the 9-1-1 system was down, and they should have pointed to the local officials' guidance on what the public should do in case of an emergency. Especially during this event, when everyone was challenged by lack of electricity, phones, and connectivity, officials needed a more robust public messaging response on Verizon's part to complement local government efforts. In these reports, Verizon states it is mobilizing a more robust emergency response communications process to ensure media outlets and other channels are provided relevant information on a timely basis.

Verizon's first responsibility in a service interruption is to notify the 9-1-1 center. Then, in its role as a local utility, and in cooperation with local government, Verizon has the responsibility to provide enhanced customer service to inform the public of 9-1-1 interruptions. This should include dissemination of information about the extent of the problem and when it will be resolved. PIOs and 9-1-1 centers should remain the primary source of guidance to the public during an emergency.

RECOMMENDATIONS

On July 19, 2012 the Northern Virginia 9-1-1 Directors (City of Alexandria, Arlington County, Fairfax County, Prince William County and Stafford County), and subsequently all of the 9-1-1 Directors in the COG Region, concurred on five recommendations which were accepted by Verizon and are in various stages of completion.

1. Adoption of the National Incident Management System (NIMS) Model (www.fema.gov/national-incident-management-system)
2. 9-1-1 Interruption Notification
3. Semi-annual 9-1-1 Outage Drill
4. Monthly update of contact list
5. Verizon Representative present in Emergency Operations Center (EOC), during an activation

In addition to the recommendations of COG 9-1-1 Directors, SCC and FCC staffs, there are several other recommendations from COG 9-1-1 Telecommunications Network Steering Group and 9-1-1 Directors that should be considered and are outlined below.

1. Federal and State Regulatory Authorities should strongly encourage Verizon and other 9-1-1 service providers to perform a comprehensive independent audit of **the entire** infrastructure, processes and procedures that support 9-1-1 service and related systems, to ensure the reliability and continuity of 9-1-1 service under any circumstance. Based on the results of these audits, comprehensive plans and strategies should be developed to immediately resolve any findings. The results of these audits and resolution plans should be made available to the 9-1-1 stakeholders.
2. It is highly recommended that Verizon and other 9-1-1 service provider should be proactively engaged with the local 9-1-1 center agencies to provide subject matter expertise and make recommendations to the 9-1-1 centers and their stakeholders to ensure reliability and continuity of 9-1-1 service. This should include, but not be limited to, network redundancy, 9-1-1 center equipment and systems, and best practices, and procedures. In addition, Verizon and other 9-1-1 services providers should encourage and participate in regional discussions between 9-1-1 agencies in relationship to network configurations and routing, to ensure network reliability, resiliency, for network back-up and redundancy. Communications providers need to recognize that their services, which are paid for by the public through 9-1-1 fees, are a critical capability in carrying out this responsibility.

3. It is critical that Verizon continue to review and update their communications and public notification plans with each 9-1-1 center's communicators and/or Public Information Officers (PIO) regarding the dissemination of emergency messages (using both traditional and social media) to the public during 9-1-1 outages. This process should also explore alternative methods to communicate with the public in case of widespread power and telephone outages. Verizon should coordinate with National Capital Region communicators/PIOs during any future outages, to inform the public, and amplify the 9-1-1 center-specific public messages and information.
4. Verizon should keep governmental authorities and the public informed of any service issues, the extent of the outage, and time for resolution, and coordinate appropriate alternatives for service continuity
5. Federal and State Regulatory Authorities should continue to evaluate the steps and actions of Verizon, related to this event, and through audits, to ensure Verizon has adequately resolved all issues and continues to improve their processes and infrastructure to ensure reliability and continuity of 9-1-1 service and that they implement the best practices that have been established within the industry.
6. COG members and localities should continue to work with their State and Federal regulatory authorities and Legislators to ensure, through proper oversight, best practices and procedures by establishing service level agreements to ensure reliability and continuity of 9-1-1 service.

By all indications during this event, the systems and processes in place by the public safety agencies in the COG region operated as designed, and the 9-1-1 centers remained operational and were fully prepared to provide service to the public. However, there are some items which need to be considered by local and state government officials to ensure future reliability and continuity of 9-1-1 services, which are as follows.

1. State and local 9-1-1 authorities should be encouraged to perform a full assessment of their current 9-1-1 systems and operations to ensure reliability and continuity of 9-1-1 service.
2. It is recommended that State and Federal regulatory authorities review current laws and regulations related to 9-1-1 service, to ensure they place emphasis on and favor public safety versus the 9-1-1 service providers or telecommunications providers. The interest of the public and public safety should come first over the interest of commercial providers.
3. State and local 9-1-1 authorities should work with their Legislators to ensure the funding required to support the current 9-1-1 services and future Next Generation 9-1-1 are adequate and available, and that the fees and funds collected from the citizens of their States for 9-1-1 services are dedicated and used solely for the purpose as intended for the implementation, operation and maintenance of 9-1-1 emergency telephone services and other supporting technologies as required by the Enhance911 Act of 2004(Pub. Law 108-494). In addition, the fees collected should be equitably distributed to the 9-1-1 authorities.

Next Steps

1. COG should formalize a committee of 9-1-1 Directors that can address specific issues related to 9-1-1 emergency telecommunications service for the NCR.
2. COG, with the assistance of the 9-1-1 authorities, should take the lead to work cooperatively in the development of a multi-year 9-1-1 strategic plan to include development and implementation of Next Generation 9-1-1.
3. 9-1-1 preparedness activities should be incorporated into regional emergency planning, training and exercises in coordination with local Emergency Managers and the COG Emergency Manager's Committee, who can provide the link to the Exercise and Training Operations Panel (ETOP).
4. COG's Information Technology Committee, through its role in regional homeland security planning should include 9-1-1 telephony services in the set of interoperable communications goals in the National Capital Region Strategic Plan and/or the Critical Infrastructure Protection (CIP)

Conclusion

The Derecho's impact on 9-1-1 services and the ensuing public and industry reaction has been one of the most significant events in the history of enhanced 9-1-1 services in the United States. It is conclusive that there were many areas in which Verizon could have performed better relative to their efforts to prevent the widespread outages and their initial response to the issues the Derecho storm created, overall operational resiliency, testing plans, and communications protocols with local 9-1-1 agencies. Questions still remain about the current reliability, age, and condition of the Verizon infrastructure which local governments rely on to provide life-saving 9-1-1 public services.

In the aftermath of the storm, Verizon has taken steps to address the issues of June 29, 2012. However, Verizon has a responsibility to follow-up on the additional recommendations of this and other recommendations made in the FCC hearings. Verizon must continue to evaluate their ongoing operations, processes, and best practices to mitigate the impacts of this type of event should it happen again. There is much Verizon must do to regain the confidence of the public safety community and citizens that their portion of the vital 9-1-1 communications service is highly reliable and sufficiently redundant to withstand all events and remain operational.

There were no identifiable issues for the local 9-1-1 centers during this event and all of their systems operated as designed. However, the public safety community must also be more aggressive in determining where less than optimal gaps exist, what improvements can be made and make plans for continuous improvements to meet service level expectations and solutions to new operational and technology challenges. State and federal government officials need to provide resources to the public safety community, and proper oversight, to allow the technology and human resources that are necessary to support the operations of the current 9-1-1 services as well as Next Generation 9-1-1 services.

GLOSSARY

1. **Automatic Location Identification (ALI)** - An electronic system that automatically relays a caller's location when that call is placed to a 9-1-1
2. **Automatic Number Identification (ANI)** - is a service that provides the 9-1-1 center with the telephone number of the calling phone
3. **Competitive Local Exchange Carrier (CLEC)** - Any company or person authorized to provide local exchange services in competition with an incumbent telephone company
4. **Derecho** (from Spanish: " meaning "straight") - A line of intense, widespread, and fast-moving windstorms and sometimes thunderstorms that moves across a great distance and is characterized by damaging winds
5. **E9-1-1 Tandem -** The telephone central office that provides the switching of 9-1-1calls and controls delivery of the voice call with ANI to the 9-1-1 center and provides certain functions such speed calling and call transfer.
6. **Federal Communications Commission (FCC) -** Independent US government agency, directly responsible to Congress, and charged with regulating interstate and international communications by radio, television, wire, satellite and cable.
7. **National Incident Management System (NIMS)** - A system mandated by Homeland Security Presidential Directive 5 that provides a consistent nationwide approach for governments, the private sector, and non-governmental organizations to work effectively and efficiently together to prepare for, respond to, and recover from domestic incidents, regardless of cause, size, or complexity.
8. **NG9-1-1** - An initiative aimed at updating the 9-1-1 service infrastructure to improve public emergency communications services in a wireless mobile society that enables the public to transmit text, images, video and data to the 9-1-1 center
9. **Public Branch Exchange (PBX)** – A private telephone switching system
10. **Public Safety Answering Point (9-1-1 center)** – 9-1-1 Call Center that receives emergency calls from the public.
11. **Reverse 9-1-1®** - A public safety communications system developed by Cassidian Communications used public safety organizations to deliver recorded emergency notifications to a selected set of telephone service subscribers or groups of people in a defined geographic area. There are other emergency notification vendors and products in addition to Reverse 9-1-1®
12. **Session Initiation Protocol (SIP**) - an application protocol that establishes, manages, and terminates a multimedia session.
13. **Telemetry** - A technology that allows remote measurement and reporting of information about a telecommunications providers network and related infrastructure
14. **Virginia State Corporation Commission (SCC)** – The Virginia commission that provides oversight and regulations of the Commonwealth's telecommunications industry
15. **Voice over Internet Protocol (VoIP)** - A communications protocol that allows for telephonic communication via the Internet

APPENDICES

COG 9-1-1 Telecommunications Network Steering Group

First Name	Last Name	Position/Title	Jurisdiction/Organization
		9-1-1 Tech Network Steering Group	
Doug	Brammer	Manager Gov Affairs	Verizon
Flaherty	Charlynn	Assoc Dir Emergency Communications Center	Prince George's County
Cheryl	Childress	Emergency Communications Center	City of Manassas Park
John	Crawford	Emergency Communications Center	Arlington County
Mike	Daigle	VP Access/Transport Engineering	Verizon
Maureen	Davis	VP Corporate Technology	Verizon
Bill	Ferretti	Deputy Director, 9-1-1 ECC	Montgomery County
Merni	Fitzgerald	Director Public Affairs	Fairfax County
Wanda	Gibson	Chief of Information Technology	Fairfax County
Jennifer	Greene	Director, Office of Unified Communications	District of Columbia
Cary	Hinton	Policy Advisor to Chairman	DC Public Service Commission
William	Hutchinson	Emergency Communications Center	City of Manassas
Chip	Jewell	Dept. of Emergency Communications	Frederick County
Lauren	Kravetz	Deputy Chief of CCR	FCC
Larry	Kubrock	Senior Telecom Specialist	VA State Corporation Commission
Patrick	Lacefield	Director Public Information	Montgomery County
Mick	Lemish	PSAP Director and Interoperability Coord	Loudoun County
Ted	McInteer	Director, Public Safety Communications	Prince William County

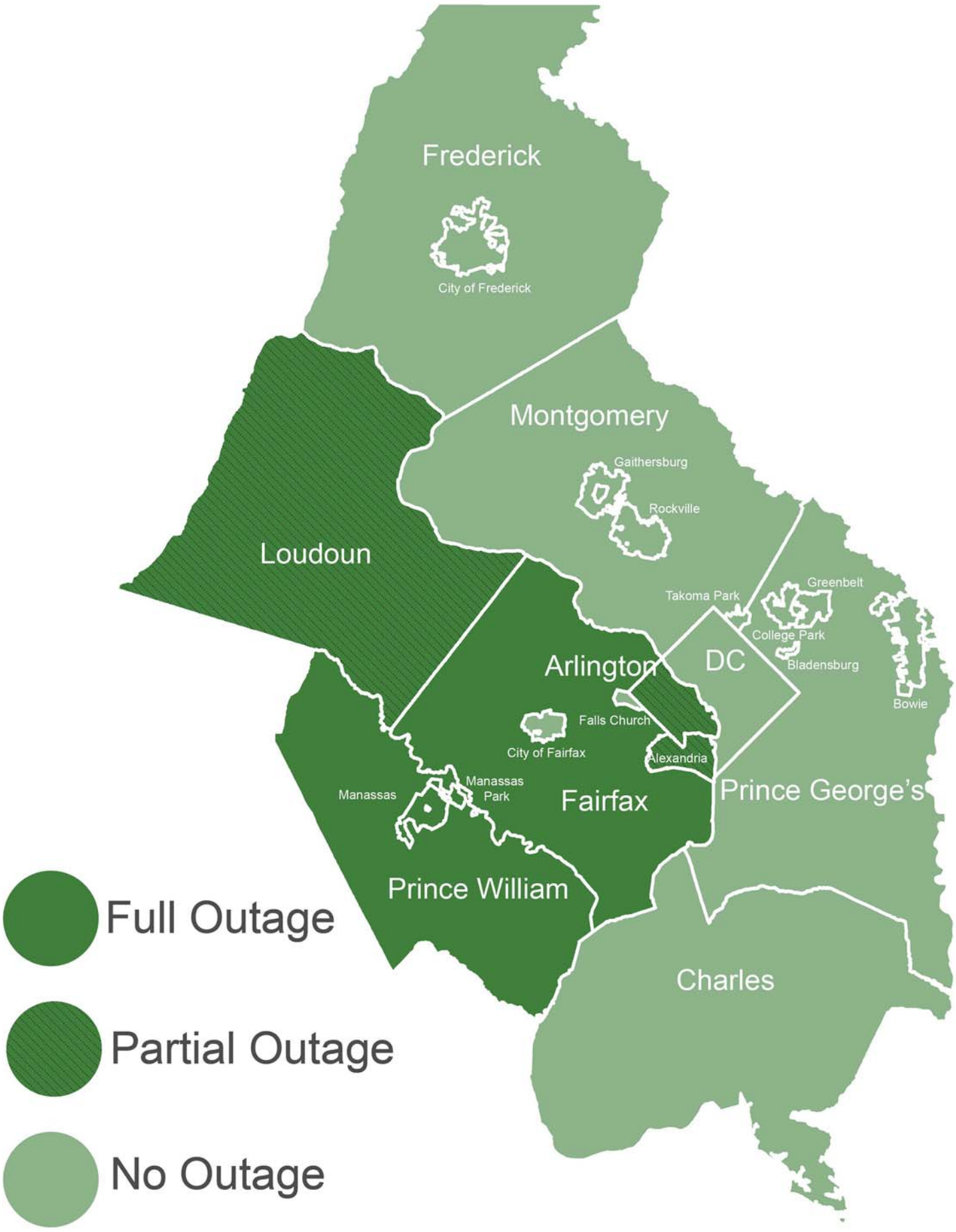
David	McKernan	Director of Emergency Management	Fairfax County
Brian	Melby	Director, Police 9-1-1 Communications Center	Montgomery County
Jo-Anne	Munroe	Director, Department of Communications	City of Alexandria
Anthony	Myers	Assistant Executive Director	Maryland Public Service Commission
Mark	Penn	Emergency Management Coordinator	City of Alexandria
Tony	Rose	Chief, Com/9-1-1	Charles County
Sonny	Segal	Chief of Information Technology	Montgomery County
Sue	Snider	UASI State Program Manager/NCR Liaison	Commonwealth of Virginia
Steve	Souder*	Director, Public Safety Com	Fairfax County
Robert	Weaver	VA Police Department	City of Manassas
Robert	Weaver	City of Manassas	VA Police Department
		COG Staff	
Chuck	Bean	Executive Director	MWCOG
Stuart	Freudberg	Director DEP	MWCOG
Dave	McMillion	Director DPSH	MWCOG
Sharon	Pandak	General Counsel	MWCOG
Lisa	Robertson	Assoc. General Counsel	MWCOG
Jeanne	Saddler	Director OPA	MWCOG
Steven	Kania	Manager OPA	MWCOG

*Steve Souder served as Chairman of the Steering Group

Information Only			
Carol	Adams	ECC Director	Stafford County
Dale	Blackman	Engineering	Verizon
Steve	Brundage	Director of Com Technologies, IT	Fairfax County
Gordon	Deans	Executive Director MD 911 Board	MD 911 Board
Brenda	Edmundson	Fairfax DPSC	Fairfax County
Lorraine	Fells-Danzer	Fairfax DPSC	Fairfax County
Sally	Fitzpatrick	Fairfax DPSC	Supervisor
Tim	Fowler	Fairfax County Fire and Rescue	Fairfax County
Chris	Frederick	Fairfax DPSC	Fairfax County
Chris	Frederick	Fairfax DPSC	Fairfax County
David	Haga		Verizon
Jeff	Horwitz	ECC Deputy Commander	Arlington County ECC
Dale	Johnson	Alexandria Comm.	City of Alexandria
Dale	Johnson	Alexandria Comm.	Alexandria
Ron	Manzo	FCPD	Fairfax County
Dario	Marquez	President and CEO	MVM
Jamal	Matthews	Firewall Administrator	City of Falls Church
Stephen	Matthews	Sup. Electronic Engineer	DC Office of Unified Communications
William	McGown	Operations Manager	Prince George's County
Steve	McMurren	Fairfax DPSC	Fairfax County
Julie	Miller		Verizon
Ron	Novak	FCPD	Fairfax County

David	Ogburn	State Government Affairs	Verizon
Bridget	Owens	Fairfax DPSC	Fairfax County
Robert	Pedersen	Regional Coordinator	DHS/OEC
Sheila	Ragan	Operations Manager	Prince William County
Glenn	Roach	Vice President	Winbourne Consulting
Tony	Rose	Chief, Fire & EMS Communications	Charles County
Joe	Ruggiero	Verizon	Verizon
Sandy	Salang	Assistant to City Manager	City of Falls Church
Charlie	Schwab	IT Mgr., Montgomery	Police Dept 9-1-1
Rob	Stalzer	DCEX	Fairfax County
Kimberly	Suiters		CBS Radio
Penny	VanDyke		Prince George's County
Laura	Walt	General Counsel's Office	DC Public Service Commission
Erin	Ward	Fairfax County Attorney's Office	Fairfax County
Stephen	Williams	IT Mgr.	DC Office of Unified Communications

COG Consultant: Glenn A. Roach


Frederick
City of Frederick
Montgomery
Gaithersburg
Rockville
Loudoun
Takoma Park
Greenbelt
College Park
Bladensburg
Bowie
DC
Arlington
Falls Church
City of Fairfax
Alexandria
Manassas
Manassas Park
Fairfax
Prince George's
Prince William
Charles
Full Outage
Partial Outage
No Outage

9-1-1 CENTERS IMPACTED BY THE OUTAGE

Virginia PSAPs

Amelia County PSAP 2094 –PSAP experienced a loss of both ALI links.

Arlington County Primary PSAP 6008 – PSAP experienced a failure of their 911 Fairfax tandem trunks, a sporadic loss of ANI and loss of three PRI spans that carry administrative traffic.

Arlington County Backup PSAP 6002 – PSAP experienced a loss of all four ALI links..

Bedford County PSAP 2001 – PSAP experienced a loss of ALI, issue was determined to be CPE caused..

Fairfax PSAP 6009 – PSAP experienced a loss of 911 trunk groups for Wireless, Wireline, and Voice over IP (VoIP) and the loss of all four ALI links.

Fairfax County Alternate PSAP 6000 – PSAP experienced loss of ALI at backup site.

Fairfax City Secondary PSAP 6007 – PSAP experienced a loss of ALI at backup site..

Fauquier County (Warrenton) PSAP 2053 – PSAP lost commercial power and after commercial power was restored, the PSAP then lost ALI and all four 911 trunks were out of service in the Fairfax and Alexandria tandems.

Giles County (Pearisburg) PSAP 2057 – Non-Verizon maintained CPE server had failed. Loss of ALI.

Gloucester County PSAP 2127 – PSAP lost commercial power impacting CPE. .

Herndon Town Secondary PSAP 6003 – PSAP experienced a loss of both ALI links.

Langley Air Force Base Secondary PSAP 2013 – PSAP experienced a loss of both ALI links

Loudon County (Leesburg) PSAP 2068 - PSAP experienced loss of Automatic Number Identification (ANI) on wireless calls. PSAP is dual served from Fairfax/Alexandria mated pair selective routers in Northern VA, and Fredericksburg/Winchester mated pair in Culpeper LATA. All trunks from Fairfax and Alexandria failed.

City of Manassas PSAP 2136 – PSAP experienced all ALI links were out of service. 911 wireline calls to the Fairfax tandem failed due to the Fairfax central office SS7 isolation, and 911 wireline calls that would have been routed through the Alexandria tandem from the Manassas local switch failed because the 911 trunks connecting the two were down.

Manassas Park PSAP 2137 – PSAP experienced a loss of all ALI links.

Mathews County PSAP 2209 - PSAP experienced a loss of all ALI links.

Middlesex County (Saluda) PSAP 2138 - PSAP experienced trunk OOS condition

9-1-1 CENTERS IMPACTED BY THE OUTAGE

New Kent County PSAP 2073 – PSAP experienced loss of both ALI links along with a CPE issue.

Prince William County PSAP 2135 – PSAP experienced a loss of all ALI links. PSAP activates network controls to re-reroute wireless and wireline calls through the Alexandria tandem but the re-routes failed.

Southampton County PSAP 2125 –PSAP experienced a loss of both ALI links. This event was determined to be related to the loss of transport gear due to power loss and hardware damage.

Stafford County PSAP 2189 – PSAP experienced 911 Wireline and Wireless trunk impact.

Vienna Town PSAP 6004 – PSAP experienced a loss of both ALI links and impact to the Alexandria and Fairfax tandem trunks which were down.

Sussex County PSAP 2102 - PSAP experienced a power surge on their CPE. The PSAP requested a reroute to 10-digit administrative lines.

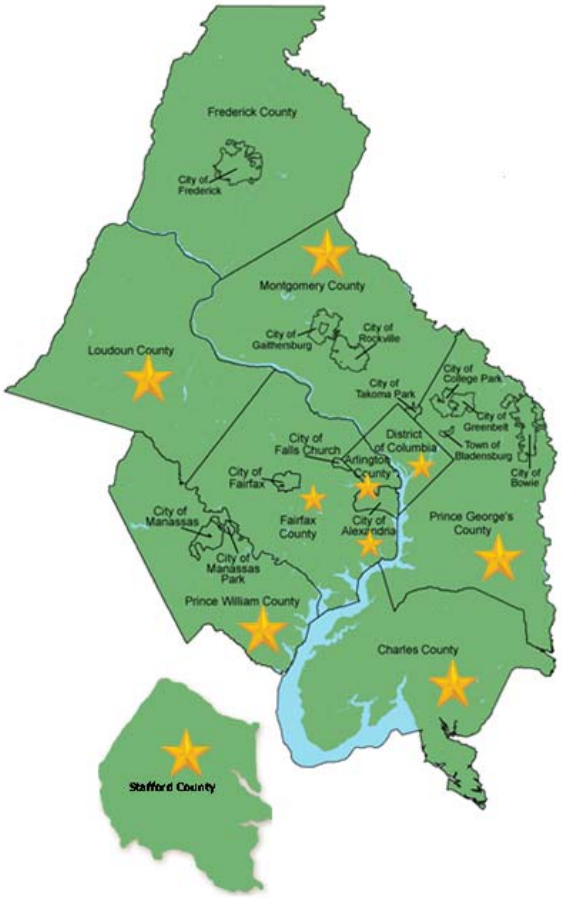
Metropolitan Washington Airport Authority PSAP 6010 - PSAP experienced their Private Line (PL) circuits were down and indicated that intermittent 911 call receipt occurring.

Maryland PSAPs

Caroline County (Denton) PSAP 7005 - PSAP experienced that both of the PSAP's wireless trunks were down.

Garrett County (Oakland) PSAP 7011 - Verizon's investigation found that only wireless carrier US Cellular had a routing problem as all other Wireless carriers calls were coming into PSAP with ALI.

Jurisdictions Involved in Development of Report



Involved Parties in COG 9-1-1 Report

- Arlington County
- City of Alexandria
- Fairfax County
- Prince William County
- Loudoun County
- Stafford County
- District of Columbia
- Montgomery County
- Prince George's County
- Charles County
- Maryland Public Service Commission
- Maryland Emergency Number Systems Board

METROPOLITAN WASHINGTON COUNCIL OF GOVERNMENTS
777 North Capitol Street, N.E.
Washington, D.C. 20002

RESOLUTION TO ENCOURAGE STEPS TO ADDRESS VERIZON 9-1-1 SERVICE GAPS DURING AND FOLLOWING THE DERECHO STORM ON JUNE 29, 2012

WHEREAS, on June 29, 2012, the National Capital Region experienced unusually severe weather from Derecho storms which necessitated substantial mobilization of emergency personnel and equipment on that date and during subsequent days; however, both the public and local 9-1-1 offices were frustrated in obtaining and providing emergency responses by the periodic and extended failure of 9-1-1 service, on which the region depends; and

WHEREAS, Verizon's 9-1-1 service has previously and periodically failed, and local governments of the National Capital Region, their 9-1-1 centers and emergency managers, and the public have not been assured that the problems causing it to do so have been fixed; and

WHEREAS, the Board of Directors is extremely concerned that such gaps have occurred and increased the risks to the safety and lives of residents of the National Capital Region who have come to rely on such service; and

WHEREAS, COG has learned that the Commonwealth of Virginia State Corporation Commission has entered an order establishing an investigation regarding problems with 9-1-1 emergency call services within the Commonwealth from the June storms, and also that the Federal Communications Commission's staff will meet with carriers to explore the cause of service issues to 9-1-1 centers; and

WHEREAS, COG, through the work of its Chief Administrative Officers Committee and area 9-1-1 managers previously advised Verizon of its concerns with gaps in 9-1-1 service in 2011; and

WHEREAS, constant, reliable 9-1-1 service is a necessity for the National Capital Region, and the COG Board desires to strongly encourage steps which it believes will expedite addressing the gaps which have been experienced in such service at the Verizon, regional, state and national levels; and

WHEREAS, by separate resolution, the Board of Directors is addressing the need for an after-action report as a matter of preventive practice for future emergencies;

NOW, THEREFORE, BE IT RESOLVED BY THE BOARD OF DIRECTORS OF THE METROPOLITAN WASHINGTON COUNCIL OF GOVERNMENTS (COG) THAT

1. LOCAL AND STATE GOVERNMENT TECHNICAL INPUT – The COG Board directs its technical and other committees with expertise in 9-1-1 service, telecommunications and related matters to compile, assess and identify actions required to address the 9-1-1 service issues during and following the June 29 storms. Participating committees include but are not limited to 9-1-1 directors, public information officials, chief information/technology officers and emergency management directors.

2. COMMITTEE WORK SCOPE AND OUTCOMES – The 9-1-1 Telecommunications Network Response Steering Group, comprised of technical committee representatives shall finalize and manage a scope of work that includes:

    a. Determine cause of Verizon's 9-1-1 failure;
    b. Examining existing redundancy and backup capabilities;
    c. Examine vulnerability of newer technologies that required battery or back-up power, including home and business service;
    d. Pursue opportunities for COG localities to influence and strengthen regulatory oversight and remedies at the state and federal levels; and
    e. Ensure improved communication or messaging from Verizon 9-1-1 to the public and to local emergency response officials concerning 9-1-1 Emergency Network service.

    The Steering Group shall Include participation and input by Verizon and state and federal regulatory and oversight agencies, and report its findings and recommendations to the COG Board no later than October 31, 2012.

3. FUNDING RESOURCES – The COG Board authorizes the Executive Director or his designee to spend an amount not to exceed $50,000 in FY 2013 contingency reserve funding.

4. TRANSMITTAL – Copies of this resolution shall be transmitted to the Federal Communications Commission, the Mayor of the District of Columbia and Governors of the State of Maryland and Commonwealth of Virginia, state telecommunications regulatory and oversight agencies, the COG Chief Administrative Officers Committee, and the National Capital Region Emergency Preparedness Council.

The foregoing resolution was unanimously approved and adopted by the COG Board of Directors at its regular meeting held on July 11, 2012.

Barbara J. Chapman
Executive Board Secretary

METROPOLITAN WASHINGTON COUNCIL OF GOVERNMENTS
777 North Capitol Street, N.E.
Washington, D.C. 20002

RESOLUTION DIRECTING AFTER-ACTION REPORT ON THE DERECHO STORM ON JUNE 29, 2012

WHEREAS, on June 29, 2012, the National Capital Region experienced unusually severe weather from Derecho storms which necessitated substantial mobilization of emergency personnel and equipment on that date and during subsequent days; and

WHEREAS, by separate resolution, the Board of Directors is taking action to address Verizon 9-1-1 service gaps in the National Capital Region; and

WHEREAS, as a matter of preventive practice for future emergencies, COG should build on and partner with local, state and federal government officials to review and implement findings and recommendations concerning the June 29, 2012, storm and its aftermath;

NOW, THEREFORE, BE IT RESOLVED BY THE BOARD OF DIRECTORS OF THE METROPOLITAN WASHINGTON COUNCIL OF GOVERNMENTS (COG) THAT

REGIONAL AFTER-ACTION REPORT – To examine and broadly identify opportunities for improvement in emergency preparedness, coordination and response associated with the June 29 storm, the National Capital Region Emergency Preparedness Council, and the Senior Policy Group and Chief Administrative Officers Committee are requested to identify relevant outcomes from past after-action reports and/or support a new Urban Area Security Initiative grant-funded after-action report. The new after-action report, if required, should be inclusive of key regional and local issues, including weather notification, emergency coordination and response, and critical infrastructure such as electric power, telecommunications and water, and notification to the public. The compilation of past after-action report outcomes and/or new after-action outcomes should be completed and made available to the EPC and the COG Board no later than December 15, 2012.

TRANSMITTAL – Copies of this resolution shall be transmitted to the Mayor of the District of Columbia and Governors of the State of Maryland and Commonwealth of Virginia, state telecommunications regulatory and oversight agencies, the COG Chief Administrative Officers Committee, and the National Capital Region Emergency Preparedness Council.

The foregoing resolution was unanimously approved and adopted by the COG Board of Directors at its regular meeting held on July 11, 2012.

Barbara J. Chapman
Executive Board Secretary

PUBLIC LAW 108–494—DEC. 23, 2004

ENHANCE 911 SERVICES

Public Law 108–494
108th Congress

An Act

To amend the National Telecommunications and Information Administration Organization Act to facilitate the reallocation of spectrum from governmental to commercial users; to improve, enhance, and promote the Nation's homeland security, public safety, and citizen activated emergency response capabilities through the use of enhanced 911 services, to further upgrade Public Safety Answering Point capabilities and related functions in receiving E–911 calls, and to support in the construction and operation of a ubiquitous and reliable citizen activated system; and to provide that funds received as universal service contributions under section 254 of the Communications Act of 1934 and the universal service support programs established pursuant thereto are not subject to certain provisions of title 31, United States Code, commonly known as the Antideficiency Act, for a period of time.

Dec. 23, 2004
[H.R. 5419]

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,

TITLE I—E–911

Ensuring Needed Help Arrives Near Callers Employing 911 Act of 2004.
47 USC 901 note.

SEC. 101. SHORT TITLE.

This title may be cited as the "Ensuring Needed Help Arrives Near Callers Employing 911 Act of 2004" or the "ENHANCE 911 Act of 2004".

47 USC 942 note.

SEC. 102. FINDINGS.

The Congress finds that—

(1) for the sake of our Nation's homeland security and public safety, a universal emergency telephone number (911) that is enhanced with the most modern and state-of-the-art telecommunications capabilities possible should be available to all citizens in all regions of the Nation;

(2) enhanced emergency communications require Federal, State, and local government resources and coordination;

(3) any funds that are collected from fees imposed on consumer bills for the purposes of funding 911 services or enhanced 911 should go only for the purposes for which the funds are collected; and

(4) enhanced 911 is a high national priority and it requires Federal leadership, working in cooperation with State and local governments and with the numerous organizations dedicated to delivering emergency communications services.

47 USC 942 note.

SEC. 103. PURPOSES.

The purposes of this title are—

(1) to coordinate 911 services and E–911 services, at the Federal, State, and local levels; and

(2) to ensure that funds collected on telecommunications bills for enhancing emergency 911 services are used only for the purposes for which the funds are being collected.

SEC. 104. COORDINATION OF E–911 IMPLEMENTATION.

Part C of title I of the National Telecommunications and Information Administration Organization Act (47 U.S.C. 901 et seq.) is amended by adding at the end the following:

"SEC. 158. COORDINATION OF E–911 IMPLEMENTATION. 47 USC 942.

"(a) E–911 IMPLEMENTATION COORDINATION OFFICE.—

"(1) ESTABLISHMENT.—The Assistant Secretary and the Administrator of the National Highway Traffic Safety Administration shall—

"(A) establish a joint program to facilitate coordination and communication between Federal, State, and local emergency communications systems, emergency personnel, public safety organizations, telecommunications carriers, and telecommunications equipment manufacturers and vendors involved in the implementation of E–911 services; and

"(B) create an E-911 Implementation Coordination Office to implement the provisions of this section.

"(2) MANAGEMENT PLAN.—The Assistant Secretary and the Administrator shall jointly develop a management plan for the program established under this section. Such plan shall include the organizational structure and funding profiles for the 5-year duration of the program. The Assistant Secretary and the Administrator shall, within 90 days after the date of enactment of this Act, submit the management plan to the Committees on Energy and Commerce and Appropriations of the House of Representatives and the Committees on Commerce, Science, and Transportation and Appropriations of the Senate. Deadline.

"(3) PURPOSE OF OFFICE.—The Office shall—

"(A) take actions, in concert with coordinators designated in accordance with subsection (b)(3)(A)(ii), to improve such coordination and communication;

"(B) develop, collect, and disseminate information concerning practices, procedures, and technology used in the implementation of E–911 services;

"(C) advise and assist eligible entities in the preparation of implementation plans required under subsection (b)(3)(A)(iii);

"(D) receive, review, and recommend the approval or disapproval of applications for grants under subsection (b); and

"(E) oversee the use of funds provided by such grants in fulfilling such implementation plans.

"(4) REPORTS.—The Assistant Secretary and the Administrator shall provide a joint annual report to Congress by the first day of October of each year on the activities of the Office to improve coordination and communication with respect to the implementation of E–911 services.

"(b) PHASE II E–911 IMPLEMENTATION GRANTS.—

"(1) MATCHING GRANTS.—The Assistant Secretary and the Administrator, after consultation with the Secretary of Homeland Security and the Chairman of the Federal Communications

Commission, and acting through the Office, shall provide grants to eligible entities for the implementation and operation of Phase II E–911 services.

"(2) MATCHING REQUIREMENT.—The Federal share of the cost of a project eligible for a grant under this section shall not exceed 50 percent. The non-Federal share of the cost shall be provided from non-Federal sources.

"(3) COORDINATION REQUIRED.—In providing grants under paragraph (1), the Assistant Secretary and the Administrator shall require an eligible entity to certify in its application that—

"(A) in the case of an eligible entity that is a State government, the entity—

"(i) has coordinated its application with the public safety answering points (as such term is defined in section 222(h)(4) of the Communications Act of 1934) located within the jurisdiction of such entity;

"(ii) has designated a single officer or governmental body of the entity to serve as the coordinator of implementation of E–911 services, except that such designation need not vest such coordinator with direct legal authority to implement E–911 services or manage emergency communications operations;

"(iii) has established a plan for the coordination and implementation of E–911 services; and

"(iv) has integrated telecommunications services involved in the implementation and delivery of phase II E–911 services; or

"(B) in the case of an eligible entity that is not a State, the entity has complied with clauses (i), (iii), and (iv) of subparagraph (A), and the State in which it is located has complied with clause (ii) of such subparagraph.

Regulations. Deadlines.

"(4) CRITERIA.—The Assistant Secretary and the Administrator shall jointly issue regulations within 180 days after the date of enactment of the ENHANCE 911 Act of 2004, after a public comment period of not less than 60 days, prescribing the criteria for selection for grants under this section, and shall update such regulations as necessary. The criteria shall include performance requirements and a timeline for completion of any project to be financed by a grant under this section.

"(c) DIVERSION OF E–911 CHARGES.—

"(1) DESIGNATED E–911 CHARGES.—For the purposes of this subsection, the term 'designated E–911 charges' means any taxes, fees, or other charges imposed by a State or other taxing jurisdiction that are designated or presented as dedicated to deliver or improve E–911 services.

"(2) CERTIFICATION.—Each applicant for a matching grant under this section shall certify to the Assistant Secretary and the Administrator at the time of application, and each applicant that receives such a grant shall certify to the Assistant Secretary and the Administrator annually thereafter during any period of time during which the funds from the grant are available to the applicant, that no portion of any designated E–911 charges imposed by a State or other taxing jurisdiction within which the applicant is located are being obligated or expended for any purpose other than the purposes for which

such charges are designated or presented during the period beginning 180 days immediately preceding the date of the application and continuing through the period of time during which the funds from the grant are available to the applicant.

"(3) CONDITION OF GRANT.—Each applicant for a grant under this section shall agree, as a condition of receipt of the grant, that if the State or other taxing jurisdiction within which the applicant is located, during any period of time during which the funds from the grant are available to the applicant, obligates or expends designated E–911 charges for any purpose other than the purposes for which such charges are designated or presented, all of the funds from such grant shall be returned to the Office.

"(4) PENALTY FOR PROVIDING FALSE INFORMATION.—Any applicant that provides a certification under paragraph (1) knowing that the information provided in the certification was false shall—

"(A) not be eligible to receive the grant under subsection (b);

"(B) return any grant awarded under subsection (b) during the time that the certification was not valid; and

"(C) not be eligible to receive any subsequent grants under subsection (b).

"(d) AUTHORIZATION; TERMINATION.—

"(1) AUTHORIZATION.—There are authorized to be appropriated to the Department of Transportation, for the purposes of grants under the joint program operated under this section with the Department of Commerce, not more than $250,000,000 for each of the fiscal years 2005 through 2009, not more than 5 percent of which for any fiscal year may be obligated or expended for administrative costs.

"(2) TERMINATION.—The provisions of this section shall cease to be effective on October 1, 2009.

"(e) DEFINITIONS.—As used in this section:

"(1) OFFICE.—The term 'Office' means the E–911 Implementation Coordination Office.

"(2) ADMINISTRATOR.—The term 'Administrator' means the Administrator of the National Highway Traffic Safety Administration.

"(3) ELIGIBLE ENTITY.—

"(A) IN GENERAL.—The term 'eligible entity' means a State or local government or a tribal organization (as defined in section 4(l) of the Indian Self-Determination and Education Assistance Act (25 U.S.C. 450b(l))).

"(B) INSTRUMENTALITIES.—Such term includes public authorities, boards, commissions, and similar bodies created by one or more eligible entities described in subparagraph (A) to provide E–911 services.

"(C) EXCEPTION.—Such term does not include any entity that has failed to submit the most recently required certification under subsection (c) within 30 days after the date on which such certification is due.

"(4) E–911 SERVICES.—The term 'E–911 services' means both phase I and phase II enhanced 911 services, as described in section 20.18 of the Commission's regulations (47 C.F.R. 20.18), as in effect on the date of enactment of the ENHANCE

911 Act of 2004, or as subsequently revised by the Federal Communications Commission.

"(5) PHASE II E–911 SERVICES.—The term 'phase II E–911 services' means only phase II enhanced 911 services, as described in such section 20.18 (47 C.F.R. 20.18), as in effect on such date, or as subsequently revised by the Federal Communications Commission.

"(6) STATE.—The term 'State' means any State of the United States, the District of Columbia, Puerto Rico, the Northern Mariana Islands, and any territory or possession of the United States.".

SEC. 105. GAO STUDY OF STATE AND LOCAL USE OF 911 SERVICE CHARGES.

Deadline.

(a) IN GENERAL.—Within 60 days after the date of enactment of this Act, the Comptroller General shall initiate a study of—

(1) the imposition of taxes, fees, or other charges imposed by States or political subdivisions of States that are designated or presented as dedicated to improve emergency communications services, including 911 services or enhanced 911 services, or related to emergency communications services operations or improvements; and

(2) the use of revenues derived from such taxes, fees, or charges.

(b) REPORT.—Within 18 months after initiating the study required by subsection (a), the Comptroller General shall transmit a report on the results of the study to the Senate Committee on Commerce, Science, and Transportation and the House of Representatives Committee on Energy and Commerce setting forth the findings, conclusions, and recommendations, if any, of the study, including—

(1) the identity of each State or political subdivision that imposes such taxes, fees, or other charges; and

(2) the amount of revenues obligated or expended by that State or political subdivision for any purpose other than the purposes for which such taxes, fees, or charges were designated or presented.

SEC. 106. REPORT ON THE DEPLOYMENT OF E–911 PHASE II SERVICES BY TIER III SERVICE PROVIDERS.

Within 90 days after the date of enactment of this Act, the Federal Communications Commission shall submit a report to the Committee on Energy and Commerce of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate detailing—

(1) the number of tier III commercial mobile service providers that are offering phase II E–911 services;

(2) the number of requests for waivers from compliance with the Commission's phase II E–911 service requirements received by the Commission from such tier III providers;

(3) the number of waivers granted or denied by the Commission to such tier III providers;

(4) how long each waiver request remained pending before it was granted or denied;

(5) how many waiver requests are pending at the time of the filing of the report;

(6) when the pending requests will be granted or denied;

(7) actions the Commission has taken to reduce the amount of time a waiver request remains pending; and

(8) the technologies that are the most effective in the deployment of phase II E–911 services by such tier III providers.

SEC. 107. FCC REQUIREMENTS FOR CERTAIN TIER III CARRIERS.

(a) IN GENERAL.—The Federal Communications Commission shall act on any petition filed by a qualified Tier III carrier requesting a waiver of compliance with the requirements of section 20.18(g)(1)(v) of the Commission's rules (47 C.F.R. 20.18(g)(1)(v)) within 100 days after the Commission receives the petition. The Commission shall grant the waiver of compliance with the requirements of section 20.18(g)(1)(v) of the Commission's rules (47 C.F.R. 20.18(g)(1)(v)) requested by the petition if it determines that strict enforcement of the requirements of that section would result in consumers having decreased access to emergency services.

(b) QUALIFIED TIER III CARRIER DEFINED.—In this section, the term "qualified Tier III carrier" means a provider of commercial mobile service (as defined in section 332(d) of the Communications Act of 1934 (47 U.S.C. 332(d)) that had 500,000 or fewer subscribers as of December 31, 2001.

TITLE II—SPECTRUM RELOCATION

Commercial Spectrum Enhancement Act.
47 USC 901 note.

SEC. 201. SHORT TITLE.

This title may be cited as the "Commercial Spectrum Enhancement Act".

SEC. 202. RELOCATION OF ELIGIBLE FEDERAL ENTITIES FOR THE REALLOCATION OF SPECTRUM FOR COMMERCIAL PURPOSES.

Section 113(g) of the National Telecommunications and Information Administration Organization Act (47 U.S.C. 923(g)) is amended by striking paragraphs (1) through (3) and inserting the following:

"(1) ELIGIBLE FEDERAL ENTITIES.—Any Federal entity that operates a Federal Government station assigned to a band of frequencies specified in paragraph (2) and that incurs relocation costs because of the reallocation of frequencies from Federal use to non-Federal use shall receive payment for such costs from the Spectrum Relocation Fund, in accordance with section 118 of this Act. For purposes of this paragraph, Federal power agencies exempted under subsection (c)(4) that choose to relocate from the frequencies identified for reallocation pursuant to subsection (a), are eligible to receive payment under this paragraph.

"(2) ELIGIBLE FREQUENCIES.—The bands of eligible frequencies for purposes of this section are as follows:

"(A) the 216–220 megahertz band, the 1432–1435 megahertz band, the 1710–1755 megahertz band, and the 2385–2390 megahertz band of frequencies; and

"(B) any other band of frequencies reallocated from Federal use to non-Federal use after January 1, 2003, that is assigned by competitive bidding pursuant to section 309(j) of the Communications Act of 1934 (47 U.S.C. 309(j)), except for bands of frequencies previously identified by

the National Telecommunications and Information Administration in the Spectrum Reallocation Final Report, NTIA Special Publication 95–32 (1995).

"(3) DEFINITION OF RELOCATION COSTS.—For purposes of this subsection, the term 'relocation costs' means the costs incurred by a Federal entity to achieve comparable capability of systems, regardless of whether that capability is achieved by relocating to a new frequency assignment or by utilizing an alternative technology. Such costs include—

"(A) the costs of any modification or replacement of equipment, software, facilities, operating manuals, training costs, or regulations that are attributable to relocation;

"(B) the costs of all engineering, equipment, software, site acquisition and construction costs, as well as any legitimate and prudent transaction expense, including outside consultants, and reasonable additional costs incurred by the Federal entity that are attributable to relocation, including increased recurring costs associated with the replacement facilities;

"(C) the costs of engineering studies, economic analyses, or other expenses reasonably incurred in calculating the estimated relocation costs that are provided to the Commission pursuant to paragraph (4) of this subsection;

"(D) the one-time costs of any modification of equipment reasonably necessary to accommodate commercial use of such frequencies prior to the termination of the Federal entity's primary allocation or protected status, when the eligible frequencies as defined in paragraph (2) of this subsection are made available for private sector uses by competitive bidding and a Federal entity retains primary allocation or protected status in those frequencies for a period of time after the completion of the competitive bidding process; and

"(E) the costs associated with the accelerated replacement of systems and equipment if such acceleration is necessary to ensure the timely relocation of systems to a new frequency assignment.

"(4) NOTICE TO COMMISSION OF ESTIMATED RELOCATION COSTS.—

"(A) The Commission shall notify the NTIA at least 18 months prior to the commencement of any auction of eligible frequencies defined in paragraph (2). At least 6 months prior to the commencement of any such auction, the NTIA, on behalf of the Federal entities and after review by the Office of Management and Budget, shall notify the Commission of estimated relocation costs and timelines for such relocation.

"(B) Upon timely request of a Federal entity, the NTIA shall provide such entity with information regarding an alternative frequency assignment or assignments to which their radiocommunications operations could be relocated for purposes of calculating the estimated relocation costs and timelines to be submitted to the Commission pursuant to subparagraph (A).

"(C) To the extent practicable and consistent with national security considerations, the NTIA shall provide the information required by subparagraphs (A) and (B)

by the geographic location of the Federal entities' facilities or systems and the frequency bands used by such facilities or systems.

"(5) NOTICE TO CONGRESSIONAL COMMITTEES AND GAO.—The NTIA shall, at the time of providing an initial estimate of relocation costs to the Commission under paragraph (4)(A), submit to Committees on Appropriations and Energy and Commerce of the House of Representatives for approval, to the Committees on Appropriations and Commerce, Science, and Transportation of the Senate for approval, and to the Comptroller General a copy of such estimate and the timelines for relocation. Unless disapproved within 30 days, the estimate shall be approved. If disapproved, the NTIA may resubmit a revised initial estimate. Deadline.

"(6) IMPLEMENTATION OF PROCEDURES.—The NTIA shall take such actions as necessary to ensure the timely relocation of Federal entities' spectrum-related operations from frequencies defined in paragraph (2) to frequencies or facilities of comparable capability. Upon a finding by the NTIA that a Federal entity has achieved comparable capability of systems by relocating to a new frequency assignment or by utilizing an alternative technology, the NTIA shall terminate the entity's authorization and notify the Commission that the entity's relocation has been completed. The NTIA shall also terminate such entity's authorization if the NTIA determines that the entity has unreasonably failed to comply with the timeline for relocation submitted by the Director of the Office of Management and Budget under section 118(d)(2)(B).". Notification.

SEC. 203. MINIMUM AUCTION RECEIPTS AND DISPOSITION OF PROCEEDS.

(a) AUCTION DESIGN.—Section 309(j)(3) of the Communications Act of 1934 (47 U.S.C. 309(j)(3)) is amended—

(1) by striking "and" at the end of subparagraph (D);

(2) by striking the period at the end of subparagraph (E) and inserting "; and"; and

(3) by adding at the end the following new subparagraph:

"(F) for any auction of eligible frequencies described in section 113(g)(2) of the National Telecommunications and Information Administration Organization Act (47 U.S.C. 923(g)(2)), the recovery of 110 percent of estimated relocation costs as provided to the Commission pursuant to section 113(g)(4) of such Act.".

(b) SPECIAL AUCTION PROVISIONS FOR ELIGIBLE FREQUENCIES.—Section 309(j) of such Act is further amended by adding at the end the following new paragraph:

"(15) SPECIAL AUCTION PROVISIONS FOR ELIGIBLE FREQUENCIES.—

"(A) SPECIAL REGULATIONS.—The Commission shall revise the regulations prescribed under paragraph (4)(F) of this subsection to prescribe methods by which the total cash proceeds from any auction of eligible frequencies described in section 113(g)(2) of the National Telecommunications and Information Administration Organization Act (47 U.S.C. 923(g)(2)) shall at least equal 110 percent of the total estimated relocation costs provided to the Commission pursuant to section 113(g)(4) of such Act.

"(B) CONCLUSION OF AUCTIONS CONTINGENT ON MINIMUM PROCEEDS.—The Commission shall not conclude any auction of eligible frequencies described in section 113(g)(2) of such Act if the total cash proceeds attributable to such spectrum are less than 110 percent of the total estimated relocation costs provided to the Commission pursuant to section 113(g)(4) of such Act. If the Commission is unable to conclude an auction for the foregoing reason, the Commission shall cancel the auction, return within 45 days after the auction cancellation date any deposits from participating bidders held in escrow, and absolve such bidders from any obligation to the United States to bid in any subsequent reauction of such spectrum.

Deadline.

"(C) AUTHORITY TO ISSUE PRIOR TO DEAUTHORIZATION.—In any auction conducted under the regulations required by subparagraph (A), the Commission may grant a license assigned for the use of eligible frequencies prior to the termination of an eligible Federal entity's authorization. However, the Commission shall condition such license by requiring that the licensee cannot cause harmful interference to such Federal entity until such entity's authorization has been terminated by the National Telecommunications and Information Administration.".

(c) DEPOSIT OF PROCEEDS.—Paragraph (8) of section 309(j) of the Communications Act of 1934 (47 U.S.C. 309(j)) is amended—

(1) in subparagraph (A), by inserting "or subparagraph (D)" after "subparagraph (B)"; and

(2) by adding at the end the following new subparagraph:

"(D) DISPOSITION OF CASH PROCEEDS.—Cash proceeds attributable to the auction of any eligible frequencies described in section 113(g)(2) of the National Telecommunications and Information Administration Organization Act (47 U.S.C. 923(g)(2)) shall be deposited in the Spectrum Relocation Fund established under section 118 of such Act, and shall be available in accordance with that section.".

SEC. 204. ESTABLISHMENT OF FUND AND PROCEDURES.

Part B of the National Telecommunications and Information Administration Organization Act is amended by adding after section 117 (47 U.S.C. 927) the following new section:

47 USC 928.

"SEC. 118. SPECTRUM RELOCATION FUND.

"(a) ESTABLISHMENT OF SPECTRUM RELOCATION FUND.—There is established on the books of the Treasury a separate fund to be known as the 'Spectrum Relocation Fund' (in this section referred to as the 'Fund'), which shall be administered by the Office of Management and Budget (in this section referred to as 'OMB'), in consultation with the NTIA.

"(b) CREDITING OF RECEIPTS.—The Fund shall be credited with the amounts specified in section 309(j)(8)(D) of the Communications Act of 1934 (47 U.S.C. 309(j)(8)(D)).

"(c) USED TO PAY RELOCATION COSTS.—The amounts in the Fund from auctions of eligible frequencies are authorized to be used to pay relocation costs, as defined in section 113(g)(3) of this Act, of an eligible Federal entity incurring such costs with respect to relocation from those frequencies.

"(d) FUND AVAILABILITY.—

"(1) APPROPRIATION.—There are hereby appropriated from the Fund such sums as are required to pay the relocation costs specified in subsection (c).

"(2) TRANSFER CONDITIONS.—None of the funds provided under this subsection may be transferred to any eligible Federal entity—

"(A) unless the Director of OMB has determined, in consultation with the NTIA, the appropriateness of such costs and the timeline for relocation; and

"(B) until 30 days after the Director of OMB has submitted to the Committees on Appropriations and Energy and Commerce of the House of Representatives for approval, to the Committees on Appropriations and Commerce, Science, and Transportation of the Senate for approval, and to the Comptroller General a detailed plan describing specifically how the sums transferred from the Fund will be used to pay relocation costs in accordance with such subsection and the timeline for such relocation. Unless disapproved within 30 days, the amounts in the Fund shall be available immediately. If the plan is disapproved, the Director may resubmit a revised plan. Deadline.

"(3) REVERSION OF UNUSED FUNDS.—Any auction proceeds in the Fund that are remaining after the payment of the relocation costs that are payable from the Fund shall revert to and be deposited in the general fund of the Treasury not later than 8 years after the date of the deposit of such proceeds to the Fund. Deadline.

"(e) TRANSFER TO ELIGIBLE FEDERAL ENTITIES.—

"(1) TRANSFER.—

"(A) Amounts made available pursuant to subsection (d) shall be transferred to eligible Federal entities, as defined in section 113(g)(1) of this Act.

"(B) An eligible Federal entity may receive more than one such transfer, but if the sum of the subsequent transfer or transfers exceeds 10 percent of the original transfer—

"(i) such subsequent transfers are subject to prior approval by the Director of OMB as required by subsection (d)(2)(A);

"(ii) the notice to the committees containing the plan required by subsection (d)(2)(B) shall be not less than 45 days prior to the date of the transfer that causes such excess above 10 percent; Deadline.

"(iii) such notice shall include, in addition to such plan, an explanation of need for such subsequent transfer or transfers; and

"(iv) the Comptroller General shall, within 30 days after receiving such plan, review such plan and submit to such committees an assessment of the explanation for the subsequent transfer or transfers. Deadline.

"(C) Such transferred amounts shall be credited to the appropriations account of the eligible Federal entity which has incurred, or will incur, such costs, and shall, subject to paragraph (2), remain available until expended.

"(2) RETRANSFER TO FUND.—An eligible Federal entity that has received such amounts shall report its expenditures to OMB and shall transfer any amounts in excess of actual relocation costs back to the Fund immediately after the NTIA has Reports.

notified the Commission that the entity's relocation is complete, or has determined that such entity has unreasonably failed to complete such relocation in accordance with the timeline required by subsection (d)(2)(A).".

SEC. 205. TELECOMMUNICATIONS DEVELOPMENT FUND.

Section 714(f) of the Communications Act of 1934 (47 U.S.C. 614(f)) is amended to read as follows:

"(f) LENDING AND CREDIT OPERATIONS.—Loans or other extensions of credit from the Fund shall be made available to an eligible small business on the basis of—

"(1) the analysis of the business plan of the eligible small business;

"(2) the reasonable availability of collateral to secure the loan or credit extension;

"(3) the extent to which the loan or credit extension promotes the purposes of this section; and

"(4) other lending policies as defined by the Board.".

47 USC 921 note.

SEC. 206. CONSTRUCTION.

Nothing in this title is intended to modify section 1062(b) of the National Defense Authorization Act for Fiscal Year 2000 (Public Law 106–65).

47 USC 928 note.

SEC. 207. ANNUAL REPORT.

The National Telecommunications and Information Administration shall submit an annual report to the Committees on Appropriations and Energy and Commerce of the House of Representatives, the Committees on Appropriations and Commerce, Science, and Transportation of the Senate, and the Comptroller General on—

(1) the progress made in adhering to the timelines applicable to relocation from eligible frequencies required under section 118(d)(2)(A) of the National Telecommunications and Information Administration Organization Act, separately stated on a communication system-by-system basis and on an auction-by-auction basis; and

(2) with respect to each relocated communication system and auction, a statement of the estimate of relocation costs required under section 113(g)(4) of such Act, the actual relocations costs incurred, and the amount of such costs paid from the Spectrum Relocation Fund.

SEC. 208. PRESERVATION OF AUTHORITY; NTIA REPORT REQUIRED.

47 USC 923 note.

(a) SPECTRUM MANAGEMENT AUTHORITY RETAINED.—Except as provided with respect to the bands of frequencies identified in section 113(g)(2)(A) of the National Telecommunications and Information Administration Organization Act (47 U.S.C. 923(g)(2)(A)) as amended by this title, nothing in this title or the amendments made by this title shall be construed as limiting the Federal Communications Commission's authority to allocate bands of frequencies that are reallocated from Federal use to non-Federal use for unlicensed, public safety, shared, or non-commercial use.

(b) NTIA REPORT REQUIRED.—Within 1 year after the date of enactment of this Act, the Administrator of the National Telecommunications and Information Administration shall submit to the Energy and Commerce Committee of the House of Representatives and the Commerce, Science, and Transportation Committee

of the Senate a report on various policy options to compensate Federal entities for relocation costs when such entities' frequencies are allocated by the Commission for unlicensed, public safety, shared, or non-commercial use.

SEC. 209. COMMERCIAL SPECTRUM LICENSE POLICY REVIEW.

Reports. Deadline.

(a) EXAMINATION.—The Comptroller General shall examine national commercial spectrum license policy as implemented by the Federal Communications Commission, and shall report its findings to the Senate Committee on Commerce, Science, and Transportation and the House of Representatives Committee on Energy and Commerce within 270 days.

(b) CONTENT.—The report shall address each of the following:

(1) An estimate of the respective proportions of electromagnetic spectrum capacity that have been assigned by the Federal Communications Commission—

(A) prior to enactment of section 309(j) of the Communications Act of 1934 (47 U.S.C. 309(j)) providing to the Commission's competitive bidding authority,

(B) after enactment of that section using the Commission's competitive bidding authority, and

(C) by means other than competitive bidding,

and a description of the classes of licensees assigned under each method.

(2) The extent to which requiring entities to obtain licenses through competitive bidding places those entities at a competitive or financial disadvantage to offer services similar to entities that did not acquire licenses through competitive bidding.

(3) The effect, if any, of the use of competitive bidding and the resulting diversion of licensees' financial resources on the introduction of new services including the quality, pace, and scope of the offering of such services to the public.

(4) The effect, if any, of participation in competitive bidding by incumbent spectrum license holders as applicants or investors in an applicant, including a discussion of any additional effect if such applicant qualified for bidding credits as a designated entity.

(5) The effect on existing license holders and consumers of services offered by these providers of the Administration's Spectrum License User Fee proposal contained in the President's Budget of the United States Government for Fiscal Year 2004 (Budget, page 299; Appendix, page 1046), and an evaluation of whether the enactment of this proposal could address, either in part or in whole, any possible competitive disadvantages described in paragraph (2).

(c) FCC ASSISTANCE.—The Federal Communications Commission shall provide information and assistance, as necessary, to facilitate the completion of the examination required by subsection (a).

TITLE III—UNIVERSAL SERVICE

Universal Service Antideficiency Temporary Suspension Act.

SEC. 301. SHORT TITLE.

This title may be cited as the "Universal Service Antideficiency Temporary Suspension Act".

SEC. 302. APPLICATION OF CERTAIN TITLE 31 PROVISIONS TO UNIVERSAL SERVICE FUND.

Effective date. Termination date.

(a) IN GENERAL.—During the period beginning on the date of enactment of this Act and ending on December 31, 2005, section 1341 and subchapter II of chapter 15 of title 31, United States Code, do not apply—

(1) to any amount collected or received as Federal universal service contributions required by section 254 of the Communications Act of 1934 (47 U.S.C. 254), including any interest earned on such contributions; nor

(2) to the expenditure or obligation of amounts attributable to such contributions for universal service support programs established pursuant to that section.

(b) POST-2005 FULFILLMENT OF PROTECTED OBLIGATIONS.—Section 1341 and subchapter II of chapter 15 of title 31, United States Code, do not apply after December 31, 2005, to an expenditure or obligation described in subsection (a)(2) made or authorized during the period described in subsection (a).

Approved December 23, 2004.

LEGISLATIVE HISTORY—H.R. 5419 (S. 1250):

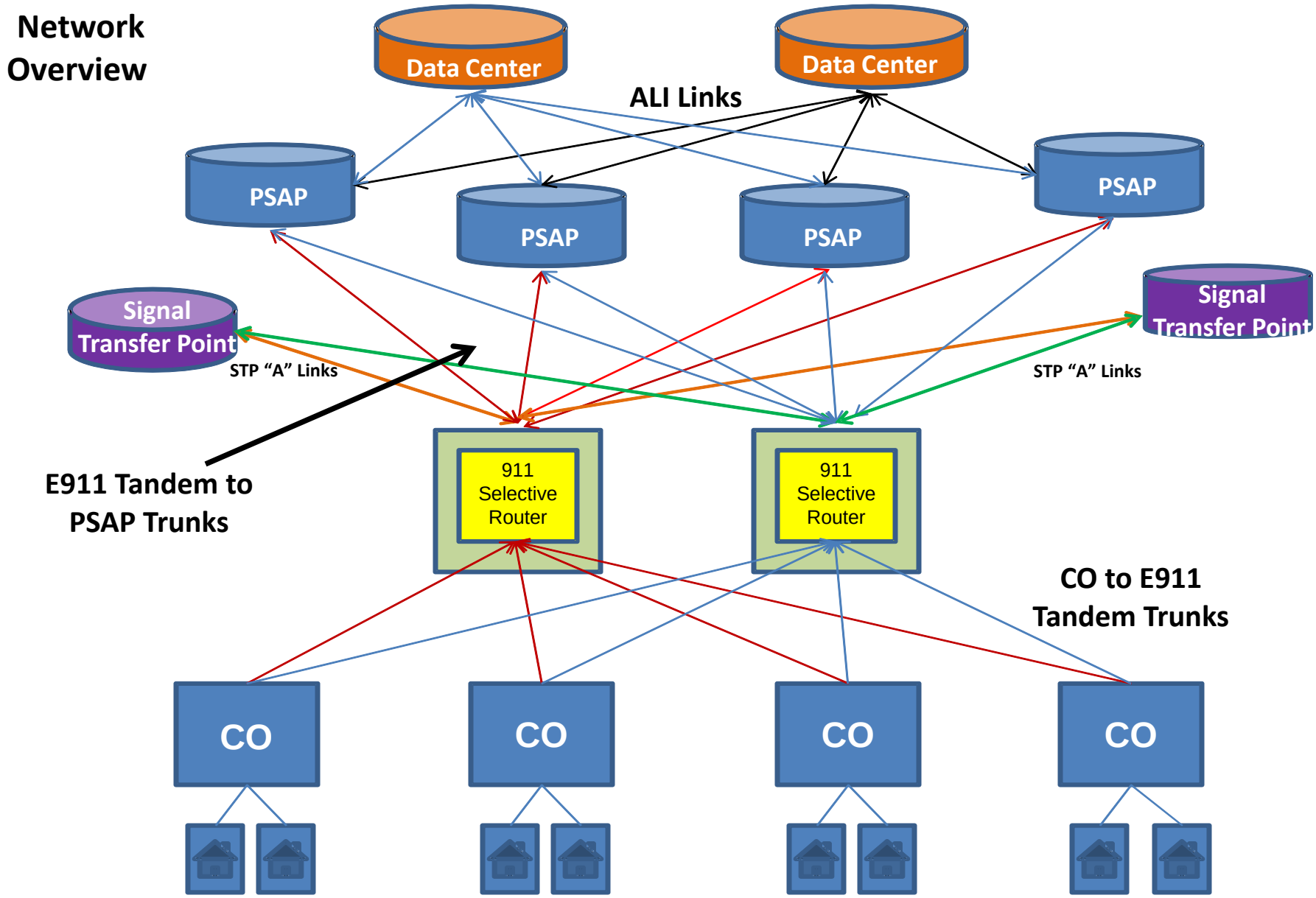
SENATE REPORTS: No. 108–130 accompanying S. 1250 (Comm. on Commerce, Science, and Transportation).

CONGRESSIONAL RECORD, Vol. 150 (2004):
Nov. 20, considered and passed House.
Dec. 8, considered and passed Senate.

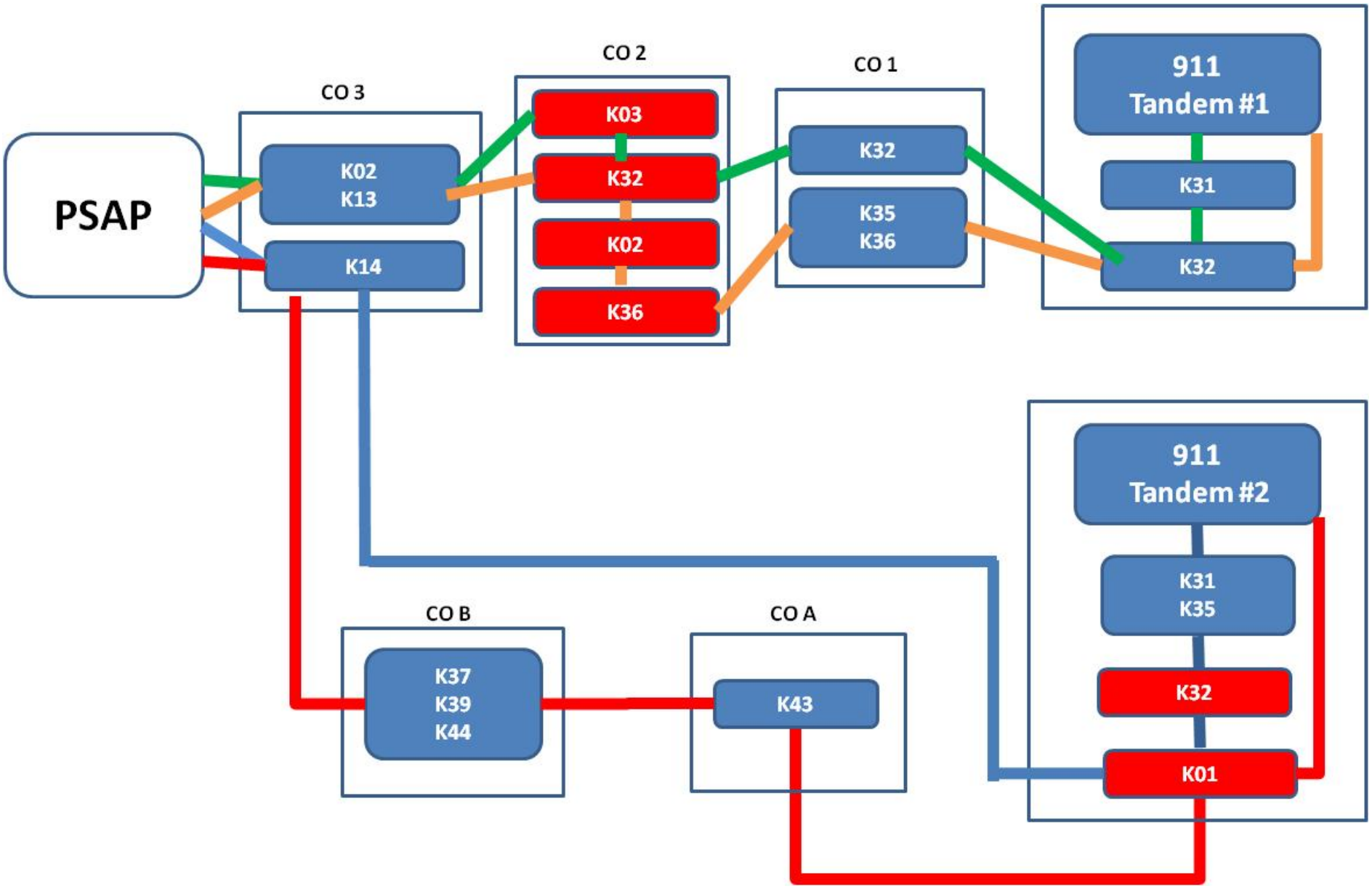
WEEKLY COMPILATION OF PRESIDENTIAL DOCUMENTS, Vol. 40 (2004):
Dec. 23, Presidential statement.

○

E911 Network Ecosystem



E911 to Tandem Routing



METROPOLITAN WASHINGTON COUNCIL OF GOVERNMENTS

One Region Moving Forward

June 21, 2011

Ivan G. Seidenberg
Chairman of the Board and CEO
Verizon
140 West Street
New York, NY 10007

Dear Mr. Seidenberg:

I am writing on behalf of the Metropolitan Washington Council of Governments (COG) Chief Administrative Officers Committee to bring to your attention significant concerns about Verizon 9-1-1 service in the National Capital Region. Specifically, there were serious service problems with 9-1-1 service on Memorial Day, May 30, 2011 that impacted residents in the National Capital Region and the larger Mid-Atlantic area.

The CAOs Committee is comprised of city and county managers from COG's 21 member local governments in the National Capital Region. Collectively we have made great progress, in partnership with federal and state agencies and the private sector, to strengthen emergency preparedness and response following the terrorist attacks of September 11, 2001. Any compromise in the integrity of 9-1-1 service threatens response to public safety and health and medical emergencies, as well as natural disasters or acts of terrorism.

On May 30, for approximately three hours, calls to 9-1-1 placed via phone cell phone and VoIP phones were received by the 9-1-1 centers without the associated E9-1-1 data. The Automatic Number Identification (ANI) and the Automatic Location Identification (ALI) for these calls failed. Additionally, Verizon's notification to impacted 9-1-1 centers, consistent with adopted policies and procedures, was inadequate and centers encountered great difficulty in reporting the failure to Verizon officials.

This incident was unfortunately the latest in a series of incidents during the past year, the most recent being January 26, 2011, when Verizon 9-1-1 service failed to meet the needs of the public and the 9-1-1 centers that serve the public. These failures are a matter of public record, have been acknowledged in the media, and are inconsistent with federal and state regulations and oversight.

777 North Capitol Street, NE, Suite 300, Washington, D.C. 20002
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www.mwcog.org

The public is dependent on 9-1-1 and it is the gateway through which every emergency is initially reported, including critical homeland security and emergency incidents. Although area local governments in the National Capital Region and their 9-1-1 centers have previously expressed frustration concerning past service failures, Verizon actions to date have not adequately addressed the problems. As of June 14, some 15 days after the May 30 failure, Verizon has yet to provide to the 9-1-1 centers the reason for the outage or actions they have taken to correct the root cause.

We are seeking swift Verizon action to examine and fully address the problem encountered most recently on Memorial Day and strengthen the 9-1-1 public-private partnership that is the foundation of health, medical, public safety and emergency response in the National Capital Region and throughout the United States.

COG and its public officials and first-responders stand ready to assist you in restoring confidence in this vital emergency response capacity.

Please contact David Robertson at 202-962-3260 or drobertson@mwcog.org if you have questions or need additional information.

Sincerely,

Timothy L. Firestine
Chief Administrative Officer, Montgomery County, MD
Chairman, COG Chief Administrative Officers Committee

Cc:
Hon. Janet Napolitano, Secretary, U.S. Dept. of Homeland Security
Hon. Julius Genachowski, Chairman, Federal Communications Commission
Hon. Betty Ann Kane, Chairman, DC Public Service Commission
Hon. Douglas Nazarian, Chairman, Maryland Public Service Commission
Hon. Judith Williams Jagdmann, Chairman, Virginia State Corporation Commission
National Capital Region Congressional Delegation
COG Board of Directors

Mr. Timothy L. Firestine
Chairman, Chief Administrative Officers Committee
Metropolitan Washington Council of Governments
777 North Capitol Street, NE
Suite 300
Washington, DC 20002

Dear Mr. Firestine:

Thank you for your letter to Mr. Seidenberg dated June 21, 2011. I was asked to respond to your letter because working with 9-1-1 centers is a key part of my responsibilities as Vice President of Verizon for Global Service Assurance. Verizon understands the critical importance of providing reliable 9-1-1 services to 9-1-1 centers, also known as Public Safety Answering Points ("PSAPs"), and the community. We recognize that 9-1-1 services are a key component of comprehensive efforts to address public safety and health and medical emergencies, as well as natural disasters or acts of terrorism. For this reason we devote significant resources to support 9-1-1 services, as well as work closely with PSAPs on 9-1-1 issues. We work proactively to ensure that our network facilities are reliable, but when events occur, we alert affected PSAPs as soon as possible. As detailed below, Verizon also is an industry leader in working comprehensively to address new technical issues that could impact 9-1-1 services across the country.

As you may know, Verizon has been working for over five months with the Federal Communications Commission, the Maryland Public Service Commission, the Maryland Emergency Number Systems Board, hundreds of PSAPs across the country, and industry groups such as the National Emergency Number Association ("NENA") and the Alliance for Telecommunications Industry Solutions ("ATIS") Network Reliability Steering Committee ("NRSC") on a variety of issues related to 9-1-1 and on a technical issue that arose in a specific incident referenced in your letter. Verizon and others have undertaken a significant amount of activity in this area, and we would welcome the opportunity to meet with you further to discuss these efforts and to include a representative from your organization in appropriate activities going forward.

May 30 Location and Number Information Issues

Your letter refers to a specific event on May 30 affecting location and telephone number information on certain wireless and VoIP calls to 9-1-1 in the Washington, D.C. area. A power outage at a New Jersey central office affected the delivery of such information on certain wireless and VoIP 9-1-1 calls in Maryland and Virginia. There was no impact on the delivery of such information on wireless or VoIP 9-1-1 calls in Washington, D.C., nor was there any impact on the delivery of such information on landline 9-1-1 calls. Importantly, though, the problems

did not prevent wireless or VoIP calls to 9-1-1 in Maryland or Virginia from being completed to PSAPs. But location and number information is a key aspect of 9-1-1 service, and Verizon investigated what happened in order to help prevent similar problems in the future.

Central Office Power Failure. The power outage at a Verizon central office in New Jersey was caused by a malfunctioning circuit breaker that tripped on the evening of May 29. Although the central office was supplied with ample and redundant power, technicians failed to follow Verizon procedures to discharge the appropriate personnel to fix the problem upon receipt of an alarm. As a result, batteries in the central office drained slowly (over approximately 12 hours) until they caused certain transport equipment to fail. Once Verizon's power team became aware of the issue, they worked quickly to replace the malfunctioning circuit breaker and to restore power to the affected transport equipment. Had Verizon's procedures been followed, the circuit breaker likely would have been replaced before the batteries in the central office drained to that point. As a result of the incident, Verizon disciplined the technicians who failed to follow procedures, reviewed the procedures again with all technicians and added additional contact points to be notified when central office batteries discharge.

Impact on Location/Number Information Delivery. As to how such a central office power failure in New Jersey could affect location and number information delivery in Maryland and Virginia, the answer lies in the mechanics of the delivery of such information for wireless and some VoIP calls to 9-1-1. Wireless and some VoIP providers typically hire a third-party vendor to deliver the information, known as Automatic Location Identification ("ALI") and Automatic Number Identification ("ANI"), for wireless and VoIP calls to 9-1-1. Such calls, because they do not have a fixed service location, have an extra step in the ALI process because they must use a "Pseudo Automatic Number Identification" or "P-ANI" to link the phone number information to the appropriate ALI record. In this case, circuits that third party providers of ALI information on wireless and VoIP calls utilized were routed through the New Jersey central office that had the power outage. Once power was restored to the central office, network transport elements began to restore automatically and Verizon personnel closely monitored the restoration process to make technical adjustments (e.g., making manual adjustments to assist with equipment restoration) to help ensure that ALI services were restored.

After the event, Verizon performed a further review of the ALI network design to determine whether any modifications or enhancements would help to avoid similar issues in the future. Based on that review, Verizon determined that further diversification of existing circuits through multiple central offices would help avoid or mitigate similar problems in the future. As a result, Verizon is adding additional diversity to the circuits serving third party vendors providing ALI services to wireless and some VoIP providers.

Communication with PSAPs. Communicating with Washington, D.C. area PSAPs at the outset of this event was a challenge because ALI/ANI delivery is handled by third party vendors hired by wireless and VoIP carriers. As a result, isolated problems with ALI/ANI on wireless and VoIP 9-1-1 calls are not apparent to Verizon unless others notify us. Once we understood that there were ALI/ANI issues on certain wireless and VoIP 9-1-1 calls, Verizon worked hard to communicate with all PSAPs that were potentially affected. We were in close communication with all PSAPs in the Washington, DC area, including communicating with the Washington,

D.C. PSAP to confirm that ALI/ANI was being delivered on all of its 9-1-1 calls.[1] And realizing the potential widespread impact, we sent out broadcast messages to all potentially affected PSAPs regarding the issue; these broadcast communications used a fax notification server, and in Maryland, we supplemented such communications by sending emails to Maryland PSAPs informing them of the issue and inviting them to join an informational conference bridge.

I also personally met with Maryland PSAPs in Annapolis on June 1, and we discussed the May 30 event at the meeting. As a result of the feedback from the PSAPs (including Montgomery County) at the meeting, we are expanding email address information for any broadcast message that may need to go out in the future.

Your letter indicates that Verizon has yet to provide PSAPs with an explanation of the outage or actions taken to address root causes. That is not accurate. In addition to discussing the incident with Maryland PSAPs in Annapolis on June 1, after Verizon completed its investigation of the incident, it provided the results of this review to all requesting PSAPs on June 23. As outlined above, we also have taken actions to address the root cause of this specific event, and are implementing additional network enhancements to protect against similar events in the future.

Other Issues

Your letter also refers to the event of January 26, 2011, in which a severe snowstorm snarled much of the Washington, D.C. metropolitan region, stranding many motorists on area roadways during the evening rush hour. The circumstances of the January 26 event are not related to the May 30 event described above. The apparent cause of the January 26 event was a technical issue associated with the way in which certain equipment deployed on the premises of the PSAPs to receive calls interacted with Verizon's network switching equipment during a mass calling event that resulted in an extremely high volume of wireless 9-1-1 calls. This technical issue appears to be industry-wide. Nevertheless, Verizon has taken the lead in having the issues considered by industry groups such as NENA and the NRSC. Verizon is also working directly with numerous PSAPs, and has instituted a number of improvements to processes for communicating with PSAPs during 9-1-1 events.

Industry-wide Technical Issue. We would welcome an opportunity to explain the technical issues in more detail if COG would like. To summarize, the issue arises during mass call events, and affects the connections between the network switches, known as "selective routers," and the PSAP equipment that receives calls, known as private branch exchanges ("PBXs"). An extreme volume and concentration of simultaneous calls can cause issues with the signaling that is passed back and forth between a selective router and a PBX during the process of setting up a call. When a PBX becomes inundated with incoming calls, it may not respond to the signals from the selective router within the allotted time to set up a call. When this occurs, it is referred to as a "wink failure," and, under certain circumstances, may cause the system to determine incorrectly that the trunks connecting the selective router to the PBX are not able to complete calls and thus take the trunks out of service for analysis and repair, if necessary.

[1] We contacted the District of Columbia PSAP, 126 PSAPs in Virginia, and 25 PSAPs in Maryland.

Verizon has done – and is continuing to do – extensive testing of this phenomenon in its laboratory. As a result of its initial findings, Verizon recommended a technical remediation to address the issues and, in February and March, engaged in extensive outreach efforts to all PSAPs in its service territory to alert them of the issue and the recommended solution. Because the technical issues are not limited to Verizon, though, Verizon also initiated industry consideration of these issues through NENA. NENA has formed a sub-group to study the issue. Included in the sub-group are representatives from area PSAPs, including Prince George's and Montgomery counties. With the encouragement of the Federal Communications Commission, Verizon also brought the issue to ATIS for consideration. In the meantime, as Verizon completes its testing, it plans to follow up its communications to all PSAPs with updated findings.

Communications Improvements. Since January 26, Verizon also has devoted extensive resources to work with the PSAPs to improve communications during 9-1-1 events. The improvements focus on having Verizon's 9-1-1 Customer Care Center ("CCC") contact PSAPs as soon as possible when particular situations arise that could affect 9-1-1 services. Those situations, which we have identified through extensive consultations and data reconciliations with various PSAPs, including Montgomery County, include:

- When a single 9-1-1 trunk is out of service and does not restore remotely on the first try.

- If a "wink failure" occurs between the Verizon and PSAP equipment more than a threshold number of times in any five-minute period.

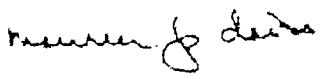
- When a threshold number of 9-1-1 calls receive busy signals within a period of time.

In addition, again based on consultations with Washington, D.C. area PSAPs, Verizon has implemented more automated ways of communicating with PSAPs. For example, Maryland PSAPs receive an email notification from the CCC when a 9-1-1 ticket is opened and closed, as well as for status updates. Verizon offered the same notification process to all PSAPs in the Washington, D.C. area (including those in Northern Virginia and Washington, DC), and those electing to receive them now do as well.

* * *

Verizon takes these issues very seriously, and has demonstrated its commitment with concrete actions and ongoing dialogue with PSAPs. We share COG's view on the critical importance of these issues and would welcome the opportunity to strengthen the 9-1-1 public-private partnership that is the foundation of health, medical, public safety and emergency response in the National Capital Region and throughout the United States. To that end, we would appreciate an opportunity to meet directly with your organization to further address our efforts to improve 9-1-1 service in the face of new technology driven issues and answer any questions you may have.

Sincerely,



Maureen P. Davis
Vice President – Verizon
Global Service Assurance
maureen.p.davis@verizon.com
908 559 6150

cc:
Hon. Janet Napolitano, Secretary, U.S. Department of Homeland Security
Hon. Julius Genachowski, Chairman, Federal Communications Commission
Hon. Betty Ann Kane, Chairman, DC Public Service Commission
Hon. Douglas R. M. Nazarian, Chairman, Maryland Public Service Commission
Hon. Judith Williams Jadgmann, Chairman, Virginia State Corporation Commission
National Capital Region Congressional Delegation
COG Board of Directors

9-1-1 SERVICE COMPONENTS OVERVIEW

To establish basic terminology and background concepts for this report a brief primer on 9-1-1 service is provided below.

9-1-1 Service – Basic Overview of Components and Participants

There are three main participants involved in providing 9-1-1 service:

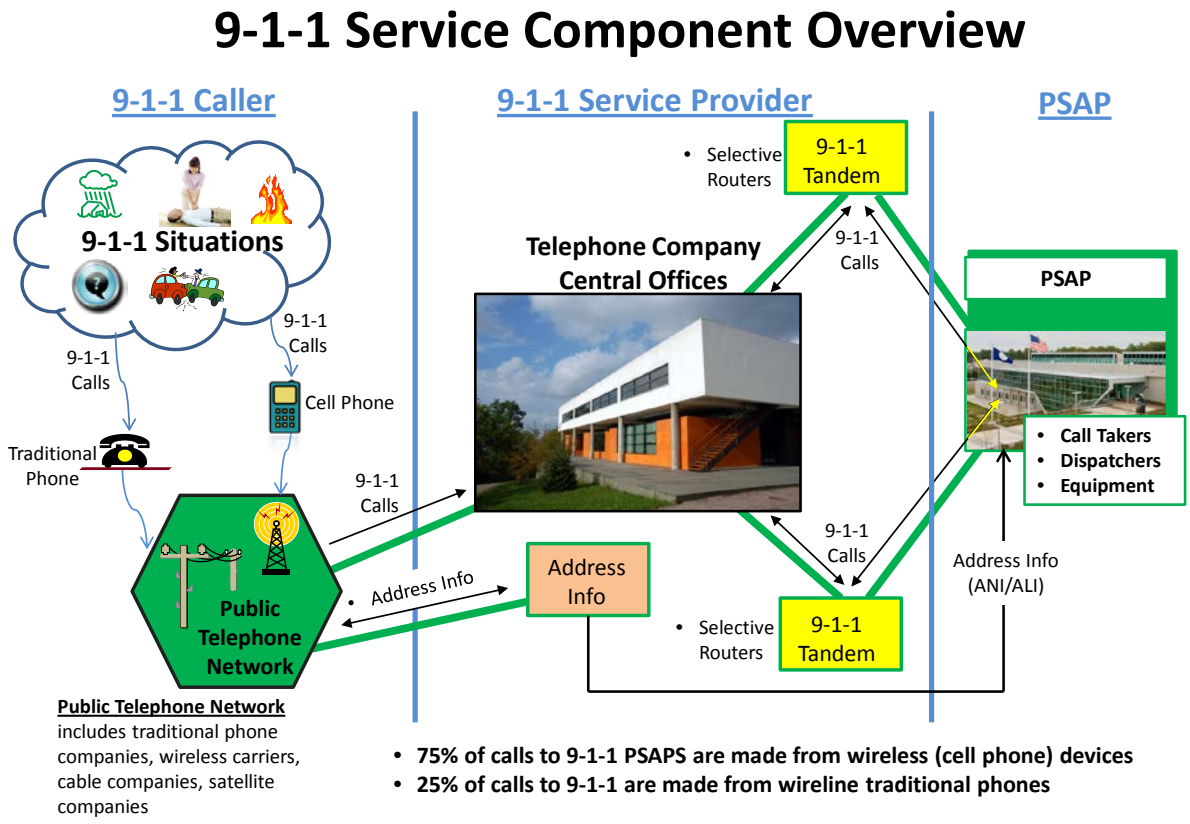
9-1-1 Caller – The callers for 9-1-1 service can be citizens, businesses, even other local jurisdictions asking for mutual aid and assistance for an emergency. A 9-1-1 call is automatically identified by the equipment in the Public telephone network as requiring specialized handling and is sent to the local 9-1-1 Service Provider's specialized 9-1-1 9-1-1 Tandem Routers for answering by the appropriate local jurisdiction Public Safety Answering Point (PSAP). There are PSAPs in each local Jurisdiction such as Arlington County, Alexandria City, the Virginia counties of Fairfax, Loudoun, Prince William, Stafford, and in Maryland the counties of Montgomery, Prince George's. The District of Columbia also has a PSAP.

Service Providers – In the case of Virginia and Maryland, Verizon handles the collection of all 9-1-1 calls from the Public Telephone network and processes the 9-1-1 call through a network of specialized equipment referred to as either 9-1-1 Tandems or Selective Routers. For redundancy, the Tandems are typically deployed in pairs to provide alternate network paths for the 9-1-1 voice call to reach the PSAP. The 9-1-1 Tandems pass the voice call to the PSAP where the call is answered by a call taker/dispatcher. Concurrent to passing the voice call, the Service Provider equipment is collecting address information (called ANI/ALI) from the originating source in the Public Telephone network and passing the address information to the PSAP with the voice call over what are called ANI/ALI links. This is known as Enhanced 9-1-1 (E9-1-1). There are typically up to four redundant paths over the network for the address information to reach the PSAP.

PSAPs – Often referred to as the 9-1-1 Center, local government jurisdictions dedicate resources to receive calls from the 9-1-1 Service Provider over specialized telephone lines called trunks. The PSAPS also receive caller address information from the Service Provider over other specialized Service Provider lines commonly referred to by the acronym ANI/ALI links. The PSAP has an interface point with the Service Provider where the 9-1-1 voice call and the address information (ANI/ALI) passes from the Service Provider's network and onto the equipment owned by the PSAP. This is stated to point out that the PSAP equipment can be fully operational within their premise but if the 9-1-1 call ~~or address information for the call~~ is not provided to the interface point by the Service Provider, the PSAP is unable to answer 9-1-1 calls from the public. If the ANI/ALI interface only is not operational, then the PSAP will receive a 9-1-1 call but as "basic" 9-1-1 rather than "enhanced" 9-1-1.

Calls for 9-1-1 service come primarily from citizens or businesses using standard wireline telephones or more frequently using wireless telephones or devices. The 9-1-1 Service Component Diagram below

depicts the overall call flow from a citizen initiating a call, showing it pass through the 9-1-1 Service Provider network where it is ultimately answered by the PSAP responsible for the area where the call originates. Approximately 75% of all 9-1-1 calls are made from cell phones through the wireless network and the remaining 25% are made from traditional telephone handsets, referred to as a wireline calls.



Vulnerability of Newer Technologies to loss of Commercial Power

POTS

- Verizon Central Office Network powers the phone to make and receive calls.
- Verizon has multiple levels of backup power available at network locations.

FIOS/Cable

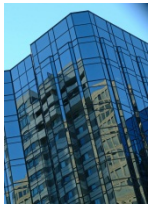
- Verizon installs battery backup power in each home – lasts eight hours depending on usage. Homeowner is responsible for maintaining the battery.
- Cordless phones require home electrical and battery

Cell Phone

- Cell Tower has varying levels of backup generator or battery power.
- User's cellphone has limited battery power based on phone usage pattern.
- Emergencies can cause network congestion and/or blockage.
- Cell phone depends on POTS

VOIP

- Voice over Internet Protocol phone relies on computer router and phone handset to connect to data network on internet to make calls.
-Loss of power means loss of phone service.
-Homeowner may or may not have generator or UPS to maintain power to

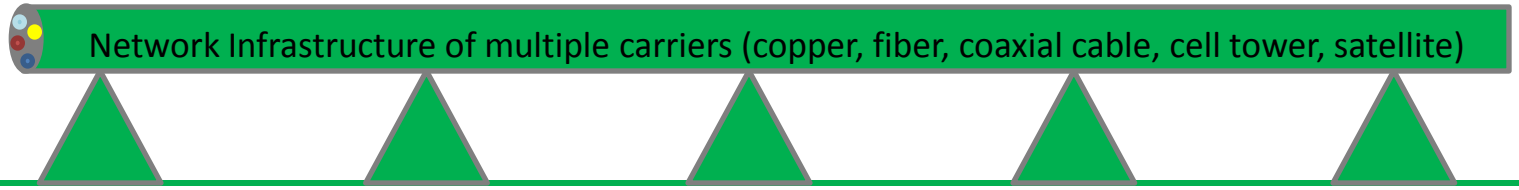


Business

- Businesses have combinations of most of available technologies.
- Some have wherewithal to have independent UPS systems for backup power.

Satellite Phone

User's SAT phone has limited battery power based on phone usage pattern.
- SAT phone depends on POTS network to complete a call except t other SAT phones.



Dependencies:

- Other carriers (AT&T, Cox, Vonage, DirectTv, etc.) have potential power issues which would limit access through the Public Telephone network to Verizon's 9-1-1 service.
- Residences and businesses alike have combinations of the above technologies inside one location.

Report of 9-1-1 Service Gaps During and Following the Derecho 57

IMPACT ON VIRGINIA'S 9-1-1 INFRASTRUCTURE

Verizon Failures during the Derecho Caused 9-1-1 Disruption across the National Capital Region

The network diagrams on the following pages provide a representation of the impact of the Derecho on the Verizon 9-1-1 network as it relates to Fairfax County. Elements of this diagram apply to other jurisdictions, however, some jurisdictions had little to no impact from the Derecho. Representing all combinations of Verizon's network status for each jurisdiction in one overall diagram is not practical but this diagram is illustrative of the impact. The diagrams are notional representations and are not descriptive of exactly how the networks are engineered.

The first diagram (subtitled "Normal Operations 24/7/365") shows the Normal State of Operations where power is available to all network components both for the citizen, the Public Telephone network and the 9-1-1 Service Provider. Green linkages between various components of the Verizon 9-1-1 network indicates full availability of the normal network connections to complete 9-1-1 calls among and between the various carriers (e.g., from an AT&T cell phone, through the Public telephone Network, and into Verizon's 9-1-1 Network for the Northern Virginia area. All 9-1-1 calls in Fairfax County are passed from the originating carrier into a specialized 9-1-1 Verizon network ring through various Central Offices. The Verizon network knows the ultimate destination of the PSAP for the call, and passes the call through a variety of Verizon Central Offices to a specialized piece of equipment (a Tandem switch) which then routes the call to a PSAP where a call taker answers the 9-1-1 call for processing.

While various 9-1-1 calls are traversing the outer green network ring (depicted in the diagram), Verizon has other **specialized** equipment that monitors the health of their network by polling the equipment on a routine basis. This monitoring, or telemetry network is depicted by the captain's wheel inside the ring and the main Telemetry location for Northern Virginia is located at a facility in Arlington, Virginia. When equipment problems occur, automated alarms are sent to a Network Operating Center, run by Verizon on a 24/7/365 basis for further investigation and resolution.

The second Verizon network diagram, (subtitled "During Outage Sat June 30,2012"), attempts to represent where failures occurred when the power and other problems Verizon encountered began to affect the network in terms of processing 9-1-1 calls into the Fairfax County, **VA** PSAP. Red represents some level of interruption of capabilities to pass a call in a normal fashion. Red "interruptions" could be homeowner specific (tree knocked their landline telephone wire off of their home), power specific (loss of power at a Verizon facility or at the caller's home or place of business), or other combinations of situations (a cell tower could have been knocked out of service due to a power loss or other storm damage limiting the ability to make or complete a cell phone call). Multiple reasons exist for why a call for 9-1-1 service **might not** have been completed. The diagram focuses on showing a general picture of how power problems incapacitated the Verizon network as it relates to processing 9-1-1 calls. Some Verizon capabilities (COs) were totally in the "red", some COs, were partially in the "red", and some COs were "green" but were limited, or isolated, by other components of the network being "red".

Early on, the telemetry network for Verizon was operating in the “red” so the visibility of problems and the capability to understand the complete extent of the impact was not available which added to the difficulties in dispatching assistance to areas where attention was needed on a priority basis (e.g., The Fairfax Central Office as one example). For some jurisdictions, Alexandria City, their ability to process 9-1-1 calls was not disrupted as the linkages into the Alexandria Tandem (see diagram) remained green. The linkages into the Tandems that would allow Fairfax to receive its 9-1-1 calls were not operational, thus the diagram has a large “X” to illustrate where network communication linkages were broken for periods of time.

Verizon's Provision of 9-1-1 Service to Fairfax County (Normal Operations – 24/7/365)

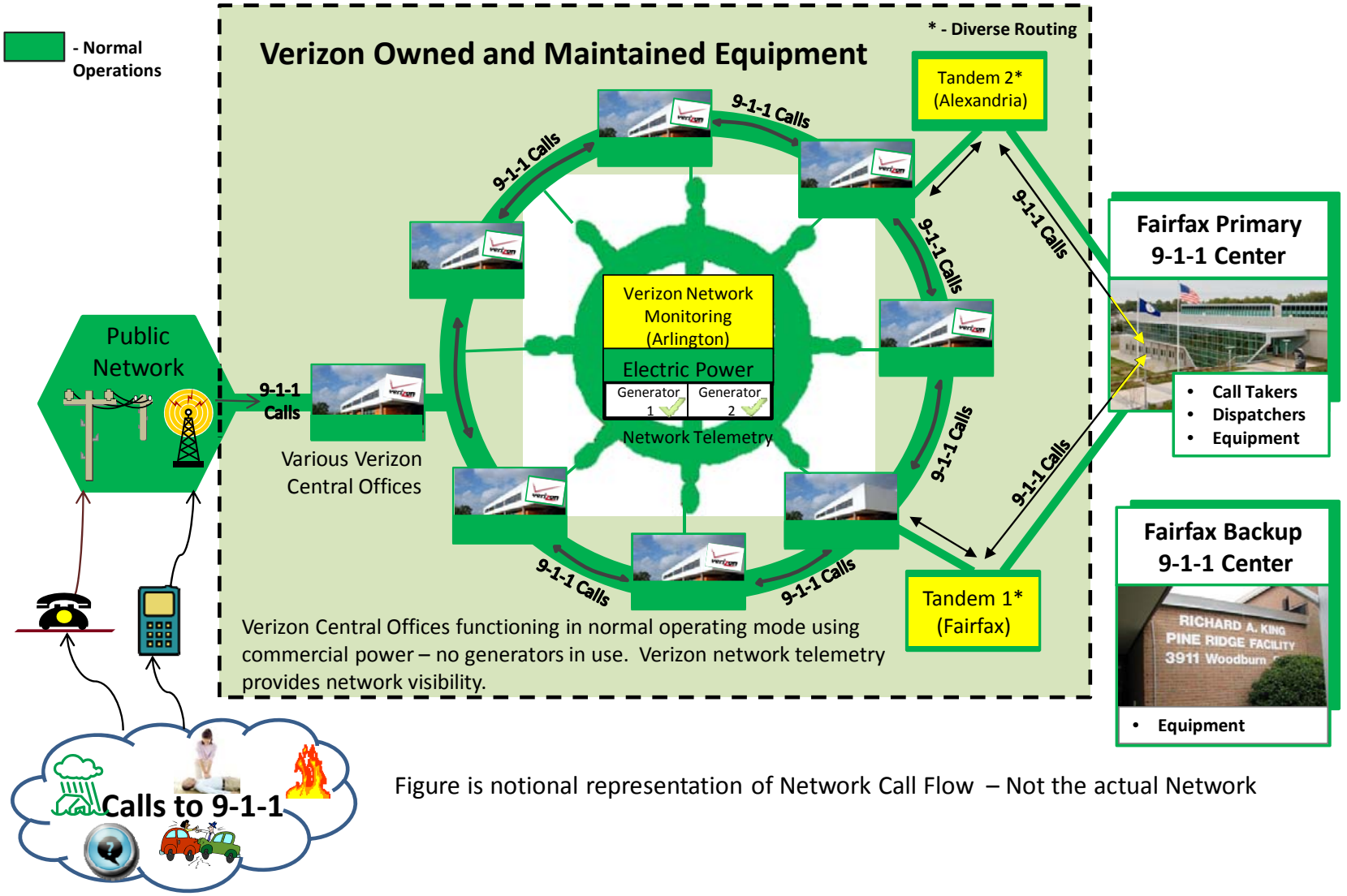


Figure is notional representation of Network Call Flow – Not the actual Network

Verizon's Provision of 9-1-1 Service to Fairfax County (During Outage Sat June 30, 2012)

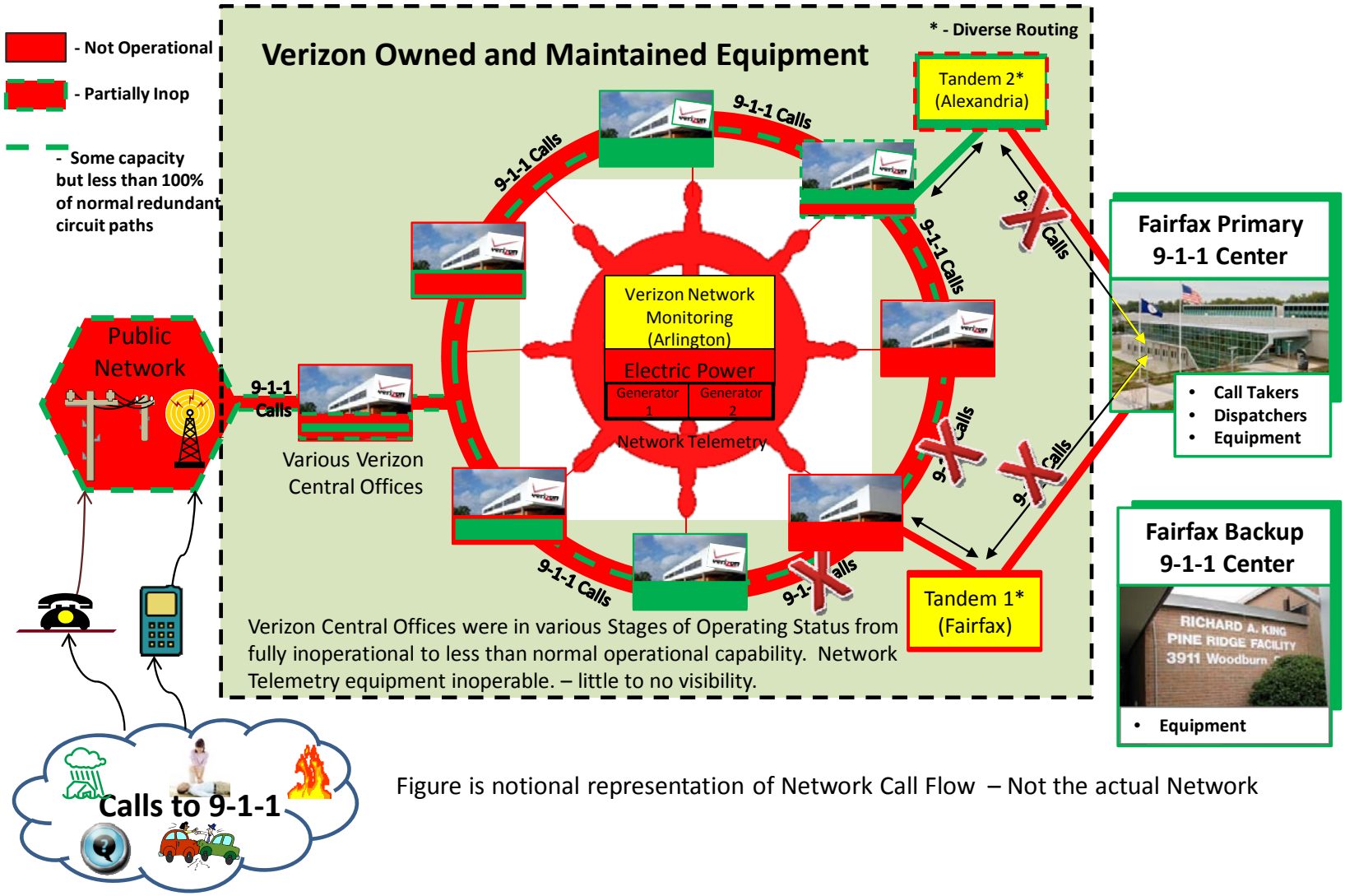


Figure is notional representation of Network Call Flow – Not the actual Network

Verizon, 911 Service and the June 29, 2012, Derecho

August 13, 2012

Verizon, 911 Service, and the June 29, 2012 Derecho

Late in the evening of Friday June 29, 2012, a severe storm hit the Mid-Atlantic region with unusually intense straight-line winds. This "Derecho" caused widespread commercial power outages in the Washington D.C., Virginia and Maryland area, and widespread damage to Verizon's networks. Indeed, the Derecho downed more poles and generated more commercial trouble tickets for Verizon than Hurricane Irene. External power failures affected more than 100 Verizon locations. At each of these locations, batteries and nearly all the back-up generators worked as designed, allowing us to continue service. However, at two of these locations, generators failed to start, disabling hundreds of network transport systems, and causing Verizon to lose much of its visibility into its network in the impacted area.[1]

Verizon designs its network to provide 911 services even during disasters. As explained further below, our 911 network designs include multiple levels of diversity and redundancy, as well as back-up power in critical facilities, to optimize resiliency during a crisis. Nevertheless, generator failures caused a temporary loss of 911 service to four of the more than two hundred 911 centers (referred to as Public Safety Answering Points, or PSAPs) that Verizon serves across the storm's path. As a result, three PSAPs (Fairfax County, Prince William County, and Manassas) did not receive 911 calls for several hours Saturday, June 30, and another (Manassas Park) did not receive 911 calls for much of that weekend. In addition, a number of area PSAPs (including those four) faced other 911-related problems, consisting primarily of a lack of delivery of location information on 911 calls and the loss of administrative and back-up phone

[1] Across the impacted area, more than 1,900 network transport systems were damaged and failed. A very significant percentage of those systems were in Arlington and Fairfax, where the two generators failing to start caused the 911 issues. Across the impacted area, nine generators failed to operate properly out of 136 in total.

lines.[2] This document describes Verizon's final analysis of what happened and identifies important corrective actions to minimize the risk of future problems.

* * *

Two Generator Starting Failures Caused the 911 Outages

Our investigation has determined that the failure of one of two back-up generators to start at each of our Arlington and Fairfax central offices following the loss of commercial power caused the Northern Virginia 911 disruptions. Multiple failures cascading from these specific generator problems and damage to the transport network combined to cause the outages for the four PSAPs. Included among those failures were systems that enable us to monitor the condition of our network facilities in Northern Virginia, and that loss of visibility over our network hindered our initial efforts to assess and repair damages.

At critical facilities, Verizon deploys a combination of batteries and generators to support critical operations during a commercial power failure. The batteries provide an immediate source of power following the loss of commercial power until the generators go online (which is designed to occur automatically), and then the batteries act as the back-up power source should the generators fail.

At more than 100 locations, Verizon's back-up batteries and generators worked as designed. However, one of two back-up generators did not start at each of the Fairfax and Arlington facilities, and these failures caused the four PSAPs' 911 call completion problems.

[2] Location information, referred to as Automatic Location Identifier ("ALI") information, automatically provides the PSAP with the address of 911 callers using landlines. Callers can dial 911 and reach the PSAP even if the ALI systems are not operating, and the PSAP can dispatch the appropriate public safety response. In these cases, however, a 911 call-taker must obtain location information from the caller rather than the information appearing automatically. In addition, the Arlington County PSAP's regular business lines (which could also be used during emergencies) were not working because of the problems at the Arlington central office, explained in more detail below.

Arlington Facility

The Arlington facility has two generators that must operate in tandem to support the site. At 10:55 PM on June 29, 2012, the Arlington facility lost commercial power. One of the two generators started, but the other did not. The single running generator could not support the entire site load, became overloaded and shut down as designed. Back-up batteries served the office's equipment into the morning of June 30. A power technician arrived at 12:28 AM on June 30, but despite best efforts throughout the night, could not get the second generator started. At approximately 5 AM on June 30, the batteries drained completely and network equipment failed.[3] We deployed additional resources, working in parallel both to start the second generator and prepare a replacement mobile generator. Commercial power was restored at 12:45 PM before those efforts were completed.

Significantly, during the period while power was out in Arlington, we lost our telemetry systems and thus our ability to monitor parts of our network and facilities in Northern Virginia, including the Fairfax facility. Once Arlington was restored, our visibility into the network began to restore.

Fairfax Facility

The Fairfax facility has two generators that each support specific components of the network when commercial power is lost. At approximately 10:35 PM on June 29, the Fairfax facility lost commercial power. One of the generators started and supported its equipment as designed. The other generator did not start, so back-up batteries served the corresponding equipment into the morning of June 30. At approximately 6:15 AM, the batteries completely drained and the network equipment in the specific section of the facility served by the inoperable

[3] Some network equipment is more sensitive to low voltage and failed before the batteries were completely exhausted.

generator failed. Throughout this period, the other generator supported its network equipment in the rest of the building. That morning, because we had lost visibility to the network at large, the decision was made to send technicians to various facilities, including Fairfax. A central office technician arrived at the site at 7:30 AM but did not immediately recognize that one section of the facility was not on generator. At approximately 9:45 AM, the central office technician realized there was an issue in one section of the building and called for a power technician. The power technician arrived at the Fairfax facility at approximately 11:30 AM, investigated the power plant, determined that the second generator had failed to start, initiated the starting procedures, and brought the generator back on manually by 12:15 PM. We immediately started restoring the equipment in the office and bringing services back on line.

We have since conducted extensive testing using third-party experts to determine why the second generator in the Arlington facility did not start. We determined that air had entered the fuel system, resulting in a lack of fuel in the lines. We have since replaced the fuel lines for both of the back-up generators at the Arlington facility (even though no leaks were found in the generator that started).

In Fairfax, Verizon's investigation has determined that the Fairfax generator did not start because the auto-start mechanisms failed. Those mechanisms are designed to automatically start the generator once commercial power is lost, but they did not operate correctly and have since been replaced.

Proactive Improvements

While the back-up power systems in place should have withstood the Derecho without the resulting 911 problems, our investigation has identified issues for which we are undertaking corrective action:

Issues	Corrective Actions
Generator system failures As described above, we suffered key generator system failures that were different in each location. The specific failures have been repaired but we are extending our review of critical locations to address potential issues.	• Conduct backup power system audits in the mission-critical Verizon facilities supporting 911 in Virginia, Maryland and Washington, D.C. • Institute any corrective measures identified in those power audits. • For example, we have already completed the Arlington audit and are instituting automated controls to prioritize system loads (e.g., telemetry) in case one of the two generators fails.
Emergency Practices and Procedures Our investigation determined we could have improved our restoration of service had we (i) recognized more quickly the partial power outage in Fairfax and (ii) been able to power some network equipment (e.g., telemetry systems) on the one generator in Arlington that was working.	• Develop and post site-specific backup power system assessment procedures that can be used by any employee to assess if there is a loss of power to an area of a building. • Develop and post site-specific manual generator start and transfer procedures, including serving system loads on a prioritized basis. • Enhance our critical facility "Black Out" testing. We test our back-up power systems regularly but will enhance this testing to include "failed automated controls" and "prioritized system load transfer" scenarios.
Communication and Mobilization We have a standard practice of internal mobilization based on actual or potential service impacts. These are triggered by alarms. The loss of visibility prevented us from receiving these alarms and delayed our response.	• Create two new event criteria for notification and mobilization purposes. We have enhanced our notification and mobilization procedures to trigger activity more quickly when batteries are activated or when telemetry is lost.
Loss of visibility to multiple sites	• Redesign the telemetry network. We are redesigning the telemetry network to include more diverse connections and failover (alternative) locations.

PSAP-Specific Routing Issues Compounded the Generator-Starting Problems

Verizon's 911 design provides multiple diversities or redundancies "inside the network." There are multiple tandem offices providing routing so that, if one fails, the calls to the failed

office are routed through the other(s). Verizon's ALI databases and links to each ALI database are redundant, as are Verizon's signaling systems, which route calls to their destinations. Verizon's analysis of the network impacts following the Derecho has identified areas for improvement, especially with ALI diversity, with specific PSAP configurations. Verizon will work directly with the specific PSAP partners to decide on improvements.[4]

Communication Improvements Are Being Addressed

PSAP Communications

Over the past few years, Verizon has established robust processes to communicate with PSAPs during an emergency or system failure, particularly during high-volume (also known as "mass calling" or "focused overload") situations. In fact, we have a large team entirely dedicated to communicating with PSAPs. These new processes generally worked well during the Derecho, as Verizon stayed in constant communication with PSAPs during the 911 outages, including sending automatic notifications to PSAPs when certain alarms were triggered. But once Verizon lost its telemetry, we did not have the specific information needed by the PSAPs to understand the impact of the event and plan for alternatives. And certain automatic notifications that go to PSAPs stopped when the alarms stopped. As discussed above, Verizon is working to develop a better design to retain its visibility into the network, which will improve the utility of the communications in the face of catastrophic failures.

As an example of how the lack of network visibility hindered communications, certain PSAPs, when they were no longer receiving 911 calls the morning after the storm, activated "network controls" to re-route calls through different paths or to a pre-designated alternate

[4] Verizon is obliged to maintain the confidentiality of its specific PSAP customers' network arrangements and is not free to share those details publicly; in addition, sharing such network design information would create security vulnerabilities.

location. Verizon has since determined that certain of these PSAPs would have been better off not doing so (i.e., they would have started receiving 911 calls earlier if they had not re-routed calls through different paths), but without the appropriate information, they were unable to make that determination at the time. We will discuss the network control process with the individual PSAPs to determine if improvements can be made (e.g., PSAPs may want to deactivate such controls if they do not improve call completion).

The 911 Directors of the City of Alexandria, and the Counties of Arlington, Fairfax, Loudoun, Prince William and Stafford have recommended that Verizon adopt five steps in response to the storm, primarily focused on communications. The recommendations are constructive suggestions, and we look forward to working with the 911 Directors to most effectively implement these concepts. Specifically:

Recommendation	**Assessment**
Verizon adopt, embrace, instruct, train and utilize the National Incident Management System (NIMS) model, to address and mitigate any and all significant events/incidents impacting providing 9-1-1 service to the aforementioned jurisdictions.	**Positive.** Verizon employs an "all hazards approach" to its Business Continuity, Disaster Recovery, Facility Preparedness and Emergency Management programs. These are essential to the protection of its employees, critical business processes and structural facilities located around the globe. Verizon today employs an Incident Management System (IMS) along with the concept of Crisis Management Centers to standardize control of certain emergency situations. When invoked, that process utilizes the National Incident Management System (NIMS) principles as published by the Department of Homeland Security. Verizon offers internal training and orientation courses on its National Emergency Command Center (NECC) Process, and an Introduction to the National Incident Management System. (In this event, Verizon did not activate its Emergency Command Center process; as noted above, thresholds for

	invoking that process have been strengthened to more readily bring those procedures to bear in similar situations.)
Verizon obtain and utilize a Reverse 911® type system to notify, via voice and text, those persons identified by the above jurisdictions, as soon it is known or suspected by Verizon that there is or may be an interruption of 9-1-1 service to any or all of the above jurisdictions. The immediately transmitted voice and text message should contain, in plain language, the nature of the problem, current or potential impact of the problem, what Verizon is doing to address the problem, recommend actions the impacted 9-1-1 center(s) should take and other appropriate information and include the name of the sender and the telephone number (business and mobile) at which the sender can be reached, and their email address.	**Positive.** Since March 2011, Verizon has employed a broadcast email process to provide specific ticket information to individual PSAPs, and also to provide general information and updates on issues that affect multiple PSAPs. Verizon will expand that process to include texting and will work with 911 Directors to establish the correct contact lists and process details. Based on experience with the email process, it is evident that there is no one common standard vehicle that is universally desired by all PSAPs. Verizon will work with the 911 Directors to accommodate specific needs within a standard process. Verizon will make every effort to share actionable information with PSAPs as soon as we are aware of service interruptions. For events that may impact multiple PSAPs, we will recommend that conference bridges will be established to brief PSAPs on the situation and allow for questions and discussion. Recommended actions would be specific to each PSAP (based on their back-up configuration and event impact) and need to be developed jointly between Verizon and the PSAP.
Verizon work with the jurisdictions to develop, by no later than December 31, 2012, a method to semi-annually conduct a drill/exercise with each jurisdiction on actions to be taken by Verizon and the impacted jurisdiction(s) in the event of a potential or actual 9-1-1 outage.	**Positive.** Verizon will engage the assistance of its Business Continuity Emergency Management (BCEM) team to work with Verizon's 911 Customer Care Center organization to develop and exercise procedures for drills that model potential or actual 911 outages with any of the jurisdictions that request such a joint exercise.
Verizon provide the above jurisdictions, during the first week of each month, a current contact list; beginning with the name and contact information (email, business telephone number, business	**Positive.** A draft will be provided to PSAPs for comment and concurrence by August 17, 2012.

mobile telephone number and any other appropriate information) for the Verizon account manager assigned to the jurisdiction and four immediately escalating Verizon personnel up to a Vice President level.	
Verizon, if/when requested by any of the above jurisdictions, have a Verizon representative with authority to act/react; respond to and to be present at the jurisdictions' Emergency Operations Center (EOC), to provide current accurate information concerning 9-1-1 service and outages, other telephone service, etc. and liaison with other parties staffing the EOC, when the EOC is activated.	**Positive.** Verizon will work with the 911 Directors to explore ways in which we can accommodate this request. We have discussed options for virtual participation in any EOC via an "instant messaging - like" application with the Virginia Commonwealth emergency management leaders. We have discussed joint training with Fairfax Emergency Management personnel and would welcome the opportunity to participate in that activity. If PSAP discussions regarding a joint regional 911 EOC become the strategy, that would present an excellent vehicle for Verizon to be present with multiple jurisdictions in an emergency situation.

Public Communications

In the future, when we face significant network-related issues like those caused by the Derecho, Verizon will share additional information about our restoration efforts more quickly to provide greater insight regarding the extent of the impact to our subscribers and the expected duration of the restoral efforts. We are mobilizing a more robust emergency response communications process to ensure that media outlets and other channels are provided relevant information on a timely basis.

Conclusion

Verizon understands the critical role of 911 services to the community, and is committed to making improvements to avoid the performance of the 911 system during the Derecho. We will work directly with the PSAPs, as well as the various governmental bodies considering these important matters, to implement the lessons learned. And we will look to apply improvements and lessons learned from the Washington metropolitan area to other areas in our service territory as well.

COMMONWEALTH OF VIRGINIA

STATE CORPORATION COMMISSION

STAFF REPORT OF
FINAL FINDINGS AND RECOMMENDATIONS

DIVISION OF COMMUNICATIONS

CASE NO. PUC-2012-00042

IN THE MATTER OF
INVESTIGATING 911 EMERGENCY
CALL SERVICE OUTAGES AND PROBLEMS

January 17, 2013

TABLE OF CONTENTS

EXECUTIVE SUMMARY

The purpose of this report is to present the final findings and recommendations of the analysis performed by The Virginia State Corporation Commission Staff ("Staff") regarding the 911 service outages following the June 29, 2012 storm ("June 29 Derecho"). A major focus is evaluating the sufficiency and extent of the corrective actions that Verizon is undertaking. The ultimate goal of this investigation is to help prevent such a serious and potentially life threatening event from occurring again. This report provides a number of recommendations to assist with achieving that objective.

Early in the afternoon on June 29, 2012, a severe and destructive storm with widespread wind gusts of over 70 mph tracked across a large section of the Midwestern United States. The storm progressed into the Mid-Atlantic States in the afternoon and evening. Late in the evening, the storm continued to expand and impacted significant portions of Virginia, Maryland, and the District of Columbia with severe straight-line wind speeds reported as high as 87 mph. By the morning of June 30, there was an unprecedented and critical loss of 911 services primarily impacting public safety answering points ("PSAPs") and citizens in the Northern Virginia area.

Verizon acknowledged multiple problems starting with the failure of backup generators to start in the Fairfax and Arlington central offices. Ultimately there was a total loss of 911 telephone service to four public safety answering points ("PSAPs") (Fairfax County, Prince William County, Manassas, and Manassas Park) for a significant period of time. In addition, 21 other Virginia PSAPS were impacted and experienced such problems as the failure to receive Automatic Location Information ("ALI") and the loss of administrative and backup telephone lines.

On September 14, 2012, the Staff Report of Preliminary Findings was filed. The primary focus of our investigation for that report was determining the causes of the 911 outages. Overall, we have determined that our preliminary findings have been substantiated further and uncontested. A list of our preliminary findings is attached to this report as Attachment 1.

Our continued investigation has identified a number of additional significant findings. These findings go beyond assessing the impact from the June 29 Derecho as they identify and address (1) other maintenance and equipment problems identified by Verizon, and (2) certain of Verizon's corrective actions and proposals, both for areas affected by the Derecho and in other parts of Virginia.

Verizon has made significant progress in implementing numerous corrective actions it initiated shortly after the June 29 Derecho. We are pleased with Verizon's candor and direct approach in identifying the issues and problems. Particular recognition is given to Verizon for initiating power audits in central offices beyond those impacted directly by the June 29 Derecho. Some corrective actions were or are being implemented quickly and Verizon should continue to complete those initiatives as soon as possible.

However, our investigation also raises concerns about the overall condition of Verizon's equipment in its Virginia offices. There is evidence of an ongoing lack of routine maintenance in the audited offices. This raises concerns about the conditions existing in other Verizon offices. It will take a concerted effort on Verizon's part to correct all the problems. This cannot be done overnight and likely requires oversight to ensure compliance. Our recommendations include details of appropriate oversight and continued monitoring.

The 911 service outages after the June 29 Derecho put thousands of Virginia citizens at risk. Those outages were a direct result of Verizon's failure to perform the necessary

maintenance on its central office facilities, and were compounded by its inability or failure to monitor and respond, both internally and externally, to the outages. As the generator maintenance logs, audits, and other Verizon interrogatory responses reveal, Verizon has allowed equipment and facilities at many of its offices to deteriorate. This discovery indicates that Verizon should not devote its efforts solely on the sixteen 911 mission critical offices but should expand its corrective efforts to all its Virginia offices.

The risk of further 911 or other customer service outages cannot be mitigated without correcting the problems at all Verizon offices in Virginia. We recognize that they cannot be corrected overnight. Market and technology change is resulting in industry movement away from the traditional copper network, particularly for voice. However, the integrity of the telecommunications system, regardless of technology (i.e., VoIP, wireless, FIOS, etc.), still depends on properly functioning central office equipment, transport systems, switching equipment, and 911 services provided by the incumbent local exchange telephone company.

We applaud Verizon's efforts to identify and correct the underlying causes and problems, and are encouraged that no 911-related problems arose in Virginia during and following Hurricane Sandy. Ensuring that testing and maintenance is performed properly and timely in all of Verizon's offices should go a long way in preventing a similar 911 outage as the one following the June 29 Derecho. In addition, Verizon has modified many of its practices to ensure more timely response in emergency situations. These efforts should be monitored and evaluated for at least some period of time (i.e., 1-3 years) to ensure that Verizon continues to undertake the necessary corrective actions. Finally, Verizon and the Staff should continue to meet and cooperate with the PSAPs to ensure their concerns are addressed.

INTRODUCTION

Early in the afternoon on June 29, 2012, a severe and destructive storm with widespread wind gusts of over 70 mph ("June 29 Derecho") tracked across a large section of the Midwestern United States. The storm progressed into the Mid-Atlantic States in the afternoon and evening. Late in the evening, the storm continued to expand and impacted significant portions of Virginia, Maryland, and the District of Columbia with severe straight-line wind speeds reported as high as 87 mph. The June 29 Derecho continued eastward during the very early morning of June 30 affecting Delaware and New Jersey, and ultimately dissipated around 4:00 a.m. in the Atlantic Ocean.

In Virginia, over one million customers lost power with many of those located in Northern Virginia. On the morning of June 30, Governor McDonnell declared a state of emergency. His announcement stated that "last night's thunderstorms caused the broadest non-hurricane related power outage in Virginia history."

By the morning of June 30, there was an unprecedented and critical loss of 911 services primarily impacting public safety answering points ("PSAPs") and citizens in the Northern Virginia area. Subsequently, the Virginia State Corporation Commission ("Commission") started receiving reports of 911 emergency call outages in the areas of Virginia served by Verizon Virginia LLC and Verizon South Inc. (collectively, "Verizon"), and unconfirmed reports of 911 service problems in the service territories of other providers. On July 3, the Commission issued an Order Establishing Investigation ("July 3, 2012 Order") directing its Staff ("Staff") to investigate the loss of 911 emergency call services from the June storms. The July 3, 2012 Order required the Staff to report its preliminary findings by September 14, 2012, and to file a report with its final findings and recommendations by December 31, 2012. At the Staff's request, the

date for filing this report was extended to January 17, 2013.

In addition, on July 13, 2012, the Federal Communications Commission's ("FCC") Public Safety and Homeland Security Bureau released a Public Notice ("PSHSB Notice") seeking comments on 911 resiliency and reliability in the wake of the June 29 Derecho in PS Docket No.11-60. The PSHSB Notice recognized that the impact of the storm was particularly severe in Northern Virginia, notably in Fairfax County, parts of Prince William County, Manassas Park, and Manassas "where over 1 million people faced the possibility of not being able to call 9-1-1 successfully" and where "media reports and local government officials indicate that public safety answering points...failed as did backup systems."[1]

PRELIMINARY FINDINGS REPORT

On September 14, 2012, the Staff Report of Preliminary Findings ("Preliminary Findings Report") was filed. The primary focus of our investigation for the Preliminary Findings Report was determining the causes of the 911 outages. Those findings showed that there were numerous and compounding errors, failures, and deficiencies on the part of Verizon that multiplied into a potentially catastrophic event exposing inherent weaknesses in Verizon's service and associated 911 network design and maintenance. A list of our preliminary findings is attached to this report as Attachment 1.

The Preliminary Findings Report recognized that Verizon had initiated numerous efforts to correct deficiencies exposed by the events surrounding the June 29 Derecho. The stated intent of our continued investigation was to evaluate more fully Verizon's corrective action plans going

[1] PSHSB Notice, p.1. Comments were filed in this proceeding by a number of parties, including Verizon, wireless carriers, Fairfax County and other localities, as well as public safety associations or entities. Reply comments were also filed by a number of parties. On January 10, 2013, the Public Safety and Homeland Security Bureau released a Report and Recommendations; "Impact of the June 2012 Derecho on Communications Networks and Services" ("PSHSB Report and Recommendations"). **http://apps.fcc.gov/ecfs/proceeding/view?name=11-60**

forward. Of particular concern was whether the generators in the Arlington and Fairfax offices had been properly maintained and tested. We were (and still are) concerned "whether such is indicative of a systematic deficiency throughout Verizon's network."[2]

STAFF INVESTIGATION

To date, the Staff has served Verizon with five sets of interrogatories consisting of 78 questions (many with multiple subsections). We have received and reviewed hundreds of documents (thousands of pages) provided by Verizon. We also met with various Verizon personnel on several occasions to discuss issues and responses in more detail. One meeting included an expansive tour of both the Arlington and Fairfax central offices on November 14, 2012. We have participated in meetings of the Governor's Secure Commonwealth 911 Sub Panel, the National Capital Region Emergency Preparedness Council (which is part of the Metropolitan Washington Council of Governments ("COG")), the COG 911 Directors, and Fairfax County officials. We also met with members of the PSAP community in Northern Virginia on December 20, 2012. In addition, on November 14, 2012, COG's Telecommunications Network Steering Committee issued its Preliminary Report of 9-1-1 Service Gaps During and Following the Derecho Storm on June 29, 2012.[3]

A major focus of our investigation for this final report was to gather as much detail as possible to evaluate Verizon's corrective action plans. We are seeking a better understanding of the depth and technical thoroughness of many of Verizon's proposed actions. An important aspect of our effort is determining the scope and specific schedule for the proposed changes. In other words, how deep into the network does Verizon intend to go (i.e., how far beyond the

[2] Preliminary Findings Report, p. 12.
[3] At its request, COG's report was filed in this proceeding. A copy of the Executive Summary of its report is provided as Attachment 2 to this report.

Fairfax and Arlington offices) with the changes and how soon will they be completed?

Of particular concern is obtaining and evaluating the power audits conducted by Verizon as part of its corrective action plans. We recognize that those audits took time to perform; however, we did not receive all of the completed audits until December 4, 2012. We discuss some of our most immediate concerns from those audits later in this report.

DISCUSSION

Verizon has made significant progress in implementing numerous corrective actions it initiated shortly after the June 29 Derecho. We applaud those efforts and are pleased with Verizon's candor and direct approach in identifying the issues and problems. Particular recognition is given to Verizon for initiating power audits in central offices beyond those impacted directly by the June 29 Derecho. Some corrective actions were or are being implemented quickly and Verizon should continue to complete those initiatives as soon as possible. The improvements to Verizon's emergency management processes, updating manuals, providing additional training to its personnel, and revising generator testing procedures can be done quickly (and have been completed in many instances). We are encouraged by improvements to Verizon's documented generator maintenance/testing procedures, revisions to its National Power Network Operation Center ("NPNOC") procedures in identifying and responding to emergency conditions, and placement of readily available site specific emergency procedure manuals in Verizon's central offices. In addition, many of its corrective actions are directed (at least initially) to 16 Virginia offices that Verizon designates as its 911 mission critical offices.[4]

Our Preliminary Findings Report raised concerns that the generators in the Fairfax and

[4] Verizon identified offices housing E911 Selective Router Tandems as 911 mission critical.

Arlington offices had not been properly maintained or tested and that could be indicative of a systematic deficiency throughout Verizon's network. We subsequently reviewed the generator maintenance logs in selected offices (cross section of locations and sizes) and found many instances of insufficient generator testing. We expect that if we look at the maintenance logs for other Verizon facilities in Virginia, we would see similar results. Verizon has implemented several corrective actions addressing generator maintenance and testing which should mitigate the potential for generator failures in the future. However, those practices must be adhered to in **all** Verizon facilities in Virginia, and most importantly must be continuously and routinely followed. We cannot forget that the 911 service outages following the June 29 Derecho would likely have been avoided if the generators in the Fairfax and Arlington offices had been maintained and operated as they were designed.

In addition, we are encouraged by the telemetry improvements that are being undertaken by Verizon. It is redesigning its telemetry network to eliminate the single point of failure structure that presently exists.[5] Verizon's first step is to eliminate its dependency on Uninterruptible Power Supply ("UPS") as the primary power source by moving it to DC central office power. This action should help prevent the potential of a telemetry system failure occurring so quickly after a power outage because the UPS has a very limited reserve (i.e., 30 minutes in the Arlington office). The very early failure of the telemetry system after the June 29 Derecho made restoral efforts longer and more difficult. The longer term goal for redesigning Verizon's telemetry network in accordance with its diversity guidelines is appropriate and will

[5] Verizon utilizes a telemetry network to monitor its central offices, respond to equipment alarms, and diagnose network problems from various remotely located and specialized network operations centers. The present telemetry arrangement provides for a group of central offices to be monitored from one telemetry hub. The redesign will provide for the ability for each central office to be monitored from two telemetry hubs.

provide an even greater safety net to allow for dual monitoring of its network in emergency situations.

While Verizon has been responsive to the issues identified following the June 29 Derecho, we are concerned about the overall condition of the equipment in its Virginia offices. There is evidence of an ongoing lack of routine maintenance in the audited offices. This raises concerns about the conditions existing in other Verizon offices. Verizon has initiated efforts to identify and remedy the problems in its 16 mission critical offices. However, it does not have a plan to conduct power audits in all other Virginia offices, or to conduct transport, switching equipment, or operational audits in any offices. There is not a simple or quick solution to the lack of attention to maintenance and necessary remediation. Verizon must continue to indentify and remedy the deficiencies and properly maintain its facilities going forward. Moreover, Verizon should expand its remediation actions beyond the 911 mission critical offices to all other offices in Virginia.

FINDINGS[6]

Overall we have determined that our preliminary findings identified in the Preliminary Findings Report have been substantiated further and uncontested. However, our continued investigation has identified a number of additional significant findings. These go beyond assessing the impact from the June 29 Derecho as they identify and address (1) other maintenance and equipment problems identified by Verizon, and (2) certain of Verizon's corrective actions and proposals, both for areas affected by the Derecho and in other parts of Virginia. These findings are not all inclusive, but provide a good foundation and cross section of

[6] All quoted material in these findings was obtained from various Verizon provided documents, including interrogatory responses, audits, and corrective action updates.

issues for evaluating the sufficiency of Verizon's corrective action plans. A copy of Verizon's most recent corrective action plan is included as Attachment 3.

Our investigation has identified the following additional findings:

Generator Maintenance, Testing, and Practices

- A review of the 2011 and 2012 backup generator maintenance logs prior to the June 29 Derecho in a cross section of central offices in Virginia shows a lack of compliance with Verizon's maintenance and testing procedures.
- Routine testing was not always performed and in a number of instances the testing duration was insufficient (i.e., a test should run the generator under load continuously for at least one hour **every** month and for five hours once a year). There were some instances where generators were run considerably less than an hour in a single month and in some cases not at all.
- Verizon has "reviewed and refreshed its monthly and annual preventative maintenance requirements for generator, battery and DC plant rectifiers for all its host offices."
- Verizon enhanced its Blackout Testing[7] procedures (as of September 2012) to include "failed automated controls" and "prioritized system load transfer" scenarios. Verizon plans to perform blackout tests for its 16 Virginia 911 network critical sites in 2013, scheduling each site once all the power audit findings have been addressed. It is also in the process of identifying which other facilities will be blackout tested in 2013.
- Verizon has deployed standardized log books in its offices and implemented an online tool to track monthly and annual generator testing.
- Verizon has formalized its generator test reporting and failure reporting procedures.

[7] Blackout testing simulates the loss of commercial power and, among other things, determines that the generators automatically start and office loads are automatically shifted from commercial power sources to the generators(s).

These procedures include an acknowledgement process for all generator run alarms by the responsible Network Operations Center ("NOC") and a separate operational process "to audit the generator run testing frequency compliance." Records will be maintained locally as well as by the NOC.

- Verizon is installing a street side quick connection for a portable generator at all 911 mission critical offices to be completed as follows: ten in 1Q 2013, five in 2Q 2013, and one by July 2013.
- A third permanent generator will be installed in the Arlington office by 3Q 2013.

Telemetry

- Verizon is redesigning its telemetry network to "include more diverse connections and failover (alternative) locations."
- Verizon plans to reduce the telemetry system dependency on UPS by moving the telemetry equipment to a DC central office power source. This effort will provide additional operational duration for telemetry in the event of a commercial and generator power outage.
- DC powered routers were installed at the Arlington central office on January 3, 2013.
- Verizon plans to redesign its telemetry network so that core routers, which receive data from edge routers, will have central office generator and battery back up by June 30, 2013.[8]
- Verizon is implementing site by site remediation to move all telemetry traffic to the IP network. The 911 mission critical offices should be completed by December 31, 2013.

[8] "Edge routers" are deployed in each Verizon central office. They collect all of the alarms and other messages generated by the network equipment. Those edge routers then send that data to "core routers" – regional aggregation points that distribute them to the appropriate operations support systems for analysis and action by NOC personnel.

- The ongoing telemetry redesign schedule for the remaining Verizon offices (nationwide) is based on office size (starting from largest to smallest) with an indicated completion by December 31, 2015. This redesign will eliminate a single point of failure for the telemetry system allowing Verizon to maintain visibility to its central offices from an alternative location if necessary.

Power Audits

- Following the Derecho, Verizon initiated and completed backup power system audits for its other 911 mission critical facilities in Virginia that were not affected by the Derecho. It has completed backup power system audits for all of its 911 mission critical facilities.
- The audits did not include assessment of switching or transport equipment.
- The audits surveyed the overall condition of the power, grounding, and battery room systems at each facility and were generally "non-intrusive and visual in nature."
- The audits also included an infrared thermographic scan of major system components.
- Inspections of mechanical, HVAC equipment, and building conditions were also performed in conjunction with the power audits in the 911 mission critical offices.
- The audits conducted in a few of the offices were primarily narrative in nature while the other audits used a survey template format with a pass/fail test.
- The infrared thermographic scans identified variations in temperature readings (hot spots) in electrical equipment (i.e., connections, fuses, and circuit breakers) to diagnose problems (i.e., loose mechanical connections or circuit overloads) that could potentially cause issues (i.e., from fires to equipment failures).
- The audits were not operational in nature and Verizon recognizes that "depending on the severity of any abnormalities found (if any) then a more in-depth audit of the affected

systems will have to be scheduled." We are not aware of further in-depth audits scheduled in any of the sixteen 911 mission critical offices.

- The audits for the 911 mission critical offices in Virginia identified hundreds of abnormalities. The underlying issues found in the audits ranged from minor to critical.
- Many of the audits show a broad range of problems from overall building deterioration to apparent lack of routine preventative maintenance.
- Examples of minor issues found in the various audits include low electrolyte levels in batteries, cracked flame arrestors on batteries, and safety equipment missing or depleted.
- The audits found instances where power equipment (i.e., battery strings, rectifiers, inverters) in the offices was known to be manufacturer discontinued and spare parts were not available on site or from the manufacturer. In many instances, the audits recommended replacing the manufacturer discontinued equipment. One audit stated "the obsolete rectifiers put the switch at risk due to lack of spare parts."
- Verizon indicates that it has access to spare parts in other locations and from third party vendors. In addition, Verizon retains parts from old, replaced equipment to use as spares.
- A number of the audits identified that annual Battery Run Down Tests ("RDT") had not been performed in some time. In one office, the audit stated the "battery plant reserve sizing is not sufficient to carry the load for four hours" and it was noted that the RDT had not been performed since 2009.
- There was evidence of roof leaks in several offices.
- The audits identified nonfunctioning and inadequate HVAC systems in some offices. For example, some air handling and condensing units were out of service at the time of the audits and the temperatures in the battery and equipment rooms exceeded acceptable

levels.

- The thermographic scans identified circuit breakers and fuses in a number of offices as being hotter than the surrounding equipment and posing a potential fire or failure risk.
- At one office, a brick veneer wall was falling on to the adjacent property of a U.S. post office. There are numerous indications of building deterioration in many offices.
- In addition to scheduled inspections, Verizon will conduct backup power system audits in facilities other than 911 mission critical offices based on "field requests or direction from the engineering teams." For example, items noticed in other inspections and activities in an office may trigger a field request for a power audit.
- The audits in several offices identified instances where power rectifiers were not operational, needed to be repaired, or were improperly located.
- Verizon has addressed and repaired many of the problems identified in the audits and has stated it is committed to rectifying all problems indentified therein.

Other Initiatives

- Outside the power audit process, Verizon inspected during August and September of 2012 all its Virginia central offices under its annual "Neat, Clean, Safe and Reliable" central office inspection program.
- According to Verizon, this program has resulted in hundreds of work action items in over 300 Virginia offices.
- The work action items are categorized and prioritized into three groups: Network Reliability, Safety/Security, and Neat Clean.
- Verizon has completed the work on many of these work actions and plans to address all items identified in the Virginia offices.

- Verizon accelerated its "Original Equipment Manufacturer Preventative Maintenance" program that it had planned for 2013 into 4Q 2012. Under this program, the original equipment manufacturer ("OEM"), or a qualified OEM vendor, performs an annual checklist of maintenance items. During 4Q 2012, Verizon completed this program in 222 offices nationwide, including 29 in Virginia.
- Verizon has deployed additional diversity in its long haul network and has retired some specific transport systems that were at the end of their life.
- Verizon has completed a bar code inventory of all plug-in equipment for is legacy local network.

Emergency Practices and Procedures

- Verizon revised its National Power Network Operation Center ("NPNOC") storm/emergency handling procedures.
- The revised NPNOC procedures were expanded to address "unplanned" significant natural events or storms. The NPNOC will declare a "storm/emergency event" during an unplanned event when there are five or more battery on discharge ("BOD") alarms in the same geographic area.
- When a storm/emergency event is declared (from either a forecasted or unplanned event), the NPNOC will contact the Global Event Network Management Center ("GENMC") and the GENMC will then convene a conference bridge to outline a strategy plan.
- The NPNOC will no longer suspend notifications of BOD alarms to the field during storm emergencies. All escalations to the dispatch centers and field power managers will continue during such emergencies.
- Verizon is adding an additional power technician to its evening shift in Northern

Virginia. In addition, "Verizon has modified its work schedule to designate Arlington and Fairfax offices as the primary reporting location...."

- Verizon placed a readily available copy (or copies) of a site specific "Central Office Emergency Procedure Manual" in its 911 mission critical offices that identifies and maps the power and generator procedures for the specific office.
- Verizon has centralized its emergency activation processes with its Business Continuity and Emergency Management (BCEM) organization to expedite prompt responses to unforeseen emergencies.

911/PSAP

- As part of its corrective actions, Verizon has agreed to implement a number of initiatives requested by the PSAPs.
- Verizon is developing a centralized system to access the PSAP's 911 infrastructure information and is working with the PSAPs to make this available to them.
- Verizon is working with PSAPs in Northern Virginia to recommend design changes to improve diversity and infrastructure inventory.
- All Northern Virginia PSAPs have been provided with design change recommendations.
- Verizon plans to complete its diversity review for all PSAPs in Virginia by year end 2013.
- Verizon plans to conduct a drill or exercise with each requesting jurisdiction on a semiannual basis that models potential or actual 911 outages. In early December, Verizon conducted a pilot exercise with the City of Norfolk.
- The PSAPs appear to be encouraged by the actions being undertaken by Verizon's current operational management but still have concerns about the sustainability,

adequacy, and timing of the proposed corrective actions.

RECOMMENDATIONS

Our goal for this investigation is to help prevent such a seriously and potentially life threatening event from occurring again. We recognize that there are no "absolutes" to prevent another 911 service outage. However, the 911 outage following the June 29 Derecho in Northern Virginia should not have occurred and was avoidable if Verizon had properly maintained the generators in the Arlington and Fairfax offices. Nonetheless, the 911 outage and subsequent Verizon investigation exposed numerous deficiencies and weaknesses inherent in its procedures, processes, and central offices.

Our investigation shows that Verizon has resolved many problems, and is initiating actions to correct additional deficiencies. However, it will take a concerted effort on Verizon's part to correct all the problems. This cannot be done overnight and likely requires oversight to ensure compliance. Therefore, we recommend the following:

- This docket should remain open.
- Verizon should be required to update and file quarterly corrective action progress reports with the Commission.
- Verizon should correct all deficiencies and implement all recommendations identified in its power audits.
- Verizon should meet quarterly with the Staff to provide additional details, schedules, budgets, and updates on its corrective actions, audits, inspections, and other initiatives intended to correct its deficiencies in Virginia.
- Verizon should continue to meet and cooperate with the PSAPs to ensure their concerns

are addressed.

- By the end of 1Q 2013, Verizon should develop and review with the Staff a schedule to conduct audits (including power, mechanical, and HVAC equipment) in all remaining Virginia offices. Verizon should permit the Staff to monitor any audit as it is conducted.
- Recognizing the time required to complete the audits, at a minimum, batteries should be inspected and tested in all Virginia locations by the end of 2Q 2013.
- Verizon should provide the Staff with copies quarterly of any additional or revised power audits conducted for offices in Virginia.
- Verizon should provide the Staff with any plans to conduct additional inspections or audits for switching and/or transport equipment and operational audits in Virginia. Copies of the results from any such inspections and audits should be provided to the Staff on a quarterly basis.
- Verizon should establish a plan to address the availability and sufficiency of spare parts for manufacturer discontinued equipment.
- The Staff should continue to communicate and meet with PSAPs and the 911 community.
- Verizon should maintain and update a complete inventory of its 911 service infrastructure.
- Verizon should provide a quarterly report to the Staff identifying any problems found in the monthly testing of generators in offices in Virginia. The report should indentify the office and the corrective action undertaken and include applicable dates.
- The Staff should file an annual status report with the Commission that includes recommendations on continuing the various requirements on Verizon and/or

recommendations on any changes or additions to such.

- The Staff should evaluate the FCC Public Safety and Homeland Security Bureau's Report and Recommendations released on January 10, 2013,[9] and advise the Commission of any additional recommendations we may determine are warranted based on that report.

CONCLUSION

The 911 service outages after the June 29 Derecho put thousands of Virginia citizens at risk. Those outages were a direct result of Verizon's failure to perform the necessary maintenance on its central office facilities, and were compounded by its inability or failure to monitor and respond, both internally and externally, to the outages. As the generator maintenance logs, audits, and other Verizon interrogatory responses reveal, Verizon has allowed equipment and facilities at many of its offices to deteriorate. This discovery indicates that Verizon should not devote its efforts solely on the sixteen 911 mission critical offices but should expand its corrective efforts to all its Virginia offices.

The risk of further 911 or other customer service outages cannot be mitigated without correcting the problems at all Verizon offices in Virginia. We recognize that they cannot be corrected overnight. Market and technology change is resulting in industry movement away from the traditional copper network, particularly for voice. However, the integrity of the telecommunications system, regardless of technology (i.e., VoIP, wireless, FIOS, etc.), still depends on properly functioning central office equipment, transport systems, switching equipment, and 911 services provided by the incumbent local exchange telephone company.

We applaud Verizon's efforts to identify and correct the underlying causes and problems,

[9] On January 10, 2013, FCC Chairman Genachowski announced plans to strengthen the reliability and resiliency of the nation's 911 services during major disasters. A copy of that public announcement is attached to this report as Attachment 4.

and are encouraged that no 911-related problems arose in Virginia during and following Hurricane Sandy.[10] Ensuring that testing and maintenance is performed properly and timely in all of Verizon's offices should go a long way in preventing a similar 911 outage as the one following the June 29 Derecho. In addition, Verizon has modified many of its practices to ensure more timely response in emergency situations. These efforts should be monitored and evaluated for at least some period of time (i.e., 1-3 years) to ensure that Verizon continues to undertake the necessary corrective action.

[10] While not of the magnitude or seriousness of the June 29 Derecho in Virginia, Hurricane Sandy caused commercial power loss to three Verizon central offices in Virginia, including Arlington, and the generators automatically started in all.

Attachment 1

SEPTEMBER 14, 2012 STAFF REPORT

PRELIMINARY FINDINGS

- Commission Rule 20VAC 5-425-40 A 1 requires a LEC providing 911 service to "design, construct, maintain, and operate its facilities to minimize interruptions to E-911 services."
- Verizon was the only LEC in Virginia that experienced significant 911 service problems following the June 29 Derecho.
- The total loss of 911 capabilities to the Prince William County, Fairfax County, Manassas, and Manassas Park PSAPs was an extremely serious event and it is very fortunate that there were not catastrophic consequences to any citizens in Northern Virginia
- The Prince William County, Fairfax County, Manassas, and Manassas Park PSAPs were fully prepared to respond to the June 29 Derecho and were not responsible for the 911 service failures.
- The cause of the 911 service outages in Northern Virginia from the June 29 Derecho began with the failure of two backup generators that did not start automatically when commercial power was lost. Specifically, a generator in each of Verizon's Arlington and Fairfax central offices did not start.
- A review of the maintenance logs for the backup generators in the Arlington and Fairfax central offices shows a lack of compliance with Verizon's maintenance and testing procedures.
- The generator that failed to start in the Arlington office did not start during routine testing conducted two days before the June 29 Derecho. The maintenance log indicated that

work to the generator was needed.

- A total of nine generators (out of 136) failed to operate properly during the commercial power outages from the June 29 Derecho in Verizon's Mid-Atlantic region.
- The scope of 911 problems went well beyond the calling areas served by the Arlington and Fairfax central offices.
- ALI is an important component of 911 service. The lack of delivery of ALI to many PSAPs could have put citizens across Virginia at greater risk.
- The initial battery on discharge ("BOD") alarm[1] for the Fairfax central office was sent to the National Power Network Operation Center ("NPNOC") at 10:29 p.m. on June 29, 2012 when the one generator failed to start. Under Verizon's procedures, any BOD alarm should have been seen as a **critical** power alarm requiring immediate action. However, according to Verizon, this alarm was incorrectly categorized as a **major** power alarm condition when sent to the NPNOC.
- The Regional Network Center ("RNC") received a repair ticket (identified as a **major** alarm as mentioned above) from the NPNOC for the Fairfax central office at 10:32 p.m. on June 29, 2012. At that time, and on the morning of June 30, the RNC was only working **critical** alarms and a power technician was not dispatched to the office until after the backup batteries had drained completely.
- The telemetry system (alarm monitoring) in the Arlington central office was only supported by the Uninterruptable Power Supply ("UPS") (i.e., battery power source)

[1] BOD or battery on discharge usually indicates one of two conditions. One is an all rectifier failure with or without a generator or commercial power failure, and second is a commercial power failure with generator failure. In each situation the office batteries are being depleted and the alarm condition is a CRITICAL indicator that network service is in jeopardy.

which was designed with a 30 minute reserve. The UPS failed at 11:23 p.m. on June 29, 2012.

- The very early failure of the telemetry system resulted in Verizon being unable to receive further alarms and remotely access its switches to monitor, test, or reroute traffic to 34 sites in the area. Verizon's inability to monitor its facilities and network in the Northern Virginia area significantly impacted the restoral process from the June 29 Derecho.
- The delay in identifying and repairing the critical conditions in the Fairfax and Arlington offices resulted in unnecessary damage to Verizon's network and extended the 911 problems and outages. There were hundreds of damaged or impacted pieces of equipment in those two offices (i.e., circuit cards and digital cross connects).
- The loss of the transport systems in the Arlington and Fairfax central offices was profound and collectively resulted in 17 switches becoming SS7 isolated, and therefore incapable of completing (originating or terminating) any interoffice local, long distance, or 911 emergency calls. The loss of those transport systems was also responsible for the loss of ALI to the PSAPs.
- Verizon did not activate its emergency Area Control Center located in Maryland until 10 a.m. on June 30, 2012.
- Verizon did not always provide sufficient, accurate, or timely communications to the affected PSAPs regarding its 911 problems and outages following the June 29 Derecho.
- Some battery reserves supporting major equipment systems in the Arlington (other than telemetry) and Fairfax central offices were depleted within approximately 3 to 5 hours. In addition, some equipment in those offices failed even before the batteries exhausted because of sensitivity to low voltage conditions.
- In many instances, Verizon's workforce was not timely dispatched, prepared, or trained

to recognize or correct the critical conditions from the June 29 Derecho.

- Verizon is making progress in implementing its corrective action plan, however, at this time, not all items have been fully defined or timelines determined.

Attachment 2

PRELIMINARY REPORT of 9-1-1 SERVICE GAPS DURING and FOLLOWING the DERECHO STORM on JUNE 29, 2012

Metropolitan Washington Council of Governments
9-1-1 Telecommunications Network Steering Group

November 14, 2012

EXECUTIVE SUMMARY

The 9-1-1 Emergency Call System is the vital link to public safety assistance across the country, providing access to police, fire and emergency medical services. Residents and visitors in cities, towns and rural communities are confident that accessing 9-1-1 will result in saving lives and property. It is the public's expectation that the responsibility of public safety and local and state government officials is to assure that the fees and charges assessed for 9-1-1 service are used to provide continuous and reliable public safety service. The National Capital Region (NCR), as the nation's capital and a major urban center, must have a reliable 9-1-1 system.

Figure 1: Basic 9-1-1- Call Flow

Late on the evening of Friday, June 29, 2012, a severe storm (Derecho) hit the Mid-Atlantic region with unusually intense straight-line winds. The storm caused widespread commercial electric power and communications outages in Washington D.C., Virginia, Maryland and additional states. At approximately 7:30 AM on Saturday, June 30, 2012, the 9-1-1 centers in Fairfax County, Prince William County, Cities of Manassas and Manassas Park experienced a complete failure of Verizon's 9-1-1 and telephone service. Three additional 9-1-1 centers, Arlington County, City of Alexandria and Loudoun County experienced a partial failure of these services. Verizon's restoration of 9-1-1 service began at approximately noon on Saturday, but some of the issues continued for over 5 days until July 4th, 2012.

Metropolitan Washington Councils of Governments Response

While the states and federal government regulate telecommunication utilities, 9-1-1 connects people in need with local governments. Thus, the failure of this system as a result of the Derecho became an issue of great concern to the Metropolitan Washington Council of Governments (COG), an association of 22 local governments that represent over 5 million residents. In addition, there have been previous issues with 9-1-1 service, that have been brought to Verizon's attention as indicated in a letter to Verizon from COG dated July 21, 2011.

On July 11, 2012, at its regular meeting, COG Board of Directors unanimously adopted R36-2012 Resolution to Encourage Steps to Address Verizon 9-1-1 Service Gaps During and Following the Derecho on June 29, 2012 which included the five items below

- Cause of Verizon's 9-1-1 failure;
- Existing redundancy and backup capabilities;
- Vulnerability of newer technologies that required battery or back-up power, including home and business service;

- Opportunities for COG localities to influence and strengthen regulatory oversight and remedies at the state and federal levels;
- Verizon's communication and messaging to the public and local emergency response officials concerning 9-1-1 services

COG formed a task force of 9-1-1 Center Directors and other interested parties to address the five items in the resolution. The following are the preliminary findings of the task force.

1. Cause of Verizon's 9-1-1 Failure

The loss of commercial power and the subsequent failure of one of two backup generators in each of Verizon's Arlington and Fairfax Central Offices (CO) were the predominant causes of the 9-1-1 service outages.

- The Derecho impact on the electrical infrastructure caused the loss of commercial power to the Verizon facilities located in Arlington and Fairfax, Virginia and elsewhere.
- The back-up generator, in the Fairfax CO, that supported 9-1-1 systems did not start
- In addition, the back-up generator in the Arlington CO, that supports Verizon's ability to view, monitor and identify problems in its network, did not start.
- Verizon had failed to identify or resolve previously identified maintenance issues with these generators; air in the fuel lines or faulty automatic fail-over switches, incorrect log entries and corrective action.
- Verizon's technician dispatched to Fairfax CO, on the morning of Saturday, June 30, 2012, did not realize, and took several hours to identify, that the generator supporting the 9-1-1 infrastructure was not operating. The delay allowed the batteries to drain resulting in the loss of 9-1-1 services.
- Both the Verizon Arlington and Fairfax facilities were supported by back-up battery power, but these batteries drained.
- Verizon failed to successfully implement any mitigating action to restore these two generators prior to the battery back-ups expiration.
- Once the battery supplies were exhausted both the ability to view and identify problems and 9-1-1 systems at the Verizon Arlington and Fairfax facilities failed.
- In addition, damage and failure of other 9-1-1 supporting systems within the Verizon network and infrastructure, such as the ability to receive the callers location, severely contributed to the 9-1-1 outage. However, these were largely cascading effects related to the loss of adequate backup power in Arlington and Fairfax COs.

2. Existing Redundancy and Backup Capabilities

This report addresses the three major components of 9-1-1 services from both the 9-1-1 Service Provider (Verizon) and Public Safety Agencies perspective to include Power, Network and 9-1-1 center

- Power

Verizon and other telecommunications providers and many of the 9-1-1 centers have designed and implemented backup power systems in most of their critical facilities that include generators and backup battery supplies in case of commercial power failure. In some cases they have worked with the local power companies to implement dual power sources from separate power feeds.

In the case of the Derecho on June 29, 2012, the 9-1-1 center and other telecommunications providers' backup power systems generally operated as designed and continued to provide required power until commercial power was restored. The generator issues experienced by Verizon, however, had significant impacts.

- Network

Verizon's network to provide 9-1-1 services includes multiple levels of diversity and redundancy, as well as back-up power in critical facilities, to optimize resiliency during a crisis.

- 9-1-1 Centers

Most of the critical systems and facilities, including servers, workstations, and databases, within the 9-1-1 centers have redundant components that are designed to provide continuous service and mitigate any downtime. In addition, many of the 9-1-1 centers have backup locations where calls can be routed in the case of major outages or the loss of the primary 9-1-1 center. In the case of the Derecho event, many of the backup 9-1-1 centers' services were provided through the Verizon Arlington and Fairfax locations, and thus were also unable to receive emergency calls.

3. Vulnerability of Newer Technologies that Require Battery or Back-Up Power, Including Home and Business Service

For many decades, power for traditional telephone service for most residences and small businesses was supplied via the hard wire connection through the telephone lines and therefore the loss of commercial power often did not result in the loss of dial tone or telephone service. Today, the widespread use of cordless phones which depend on commercial and limited battery power, results in the loss of telephone service during power outages.

Certain more recent technologies such as Voice over Internet Protocol (VoIP) or Standard Internet Protocol (SIP) rely on a modem or router located on premise or within a computer. With the use of these technologies, the loss of power causes the loss of telephone service and access to 9-1-1 once the back-up battery contained within the equipment, drains.

Some commercial or business telephone systems, primarily for smaller businesses, might also require power to operate properly. In addition, mobile telephone service, when a high volume of calls are being attempted into the mobile network at the same time, can cause network congestion and/or blockage. Also, the loss or failure of the mobile infrastructure, such as physical damage to cell sites, or network connectivity, can impact the ability to make and receive mobile calls and therefore access to 9-1-1.

4. Opportunities for COG Localities to Influence and Strengthen Regulatory Oversight and Remedies at the State and Federal Levels

At the time of this preliminary report there are five proceedings related to the Derecho and its impact on 9-1-1 services.

It is anticipated that reports will be issued by these various groups which will be incorporated into the final version of this report.

Within the proceedings, listed below, authorities in the COG region should encourage the adoption of new rules that would require Verizon, and other 9-1-1 service providers to adhere to high standards of operation to better ensure and support 9-1-1 service or face penalties.

1. Virginia SCC Case No. PUC-2012-00042
http://www.scc.virginia.gov/case/PublicComments.aspx
2. FCC PS Docket No. 11-60
http://www.fcc.gov/document/pshsb-seeks-comment-effects-derecho-storm-communications)
3. Virginia Secure Commonwealth Panel – 9-1-1 Sub Panel
4. Maryland Public Service Commission Case No. 9298
http://webapp.psc.state.md.us/Intranet/Casenum/CaseAction_new.cfm?CaseNumber=9298
5. Maryland Emergency Number Systems Board (ENSB) Inquiry

5. Verizon's Communication and Messaging to the Public and Local Emergency Response Officials Concerning 9-1-1 Services

Public messaging was needed not only from the public information officers (PIOs) supporting the 9-1-1 centers, but from the utility itself. As part of the overall system of disseminating information to the public, Verizon needed to be part of the many voices with the common message that the 9-1-1 system was down. Verizon should have pointed to the local officials' guidance on what the public should do in case of an emergency, especially during this event, when everyone was challenged by lack of electricity, phones and connectivity. Officials needed a more robust public messaging response on Verizon's part to complement local government efforts. In these reports, Verizon states it is mobilizing a more robust emergency response communications process to ensure that media outlets and other channels are provided relevant information on a timely basis.

Verizon's first responsibility, in a service interruption, is to notify the 9-1-1 center. Then in its role as a local utility, in cooperation with local government, Verizon has the responsibility in providing enhanced customer service, to inform the public of 9-1-1 interruptions. This should include dissemination of information about the extent of the problem and when it will be resolved. PIOs and 9-1-1 centers should remain the primary source of guidance to the public during an emergency.

Recommendations

On July 19, 2012 the Northern Virginia 9-1-1 Directors (City of Alexandria, Arlington County, Fairfax County, Prince William County and Stafford County), and subsequently all of the 9-1-1 Directors in the COG Region, concurred on five recommendations which were accepted by Verizon and are in various stages of completion.

1. Adoption of the National Incident Management System (NIMS) Model (www.fema.gov/national-incident-management-system)
2. 9-1-1 Interruption Notification
3. Semi-annual 9-1-1 Outage Drill
4. Monthly update of contact list
5. Verizon Emergency Operations Center (EOC) Representative

In addition to the recommendations of COG 9-1-1 Directors released in the aftermath of the Derecho event, which Verizon should continue to implement, there are several other recommendations from COG 9-1-1 Telecommunications Network Steering Group and 9-1-1 Directors that should be considered and are outlined below.

1. Federal and State Regulatory Authorities should strongly encourage Verizon and other 9-1-1 service providers to perform a comprehensive independent audit of **the entire** infrastructure, processes and procedures that support 9-1-1 service and related systems, to assure the reliability and continuity of 9-1-1 service under any circumstance. Based on the results of these audits, comprehensive plans and strategies should be developed to immediately resolve any findings. The results of these audits and resolution plans should be made available to the 9-1-1 stakeholders.
2. It is highly recommended, that Verizon and other 9-1-1 service providers should provide subject matter expertise and make recommendations to the 9-1-1 centers and their stakeholders to assure reliability and continuity of 9-1-1 service. This should include, but not be limited to, network redundancy, 9-1-1 center equipment and systems, and best practices and procedures.
3. It is critical, that Verizon review their communications and public notification plans with each 9-1-1 center's communicators and/or Public Information Officers (PIO) regarding the dissemination of emergency messages (using both traditional and social media) to the public during 9-1-1 outages and update as needed. This process should also explore alternative methods to communicate with the public in case of widespread power and telephone outages. Verizon should coordinate with National Capital Region communicators/PIOs during any future outages, to inform and keep the public updated, and amplify the 9-1-1 center-specific public messages and information.
4. Verizon should keep the public informed of any service issues, the extent of the outage and time for resolution.
5. Federal and State Regulatory Authorities should evaluate the steps and actions of Verizon, related to this event, and the above audits, to ensure Verizon has adequately resolved all issues

and continues to improve their processes and infrastructure to ensure reliability and continuity of 9-1-1 service.

6. COG members and localities should work with their State and Federal regulatory authorities and Legislators, as needed, to assure, through proper oversight, best practices and procedures by establishing service level agreements to ensure reliability and continuity of 9-1-1 service.
7. It is recommended that there be further investigation by State and Federal Regulators, on whether the 9-1-1 supporting infrastructure of other telecommunications providers other than Verizon, was also impacted by the Derecho. As an example, AT&T Wireless in their comments to FCC PS Docket No. 11-60, indicated there was some impact to their infrastructure during and after the Derecho.

By all indications during this event, the systems and processes in place by the public safety agencies in the COG region, operated as designed, and the 9-1-1 centers were fully prepared to provide service to the public. But, there are some items, which need to be considered, by local and state government officials, to ensure future reliability and continuity of 9-1-1 services which are as follows.

1. State and local 9-1-1 authorities should be encouraged to perform a full assessment of their current 9-1-1 systems and operations to assure reliability and continuity of 9-1-1 service.
2. It is recommended that State and Federal regulatory authorities, review current laws and regulations related to 9-1-1 service, to assure it places emphasis and favors public safety versus the 9-1-1 service providers or telecommunications providers. The interest of the public and public safety should come first over the interest of commercial providers.
3. State and local 9-1-1 authorities should work with their Legislators to ensure that the funding required to support the current 9-1-1 services and future Next Generation 9-1-1 are adequate and available, and that the fees and funds collected from the citizens of their States for 9-1-1 services are dedicated and used solely for the purpose as intended for the implementation, operation and maintenance of 9-1-1 emergency telephone services as required by the Enhance911 Act of 2004(Pub. Law 108-494). In addition, the fees collected should be fairly and equally distributed to the 9-1-1 authorities.

Outstanding Issues

There appears to be no standards for 9-1-1 service providers to adhere to public safety grade requirements for backup power related to the systems that support 9-1-1 services.

Next Steps

1. COG should formalize a committee of 9-1-1 Directors that can address specific issues related to 9-1-1 emergency telecommunications service for the NCR
2. COG, with the assistance of the 9-1-1 authorities, should take the lead to work cooperatively in the development of a multi-year 9-1-1 strategic plan to include Next Generation 9-1-1

Conclusion

The Derecho's impact on 9-1-1 services and the ensuing public and industry reaction has been one of the most significant events in the history of enhanced 9-1-1 services in the United States. It is conclusive that there were many areas in which Verizon could have performed better related to their initial response to the issues the Derecho storm created. Questions still remain about the current reliability, age and condition of the Verizon infrastructure local governments rely on to provide life-saving 9-1-1 public services.

In the aftermath of the storm, Verizon has taken steps to address the issues of June 29, 2012. Verizon, however, has a responsibility to follow-up on the additional recommendations of this and other recommendations made to the FCC hearings. Verizon must continue to evaluate their ongoing operations, processes and best practices to mitigate the impacts of this type should it happen again. There is much Verizon must do to regain the confidence of the public safety community and citizens that their part in providing vital 9-1-1 communications service is highly reliable and sufficiently redundant on an ongoing basis.

There were no identifiable issues for the 9-1-1 centers during this event and all of their systems operated as designed. The public safety community, however, must also shoulder the responsibility to determine where improvements can be made and make plans for continuous improvements to meet new operational and technology challenges. State and federal government officials need to provide resources to the public safety community, and proper oversight, to allow the technology and human resources that are necessary to support the operations of the current 9-1-1 services as well as Next Generation 9-1-1 services.

Attachment 3

Verizon, 911 Service and the Derecho

Moving Forward

Corrective Actions Update

January 8, 2013

Maureen Davis
Vice President Network Operations
MidAtlantic

verizon

Power

The specific cause of the Northern Virginia 911 disruptions was the failure of one of two back-up generators to start in Arlington and Fairfax following the loss of commercial power. These problems are fixed.

Issue	Action Plan	Status
Arlington Back-up Power	• Install new start batteries on Generator 1 • Complete Generator 2 repairs • Complete full load transfer test (pending battery tests and run down testing) • Complete fuel system repairs • Update manual generator-starting procedure	Complete
Fairfax (Lee Hwy) Back-up Power	• Install a new UPS on the Generator 2 Auto Transfer Switch (this solves the Generator 2 start failure) • Install a permanent Auto Transfer Switch power source via the inverter power plant that is tied to DC power plant batteries.	Complete

Power (cont'd)

Verizon's investigation revealed significant opportunities for improvement to ensure that best practices are followed and lessons learned are applied throughout Verizon's service territory.

Issue	Action Plan	Status
Generator system failures were different in each location. While the specific failures have been repaired, we have extended our review across the footprint to identify and address potential vulnerabilities.	• Conduct back-up power system audits in the mission-critical Verizon facilities supporting 911 in Virginia, Maryland and Washington, DC. • These audits include ensuring the proper categorization of power alarms, as the investigation revealed that an alarm from Fairfax before the loss of network monitoring was mis-categorized and thus placed lower on the priority list. • Institute any corrective measures identified in those power audits. • Where multiple generators are present, we will institute automated controls to prioritize system loads so that critical elements (e.g., network monitoring) stay up or are restored first in case one of the two generators fails.	• Completed for VA, MD and DC sites: 10/17/12 • Power alarms tested for 3 most critical conditions for all Verizon central offices: 12/5/12 • Remediation for such conditions is 98% complete • Corrective actions for audit findings in progress. Most items will complete by 3/31/13; some items require longer time frames and are scheduled for 2Q13 and 3Q13. • Arlington audit concluded that automated load shed not optimal solution; a 3rd permanent generator will be installed 3Q13. Existing portable generator to remain on site and connected until permanent one installed.

Power (cont'd)

Issue	Action Plan	Status
Emergency Power Practices and Procedures Verizon will improve its speed of restoration of power, moving to manual starts where necessary without delay, prioritizing power to key network equipment (e.g., 911, monitoring systems) in multi-generator configurations, and improving its deployment of mobile generators.	• Implement site-specific back-up power system procedures at critical facilities to ensure real-time on-site accurate identification of power loss anywhere in the facility. • Create site-specific manual generator start and transfer procedures, including prioritized system loads, to ensure a rapid start in the case of failure of automated starting systems. • Enhance critical facility "Black Out" testing. We test our back-up power systems regularly, but will now include "failed automated controls" and "prioritized system load transfer" scenarios. • Improve training and testing compliance. Our investigation revealed that the generator in Arlington had been tested just prior to the Derecho, failed to start, and required service, but that procedures weren't followed that would have ensured speedy correction of those service issues and/or faster restoration of the office.	Potomac-Complete Footprint-1Q 2013 Potomac- Complete Footprint- 2013 Field Blackout Tests 1Q13 Complete

Emergency Management Processes

More robust visibility into our network and crisis management processes will improve coordination and communication with PSAPs and other government/local officials.

Issue	Action Plan
Verizon has a standard practice of internal mobilization based on actual or potential service impacts. These are triggered by alarms. The loss of visibility into our network prevented us from receiving these alarms and delayed our response.	• We have enhanced our event criteria and procedures for notification and mobilization to trigger activity more quickly when batteries are activated or when network monitoring is lost in multiple offices in a geographic area. **Complete**
Rapid identification of emergencies and transition to Emergency Management. The Derecho was initially treated more like an internal network problem than like a hurricane-type problem, and this affected incident management.	• Emergency Management has been centralized and enhanced so that all emergencies, including network emergencies, are managed by Verizon's National Emergency Coordination Center (NECC), which utilizes the National Incident Management System (NIMS) principles as published by the U.S. Department of Homeland Security. **Complete**

Verizon Network

Telemetry systems allow Verizon to receive alarms, monitor its network, identify the cause and location of problems, and repair them rapidly.

Issue	Action Plan
Creating diverse connectivity and alternative telemetry sites will provide greater resiliency in crises. It will also improve the effectiveness of real-time communications with PSAPs. • This initiative will enhance visibility into the 911 network. For example, our investigation revealed that the Eastern portion of Loudoun County could not reach the County's PSAP for several hours on June 30, but the loss of telemetry impeded effective communication with the PSAP on the issue.	• Redesign the telemetry network to include more diverse connections and failover (alternative) locations. • Diversity guidelines for telemetry network published 8/15/12; implementation plan approved. • Replaced major hub routers in Arlington with DC powered routers to extend telemetry life to that of office battery power – completed 1/3/13. • Redesign telemetry edge routers to a core router that has generator and DC battery back-up. Virginia offices to complete by 6/30/13. • Site-by-site remediation to upgrade the edge routers and move all telemetry traffic to the IP network across the entire Verizon Telecom footprint. All E911 tandem offices throughout that footprint will be finished by 12/31/13.

verizon

911/PSAPs

Verizon's analysis of the network impacts following the Derecho has identified areas for improvement with specific PSAP configurations, especially involving ALI and trunk diversity. Verizon will work directly with the specific PSAP partners to make those improvements.

Issue	Action Plan	Status
Opportunities for improved diversity on PSAP trunking and ALI links. Conduct network design review for all Maryland and Virginia PSAPs.	• Review PSAP trunking and ALI links for diversity • Work with local Engineering and Operations team to remediate issues identified.	• Review completed for affected PSAPs in Northern Virginia 7/31/12. • Virginia redesign recommendations ready for review; scheduled with PSAPs as available. • Maryland reviews completed by 9/30/12 and reviewed with PSAPs in October and November. Redesign recommendations to follow.
A centrally inventoried 911 Infrastructure will facilitate trouble-shooting and improve restoration times.	• Develop a means to implement and maintain an inventory for E911 Infrastructure.	• Technical service managers to retain all currently developed network routing maps. • Network routing maps will be integrated into new ticketing systems to allow for faster response and facilitate trouble-shooting and restoration.

Communications

- The 911 Directors of the City of Alexandria, and the Counties of Arlington, Fairfax, Loudoun, Prince William and Stafford have recommended that Verizon adopt five steps to improve communications and crisis response. Verizon has adopted those concepts.

Recommendation	Action Plan
Verizon adopt, embrace, instruct, train and utilize the National Incident Management System (NIMS) model, to address and mitigate any and all significant events/incidents impacting providing 911 service to the aforementioned jurisdictions. Complete	• Verizon employs an "all hazards approach" to its Business Continuity, Disaster Recovery, Facility Preparedness and Emergency Management programs. These are essential to the protection of its employees, critical business processes and structural facilities located around the globe. • Verizon's National Emergency Coordination Center (NECC) process utilizes the National Incident Management System (NIMS) principles as published by the U.S. Department of Homeland Security. Verizon offers internal training and orientation courses on its NECC processes, and an Introduction to the National Incident Management System.

Communications (cont'd)

Recommendation	Action Plan
Verizon obtain and utilize a Reverse 911® type system to notify, via voice and text, those persons identified by the above jurisdictions, as soon it is known or suspected by Verizon that there is or may be an interruption of 9-1-1 service to any or all of the above jurisdictions. The immediately transmitted voice and text message should contain, in plain language, the nature of the problem, current or potential impact of the problem, what Verizon is doing to address the problem, recommend actions the impacted 9-1-1 center(s) should take and other appropriate information and include the name of the sender and the telephone number (business and mobile) at which the sender can be reached, and their email address. Complete	• Since March 2011, Verizon has employed a broadcast email process to provide specific ticket information to individual PSAPs, and also to provide general information and updates on issues that affect multiple PSAPs. • Verizon has selected a tool for broadcast voice, text and email, and is working with 911 Directors to establish the correct contact lists and process details. Completed for VA, DC and MD: 10/30/12 • Metropolitan Washington Council of Governments (COG) 911 Steering Committee launched a communications subteam of representatives from VZ and each of the 3 COG regions to develop processes and thresholds for communications, PSAP profiles and shared information preferences. • Verizon will make every effort to share actionable information with PSAPs as soon as we are aware of service interruptions. For events that may impact multiple PSAPs, we will recommend that voice conference bridges be established to enable Verizon to brief PSAPs on the situation and allow for questions and discussion. Recommended actions would be specific to each PSAP (based on their back-up configuration and event impact) and need to be developed jointly between Verizon and the PSAP.

Communications (cont'd)

Recommendation	Action Plan
Verizon work with the jurisdictions to develop, by no later than December 31, 2012, a method to semi-annually conduct a drill/exercise with each jurisdiction on actions to be taken by Verizon and the impacted jurisdiction(s) in the event of a potential or actual 9-1-1 outage.	• Verizon engaged the assistance of its Business Continuity Emergency Management (BCEM) team to work with Verizon's 911 Customer Care Center organization to develop and exercise procedures for drills that model potential or actual 911 outages with any of the jurisdictions that request such a joint exercise. • First pilot exercise conducted with City of Norfolk on 12/04/12.
Verizon provide the above jurisdictions, during the first week of each month, a current contact list; beginning with the name and contact information (email, business telephone number, business mobile telephone number and any other appropriate information) for the Verizon account manager assigned to the jurisdiction and four immediately escalating Verizon personnel up to a Vice President level.	• Based on discussions with the COG 911 communications subteam, it was decided that escalation lists would be provided quarterly (from Verizon to PSAPs), and updated if information changed in the interim. Complete

Communications (cont'd)

Recommendation	Action Plan
Verizon, if/when requested by any of the above jurisdictions, have a Verizon representative with authority to act/react; respond to and to be present at the jurisdictions' Emergency Operations Center (EOC), to provide current accurate information concerning 9-1-1 service and outages, other telephone service, etc. and liaison with other parties staffing the EOC, when the EOC is activated. Complete	• Verizon has committed to partnering with the Virginia Department of Emergency Management and staffing the state EOC in Richmond with a Verizon representative upon request in the event of an emergency. Staffed the Commonwealth EOC for Hurricane Sandy 10/28/12 – 10/31/12. • Verizon has discussed options for virtual participation in any EOC via an "instant messaging - like" application with Virginia emergency management leaders. • Verizon has discussed joint training with Fairfax Emergency Management personnel and would welcome the opportunity to participate in that activity. Staffed Fairfax EOC for Hurricane Sandy 10/29/12 – 10/30/12. • If PSAP discussions regarding a joint regional 911 EOC become the strategy, that would present an excellent vehicle for Verizon to be on site in one location serving multiple jurisdictions in an emergency situation.

Attachment 4

NEWS

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This is an unofficial announcement of Commission action. Release of the full text of a Commission order constitutes official action. See MCI v. FCC, 515 F 2d 385 (D.C. Circ 1974).

FOR IMMEDIATE RELEASE:
January 10, 2013

NEWS MEDIA CONTACT:
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FCC CHAIRMAN GENACHOWSKI ANNOUNCES ACTION TO STRENGTHEN RELIABILITY AND RESILIENCY OF 9-1-1 COMMUNICATIONS NETWORKS DURING MAJOR DISASTERS

Based on findings and recommendations of a comprehensive inquiry into widespread 9-1-1 service failures in the Midwest and mid-Atlantic regions as a result of 2012 derecho storm; Final report delivered by the FCC's Public Safety and Homeland Security Bureau

Washington, D.C. – Federal Communications Commission Chairman Julius Genachowski today announced plans to launch a rulemaking to strengthen the reliability and resiliency nationwide of our country's 9-1-1 communications networks during major disasters. Widespread outages and disruptions to 9-1-1 services in the Midwest and mid-Atlantic regions – impacting more than 3.6 million people – led to an in-depth FCC inquiry into what went wrong, and what steps should be taken to better ensure public safety. The inquiry, conducted by the FCC's Public Safety and Homeland Security Bureau, included in-depth investigation, public comment and analysis culminating in a report released today entitled "The Impact of the June 2012 Derecho on Communications and Services: Report and Recommendations."

Chairman Genachowski said, "Americans must be able to reach 9-1-1, especially in times of natural disasters. Today's report on the June 2012 derecho finds that a number of preventable system failures caused major disruptions to communications providers' networks connecting to 9-1-1 call centers during and shortly after the storm. As a result, 9-1-1 was partially or completely unavailable to millions of Americans - in some instances, for several days.

"These failures are unacceptable and the FCC will do whatever is necessary to ensure the reliability of 9-1-1.

"The FCC will soon launch a rulemaking to improve the reliability of existing 9-1-1 networks and prevent failures like those outlined in today's report. We will also accelerate the Commission's Next Generation (NG) 9-1-1 agenda. NG networks harness the power of the Internet to improve the availability and reliability of 9-1-1 communications.

"Here's the bottom line: We can't prevent disasters from happening, but we can work relentlessly to make sure Americans can connect with emergency responders when they need to most."

About the 2012 Derecho and Impact on Midwest and Mid-Atlantic Regions

The derecho – a fast-moving, destructive, and deadly storm that developed on June 29, 2012 – caused widespread disruptions to communications, especially 9-1-1 services. Shortly after the derecho, Chairman Genachowski directed the FCC's Public Safety and Homeland Security Bureau to conduct an inquiry into the disruptions, including both the causes of the outages and ways to make the public safer by avoiding future outages.

In the report issued today, the Bureau noted that a significant number of 9-1-1 systems and services were partially or completely down for several days after the derecho – from isolated breakdowns in Ohio, New Jersey, Maryland, and Indiana to systemic failures in northern Virginia and West Virginia. In all, seventy-seven 9-1-1 call centers (known as public safety answering points or "PSAPs") serving more than 3.6 million people in these six states lost some degree of connectivity, including vital information on the location of 9-1-1 calls. Seventeen of the 9-1-1 call centers, mostly in northern Virginia and West Virginia, lost service completely, leaving more than 2 million residents unable to reach emergency services for varying periods of time.

Summary of Report Findings

Unlike hurricanes and superstorms, which are generally well-forecast, derechos are more like earthquakes, tornados, and man-made events for which there is little-to-no advance notice and opportunity to prepare. As such, the derecho provided a snapshot of the reliability and readiness of a portion of the Nation's communications infrastructure in the face of unanticipated disasters – and it revealed considerable flaws in the resiliency planning and implementation of the primary 9-1-1 network providers in the affected region. In most cases, the disruptions would have been avoided if the communications network providers that route calls to 9-1-1 call centers, had fully implemented industry best practices and available industry guidance.

Summary of Report Recommendations

The Bureau outlined specific suggestions to address the primary causes of the derecho-related outages and to promote the reliability and resiliency of 9-1-1 communications networks during disasters. Chief among these, the Bureau recommended that the Commission consider actions in the following areas to ensure that communications providers:

Maintain adequate central office backup power

The Bureau recommended that the Commission consider requiring communications providers to maintain robust and reliable backup power at their central offices, supported by appropriate testing, maintenance, and records procedures.

Have reliable network monitoring systems

The Bureau recommended that the Commission consider requiring providers to take steps to ensure that communications providers' monitoring systems are reliable and resilient, and avoid cases where a single failure in a monitoring system causes a provider to lose visibility into a substantial part of its network.

Conduct periodic audits of 9-1-1 circuits

The Bureau recommended that the Commission consider requiring communications providers that route calls to 9-1-1 call centers to regularly audit their 9-1-1 circuits and the links that transmit location information for 9-1-1 calls.

Notify 9-1-1 call centers of problems

The Bureau recommended that the Commission provide more specific guidance, such as the level of information that should be included by service providers in their notifications to 9-1-1 call centers.

The Bureau also encouraged the deployment of Next Generation 9-1-1, which offers advantages over today's 9-1-1 systems that could have significantly lessened the derecho's impact on emergency communications.

In order to complete today's report, the Bureau conducted an extensive review of confidential outage reports, public comments and related documents, as well as interviews of many service providers and PSAPs, equipment and backup power vendors, and public safety and community officials.

As the Bureau was conducting its derecho inquiry, Superstorm Sandy hit the Northeast and Mid-Atlantic states. While today's report addresses the most significant communications issues that occurred in the wake of the derecho, primarily its devastating impact on the networks that connect 9-1-1 call centers, some information gathered during this inquiry also relates to broader network reliability and resiliency issues raised during Superstorm Sandy. These topics will be addressed in the Commission's upcoming field hearings on the challenges to communications networks during natural disasters and other crises.

The full Report is available via the below link:

http://hraunfoss.fcc.gov/edocs_public/attachmatch/DOC-318331A1.pdf

FCC

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COMMONWEALTH OF VIRGINIA

STATE CORPORATION COMMISSION

AT RICHMOND, FEBRUARY 22, 2013

COMMONWEALTH OF VIRGINIA, *ex rel.*

STATE CORPORATION COMMISSION

CASE NO. PUC-2012-00042

Ex Parte: In the matter of investigating
911 emergency call service outages and problems

ORDER

On July 3, 2012, the State Corporation Commission ("Commission") issued an Order Establishing Investigation ("July 3 Order") in response to reported outages and problems related to 911 emergency call services following a storm that crossed the Commonwealth of Virginia at the end of June 2012. The Commission directed the Staff of the Commission ("Staff"), pursuant to §§ 56-35, 56-36, 56-247, and 56-249 of the Code of Virginia, to investigate this matter and report on the same. The Staff was directed to file a report containing its preliminary findings by September 14, 2012, and a final report containing its final findings and recommendations by December 31, 2012.[1] The July 3 Order also directed Verizon Virginia LLC, Verizon South Inc. (collectively, "Verizon"), and any other local exchange carrier experiencing 911 service outages and problems to cooperate fully with the Staff during the course of its investigation and to respond to all requests for information, reports, or other data in a timely and efficient manner.

On September 14, 2012, the Staff filed its Report of Preliminary Findings as directed by the Commission ("Preliminary Findings Report"). This initial report stated that early in the afternoon on June 29, 2012, a severe and destructive storm ("June 29 Derecho") with widespread wind gusts of over 70 mph tracked across a large section of the Midwestern United

[1] On December 10, 2012, the Commission granted a Staff request to extend the time for filing the Staff's final report from December 31, 2012, to January 17, 2013.

States. The storm progressed into the Mid-Atlantic States in the afternoon and evening. Late in the evening, the storm continued to expand and impacted significant portions of Virginia, Maryland, and the District of Columbia with severe straight-line wind speeds reported as high as 87 mph. By the morning of June 30, there was an unprecedented and critical loss of 911 services primarily impacting public safety answering points ("PSAPs") and citizens in the Northern Virginia area.

The Preliminary Findings Report stated that Verizon acknowledged multiple problems starting with the failure of backup generators to start in the Fairfax and Arlington central offices. Ultimately there was a total loss of 911 telephone service to four public safety answering points (Fairfax County, Prince William County, Manassas, and Manassas Park) for a significant period of time. In addition, the Staff found that 21 other Virginia PSAPs were impacted and experienced such problems as the failure to receive Automatic Location Information ("ALI") and the loss of administrative and backup telephone lines.

The Preliminary Findings Report contained a number of detailed findings that suggested, among other things, that the two generators in Fairfax and Arlington may not have been properly maintained or tested. The Staff concluded that the 911 service outages should not have happened as Verizon's 911 network was engineered, designed, and constructed to withstand such a storm. The Preliminary Findings Report noted that Verizon has acknowledged that it failed to meet expectations of the PSAPs and residents of Northern Virginia and is engaged in corrective actions to prevent a reoccurrence.

On January 17, 2013, the Staff filed its Report of Final Findings and Recommendations ("Final Report"). The Staff stated that the further investigation had substantiated the findings in the Preliminary Findings Report that the 911 outages following the June 29 Derecho in Northern

Virginia should not have occurred and were avoidable if Verizon had properly maintained the generators in the Arlington and Fairfax offices. The Staff found that the 911 outages and subsequent Verizon investigation exposed numerous deficiencies and weaknesses inherent in its procedures, processes, and central offices.

The Staff also stated that its investigation showed that Verizon has resolved many problems, and is initiating actions to correct additional deficiencies. However, the Staff concluded that it will take a concerted effort on Verizon's part to correct all the problems, which the Staff believes cannot be done overnight and will require oversight to ensure compliance. To facilitate this, the Staff recommended the following to the Commission.

1. This docket should remain open.
2. Verizon should be required to update and file quarterly corrective action progress reports with the Commission.
3. Verizon should correct all deficiencies and implement all recommendations identified in its power audits.
4. Verizon should meet quarterly with the Staff to provide additional details, schedules, budgets, and updates on its corrective actions, audits, inspections, and other initiatives intended to correct its deficiencies in Virginia.
5. Verizon should continue to meet and cooperate with the PSAPs to ensure their concerns are addressed.
6. By the end of 1Q 2013, Verizon should develop and review with the Staff a schedule to conduct audits (including power, mechanical, and HVAC equipment) in all remaining Virginia offices. Verizon should permit the Staff to monitor any audit as it is conducted.

7. Recognizing the time required to complete the audits, at a minimum, batteries should be inspected and tested in all Virginia locations by the end of 2Q 2013.
8. Verizon should provide the Staff with copies quarterly of any additional or revised power audits conducted for offices in Virginia.
9. Verizon should provide the Staff with any plans to conduct additional inspections or audits for switching and/or transport equipment and operational audits in Virginia. Copies of the results from any such inspections and audits should be provided to the Staff on a quarterly basis.
10. Verizon should establish a plan to address the availability and sufficiency of spare parts for manufacturer discontinued equipment.
11. The Staff should continue to communicate and meet with PSAPs and the 911 community.
12. Verizon should maintain and update a complete inventory of its 911 service infrastructure.
13. Verizon should provide a quarterly report to the Staff identifying any problems found in the monthly testing of generators in offices in Virginia. The report should identify the office and the corrective action undertaken and include applicable dates.
14. The Staff should file an annual status report with the Commission that includes recommendations on continuing the various requirements on Verizon and/or recommendations on any changes or additions to such.
15. The Staff should evaluate the FCC Public Safety and Homeland Security Bureau's Report and Recommendations released on January 10, 2013, and advise the

Commission of any additional recommendations we may determine are warranted based on that report.

NOW THE COMMISSION, upon consideration of the foregoing, makes the following findings in this proceeding. We find that the recommendations listed in the Staff's Final Report are reasonable, responsive to our order initiating this investigation, and should continue to be implemented by Verizon and the Staff forthwith. In addition, we agree with the Staff that this docket should remain open at this time to monitor and facilitate the implementation of such recommendations including, but not limited to, the receipt of the reports referenced therein. Finally, if Verizon objects to any of the recommendations, it shall notify the Commission of such within 30 days of this Order so that we can establish further procedures for this matter.

Accordingly, IT IS SO ORDERED and this matter is continued pending further order of the Commission.

AN ATTTESTED COPY hereof shall be sent by the Clerk of the Commission to: Jennifer L. McClellan, Assistant General Counsel, Verizon Virginia LLC and Verizon South Inc., 703 East Grace Street, 7th Floor, Richmond, Virginia 23219; C. Meade Browder, Jr., Senior Assistant Attorney General, Division of Consumer Counsel, Office of the Attorney General, 900 East Main Street, Second Floor, Richmond, Virginia 23219; and to all local exchange carriers certificated in Virginia as set out in Appendix A. A copy shall be delivered to the Commission's Office of General Counsel and Division of Communications.

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PUBLIC SAFETY AND HOMELAND SECURITY BUREAU SEEKS COMMENT ON 9-1-1 RESILIENCY AND RELIABILITY IN WAKE OF JUNE 29, 2012, DERECHO STORM IN CENTRAL, MID-ATLANTIC, AND NORTHEASTERN UNITED STATES

PS Docket No. 11-60

Comments Due: August 17, 2012
Reply Comments Due: September 4, 2012

Introduction

On June 29, 2012, a fast-moving weather storm called a derecho brought a wave of destruction across wide swaths of the United States, beginning in the Midwest and continuing through the mid-Atlantic and Northeastern regions of the country. Millions of Americans lost electrical power during the storm for periods ranging from a few hours to over a week in the middle of a heat wave, and the storm caused billions of dollars in physical damage. The storm had a significant adverse effect on communications services generally and 9-1-1 facilities particularly.[1] From isolated breakdowns in Ohio, Kentucky, Indiana, and Pennsylvania, to systemic failures in northern Virginia and West Virginia, it appears that a significant number of 9-1-1 systems and services were partially or completely down for several days.

The impact of the storm in northern Virginia was particularly severe, notably in Fairfax County, parts of Prince William County, Manassas Park and Manassas, where over 1 million people faced the possibility of not being able to call 9-1-1 successfully.[2] In those jurisdictions, media reports and local government officials indicate that public safety answering points (PSAPs), which process calls to 9–1–1 facilities, failed, as did backup systems. Multiple access technologies appear to have been affected by the outages, including traditional networks, broadband networks, and wireless networks.

The Public Safety and Homeland Security Bureau (PSHSB or Bureau) of the Federal Communications Commission (FCC or Commission) responded immediately, closely coordinating with the Federal Emergency Management Agency (FEMA) and constantly communicating with service providers and other stakeholders from the time the storm hit and throughout the period impacts were felt by the public. At noon on Saturday, June 30, the Commission granted an emergency special temporary authorization allowing a Missouri power company crew to use certain frequencies to assist in the restoration of electric power within the Ohio disaster area.

[1] *See, e.g.*, Sullivan, Pat, *911 Failure Affected 2.3 Million in Northern Virginia*, WASH. POST, Jul. 11, 2012.

[2] *See, e.g.*, Sullivan, Pat, *After Storm, 9-1-1, Phone Service Remains Spotty*, WASH. POST, Jul. 2, 2012.

Utilizing the Commission's Operations Center, which is staffed 24 hours a day/7 days a week, and supplementing it with direct outreach and pre-established reporting protocols, the Commission obtained important information on communications outages related to 9-1-1 centers, broadcast stations, and public safety communications systems that it shared with its Federal partners (*e.g.*, FEMA). Vital information on outages also came through the Commission's mandatory Network Outage Reporting System (NORS) and voluntary Disaster Information Reporting System (DIRS). At 5:15 p.m. on Saturday, June 30, the Commission activated DIRS, targeting selected providers with systems in the disaster area, in this case the District of Columbia and certain counties in Maryland, Virginia, and West Virginia. Through DIRS, the Commission received regular updates on the status of wireline, wireless, and 9-1-1 communications outages and restoration efforts. As company maintenance crews largely restored communications services in certain areas, the Commission de-activated DIRS for those areas on July 3, 2012 and completely deactivated it on July 4, 2012. The Commission also issued on its website and distributed through social media a consumer tip sheet for the public about communicating after the derecho, while the effects of the storm were still being felt.

Immediately after communications and 9-1-1 services were restored, the Bureau began an inquiry focused on learning all of the facts and circumstances of the various outages, including the causes and, importantly, ways to make the public safer and avoid future outages. The Bureau began an ongoing series of meetings with stakeholders, such as communications service providers, public safety officials, and others, and continues to seek and obtain relevant information. The Bureau is assessing and evaluating the storm-related information received through NORS or DIRS, and still coming in through NORS. The Bureau is also coordinating with state and local governments, which are responsible for establishing and operating 9-1-1 facilities, providing first responder services, and regulating certain relevant communications services.

By this Public Notice, the Commission and the Bureau further expand the ongoing inquiry. The Public Notice broadens the inquiry in two ways, by expanding those who may contribute relevant information to include the public, and focusing not only on issues directly surrounding the derecho and what happened during and after it, but also on other experiences associated with natural disasters throughout the nation that involve outages or are otherwise related to the resiliency and reliability of communications services and networks of all kinds that are used to seek, process or obtain emergency assistance. Especially in the face of events that lead more people than usual to need emergency help, they must be able to connect to get it. It is vital to seek focused comments broadly on what happened during and after this or other storms, and what can be done to better address these issues going forward.

Congress has given the Commission a particular responsibility under the Communications Act to ensure communications networks of all types "promot[e] safety of life and property."[3] Central to this important responsibility is ensuring the reliability, resiliency and availability of communications networks in times of emergency, including and especially during and immediately after a natural disaster such as a derecho. Recognizing this, last year the Commission initiated a proceeding on the reliability and

[3] *See* 47 U.S.C. § 151; *see also* 47 U.S.C. § 154 (o) ("For the purpose of obtaining maximum effectiveness from the use of radio and wire communications in connection with safety of life and property, the Commission shall investigate and study all phases of the problem and the best methods of obtaining the cooperation and coordination of these systems.") In addition, the Commission recently strengthened its outage reporting requirements by extending them to interconnected VoIP services. *See* In the Matter of the Proposed Extension of Part 4 of the Commission's Rules Regarding Outage Reporting To Interconnected Voice Over Internet Protocol Service Providers and Broadband Internet Service Providers, PS Docket No. 11-82, 27 FCC Rcd 2650 (2012).

continuity of communications networks, including broadband technologies.[4] Information received in connection with this Public Notice will add important information that will inform the Commission's action in this proceeding.

Request for Comment

The Bureau seeks comment on the background, causes, and restoration efforts related to communications services and facilities impacted directly or indirectly by the storm and after. It seeks to develop a complete and accurate record of all the facts surrounding the outages during this storm as well as outages resulting from natural disasters in order to evaluate the overall resiliency and reliability of our Nation's 9-1-1 systems and services. We also seek comment on the impact these outages had on the various segments of the public, including consumers, hospitals, and public safety entities.

The Bureau's review is also intended to further develop the record in the Commission's ongoing examination of issues in the April 2011 notice of inquiry (NOI) on the resiliency, reliability and continuity abilities of communications network, including broadband technologies,[5] and comments received in response to this Public Notice will become part of the record of the NOI. In that proceeding, the Commission initiated a comprehensive examination of these issues with the goal of determining what action, if any, the Commission should take to ensure that our Nation's communications infrastructure is as reliable as possible and able to continue to function in times of emergency. In its NOI, the Commission also focused on 9-1-1 reliability and stated that "[p]eople dialing 9-1-1, whether using legacy or broadband-based networks, must be able to reach emergency personnel for assistance; and when networks dedicated to public safety become unavailable, first responders must have access to commercial communications, including broadband technologies, to coordinate their rescue and recovery efforts."[6]

Questions Regarding Derecho Impact, Effects, and Restoration Efforts

Below, the Bureau poses a series of questions related to the impact of the storm on emergency and 9-1-1 communications accessed by traditional communications networks, broadband communications networks, and wireless communications networks. The Bureau also requests comment on the storm's impact on various user groups. PSHSB seeks comment on the following issues:

Causes of Outages. What were the specific causes of the outages that occurred during or after the storms? Which network elements and components, such as Public Switched Telephone Network (PSTN) trunks, Internet-Protocol (IP) broadband access lines, databases and PSTN switches, were out of service and for how long? For example, to what extent were issues like powering, physical damage, and power surges contributing factors to the outages? To what extent are there industry best practices that address these, and any other, contributing causes? To what extent were they followed?

In what ways was physical damage due to the storm a major cause of outages? What could be done to improve the resiliency of communications infrastructure in the face of physical damage like what was seen during the storm? Are there actions the communications industry can take to avoid or mitigate

[4] *See* In the Matter of Reliability and Continuity of Communications Networks, Including Broadband Technologies, *et al*., *Notice of Inquiry*, PS Docket No. 11-60, *et al*., 26 FCC Rcd 5614 (2011) ("*Reliability NOI*").

[5] *See generally, Reliability NOI.*

[6] *See Reliability NOI*, 26 FCC Rcd at 5616 ¶ 5.

these outages in future similar events? Should the FCC take other steps to improve communications resiliency during strong storms like this?

In what ways was the derecho an "extraordinary" event? For example, compared to other types of disasters, did it occur with unusually short notice, affect an unusually large area, and was it unusually intense? How did these factors inhibit service providers in responding to the event and restoring service? How did these factors affect consumers' need for communications services and ability to obtain emergency services? What could be done to better prepare for events like this in the future? Specifically, what actions should communications service providers and PSAPs take to better prepare for similar events in the future?

How did service providers become aware that 9-1-1 outages had occurred? What types of monitoring systems were in place for various types of assets, both in the field and inside buildings? How well did these monitoring systems perform during the storm?

What role did the availability or absence of back-up power for network equipment play in the 9-1-1 outages that occurred during the storm? What could be done to improve the ability of communications assets to operate longer when commercial power is lost? Are there new technologies, such as solar and fuel cells, which provide promise in this area? What maintenance practices are in place to compensate for the loss of commercial power? How did these methods perform during the storm? Are there actions the FCC should take to improve the ability of communications networks to survive commercial power outages? What types of measures could be taken to improve the robustness of communications infrastructure in response to failures of commercial power? Should the Commission consider taking action, either voluntary or mandatory, that would address back-up power?

What forms of network interconnection, both PSTN and IP, were affected by the storm or loss of power? How and why were they affected? Did these disruptions affect communications seeking 911 or other emergency assistance and how? What carrier and public safety facilities have multiple means or forms of interconnection and which do not? Which of these facilities are essential for 911 communications? What monitoring of interconnection was in place and how did it perform? To what extent are there industry best practices addressing forms of interconnection and diversity and redundancy? To what extent were they followed?

Effect on 9-1-1 Systems and Services. What could be done to improve the reliability of the 9-1-1 network when faced with storms like the derecho or other threats? Are there actions the FCC should take to improve the reliability of 9-1-1 services during strong storms like this? What actions should communications service providers take? Are there actions that communications service providers and/or PSAPs should take to improve the 9-1-1-restoration process? What, if anything, can the FCC do to better assist communications service providers and PSAPs in the restoration process?

How was 9-1-1 call completion affected by outages caused by the storm? Is there an estimate of how many 911 calls could not be completed at all or only through alternate means, such as ten-digit numbers? To what extent do industry best practices exist that relate to these events, and were these best practices followed? Were there instances where PSAPs went offline due to failures on their own premises? To what extent did the storm affect Automatic Number Identification (ANI) and Automatic Location Identification (ALI)? What were the primary causes of failures to ANI and ALI services? To what extent were vital 9-1-1 facilities and network elements deployed redundantly by service providers? For example, were selective routers routinely deployed in a diverse manner? Likewise, were facilities

that carry ALI and ANI information routed in a diverse manner? What should be done to improve the diverse provisioning of 9-1-1 facilities and elements?[7]

Effect of 9-1-1 Outages. What impact did the 9-1-1 outages have on the public? For example, how were consumers affected? How did the outages affect the ability of public safety officials to perform their duties? How was the public alerted of the 9-1-1 outages and what alternatives were provided? How effective were these alternatives? To what extent was social media used to spread the word about the 9-1-1 outages and alternatives? What impact did the 9-1-1 outages have on other sectors of the user community, including businesses and providers of critical services, such as hospitals?

Effect of Communications Outages on Access to 9-1-1 Services. Outages in the 9-1-1 network itself are only one way that users can be denied access to 9-1-1 services. For example, if the PSAP is operational and the 9-1-1 network is functioning, users in a local area will still be unable to reach the PSAP if they lack access to the communications network due to a local outage. To what extent did users find that the general unavailability of communications service impaired their ability to access 9-1-1 service? In these instances, were multiple methods of reaching the PSAP available, like cell phones or other types of communications services? How effective were these alternative communications services in overcoming outages affecting one access platform? What should be done to improve the diversity of access to 9-1-1 services so that communications outages are less likely to result in an inability to access 9-1-1?

Questions Regarding 9-1-1 Resiliency and Reliability Generally

The 9-1-1 communications failures experienced as a result of the derecho also give rise to concerns and questions about the reliability and resiliency of our 9-1-1 communications networks nationwide, particularly in the event of a severe weather or other type of high-impact natural disaster. We seek comment on how 9-1-1 communications has fared during other recent natural disaster events. Please describe any lessons learned from those events, in particular improvements that were recommended to improve 9-1-1 service reliability and survivability. Commenters should address the impact on communications relying on the PSTN- and IP-based communications, as well as fixed and mobile wireless communications.

We also seek comment on the most common causes of failure in the 9-1-1 network that result in the following types of 9-1-1 outages: i) complete isolation of the PSAP; ii) failure to pass ALI and/or ANI; iii) loss of the ability to re-route traffic to an alternate PSAP or administrative lines. What could be done to reduce the incidence of outages in each category? What actions, if any, should the FCC take to address this problem?

In what ways does the practice of deploying redundant facilities or systems used in the 9-1-1 network promote 9-1-1 reliability? How does the service provider ensure that these practices are followed routinely and remain in place over time, even as changes are made to the networks? What, if anything, should the FCC do to promote the application of such methods?

How do service providers routinely monitor 9-1-1 facilities and the availability of 9-1-1 service? How quickly do service providers become aware of 9-1-1 failures of various kinds? Do service providers

[7] *Public Notice*, FCC's Public Safety and Homeland Security Bureau Reminds Telecommunications Service Providers of the Importance of Implementing Established 9-1-1 and Enhanced 9-1-1 Best Practices, DA 12-891, rel. June 6, 2012.

routinely notify PSAPs of 9-1-1 outages? How are they alerted, under what conditions, and how quickly? What steps does the service provider take routinely to prioritize restoration of 9-1-1 service? What standard operating procedures and systems does the service provider have in place to facilitate the detection and restoration of 9-1-1 service after an outage? Are these resources adequate?

PSAPs are typically small operations playing a large role in protecting the safety of the public. The failure of a few trunks into a PSAP could affect public safety for an entire community, but the failure of just a few trunks might not attract much attention from a service provider. Do provider alarm systems provide adequate visibility to relatively small outages that can have a large impact on PSAPs, especially when demand may spike, such as during or after a major storm? Do providers provide appropriate urgency to handling such outages?

To what extent is the availability of multiple access platforms (*e.g.*, residential telephone line, whether legacy or IP-based, cell phone, *etc.*) to reach networks services creating greater richness of diversity that would tend to improve 9-1-1 reliability? Stated differently, to what extent does the public have more than one way to reach 9-1-1 that are not reliant on each other? To what extent are available access platforms reliant on each other or another common point of failure?

The legacy communications network uses a hierarchical architecture, whereby failures of network elements located deeper in the network will result in a larger number of customers being denied network service. For this reason, elements deeper in the network (*e.g.*, switches) were often designed to very high reliability specifications. To what extent has the legacy infrastructure retained this characteristic? Today's networks are quickly migrating to broadband IP technology. To what extent does the migration to IP-based networks reduce or increase the level of concentration deeper in the network? What is the resultant impact on communications reliability?

What other steps might service providers take? What actions should PSAPs take? What other actions, if any, should the Commission take to encourage those steps? What actions should the public and other institutions like hospitals take, if any? We seek comment on whether the deployment of Next Generation (NG911) will improve the reliability of 9-1-1 services and, if so, how? Would NG911 make it easier to have more than one backup PSAP and provide additional redundancy of transmission facilities, *e.g.*, via satellite or microwave point-to-point links? Did commercial data centers in the affected areas experience outages and for how long? Would it increase reliability if critical components of the NG911 system are housed or replicated in commercial data centers?

NG911 will create the ability to utilize a "virtual PSAP." Today's 9-1-1 system generally requires a call taker to answer a 9-1-1 call from within the walls of a single physical ("brick and mortar") PSAP. In a NG911 network, however, a call taker will be able to answer a 9-1-1 call from virtually any location. We seek comment on the potential for development of virtual PSAPs. Are current technologies sufficient to support virtual PSAPs? Are there specific steps that service providers should take to ensure that they have adequate reliability when implementing NG9-1-1? How would the addition of a 9-1-1 text capability provide substantial improvement in the ability of consumers to contact PSAPs?

Procedural Matters

Pursuant to sections 1.415 and 1.419 of the Commission's rules, 47 CFR §§ 1.415, 1.419, interested parties may file comments on or before the dates indicated on the first page of this document. Comments may be filed using the Commission's Electronic Comment Filing System (ECFS). *See Electronic Filing of Documents in Rulemaking Proceedings*, 63 FR 24121 (1998).

- Electronic Filers: Comments may be filed electronically using the Internet by accessing the ECFS: http://fjallfoss.fcc.gov/ecfs2/.
- Paper Filers: Parties who choose to file by paper must file an original and one copy of each filing. If more than one docket or rulemaking number appears in the caption of this proceeding, filers must submit two additional copies for each additional docket or rulemaking number.

  Filings can be sent by hand or messenger delivery, by commercial overnight courier, or by first-class or overnight U.S. Postal Service mail. All filings must be addressed to the Commission's Secretary, Office of the Secretary, Federal Communications Commission.

  - All hand-delivered or messenger-delivered paper filings for the Commission's Secretary must be delivered to FCC Headquarters at 445 12th St., SW, Room TW-A325, Washington, DC 20554. The filing hours are 8:00 a.m. to 7:00 p.m. All hand deliveries must be held together with rubber bands or fasteners. Any envelopes and boxes must be disposed of before entering the building.
  - Commercial overnight mail (other than U.S. Postal Service Express Mail and Priority Mail) must be sent to 9300 East Hampton Drive, Capitol Heights, MD 20743.
  - U.S. Postal Service first-class, Express, and Priority mail must be addressed to 445 12th Street, SW, Washington DC 20554.

People with Disabilities: To request materials in accessible formats for people with disabilities (Braille, large print, electronic files, audio format), send an e-mail to fcc504@fcc.gov or call the Consumer and Governmental Affairs Bureau at (202) 418-0530 (voice), (202) 418-0432 (tty).

Parties wishing to file materials with a claim of confidentiality should follow the procedures set forth in section 0.459 of the Commission's rules. Casual claims of confidentiality are not accepted. Confidential submissions may not be filed via ECFS but rather should be filed with the Secretary's Office following the procedures set forth in 47 C.F.R. § 0.459. Redacted versions of confidential submissions may be filed via ECFS. Parties are advised that the Commission looks with disfavor on claims of confidentiality for entire documents. When a claim of confidentiality is made, a public, redacted version of the document should also be filed.

The proceeding of which this Notice is a part is a "permit-but-disclose" proceeding conducted in accordance with the Commission's *ex parte* rules.[8] Persons making *ex parte* presentations must file a copy of any written presentation or a memorandum summarizing any oral presentation within two business days after the presentation (unless a different deadline applicable to the Sunshine period applies). Persons making oral *ex parte* presentations are reminded that memoranda summarizing the presentation must (1) list all persons attending or otherwise participating in the meeting at which the *ex parte* presentation was made, and (2) summarize all data presented and arguments made during the presentation. If the presentation consisted in whole or in part of the presentation of data or arguments already reflected in the presenter's written comments, memoranda or other filings in the proceeding, the presenter may provide citations to such data or arguments in his or her prior comments, memoranda, or other filings (specifying the relevant page and/or paragraph numbers where such data or arguments can be found) in lieu of summarizing them in the memorandum. Documents shown or given to Commission staff during *ex parte* meetings are deemed to be written *ex parte* presentations and must be filed consistent with rule 1.1206(b). In proceedings governed by rule 1.49(f) or for which the Commission has made available a method of electronic filing, written *ex parte* presentations and memoranda summarizing

[8] 47 C.F.R. §§ 1.1200 *et seq.; see also Reliability NOI,* 26 FCC Rcd at 5630-31 ¶ 53.

oral *ex parte* presentations, and all attachments thereto, must be filed through the electronic comment filing system available for that proceeding, and must be filed in their native format (*e.g.*, .doc, .xml, .ppt, searchable .pdf). Participants in this proceeding should familiarize themselves with the Commission's *ex parte* rules.

For further information regarding this proceeding, contact Michael Connelly, Cybersecurity and Communications Reliability Division, Public Safety and Homeland Security Bureau at (202) 418-0132 or michael.connelly@fcc.gov. News media contact: Lauren Kravetz, Public Safety and Homeland Security Bureau at (202) 418-7944 or lauren.kravetz@fcc.gov.

The Public Safety and Homeland Security Bureau issues this Public Notice under delegated authority pursuant to Sections 0.191 and 0.392 of the Commission's rules, 47 C.F.R. §§ 0.191, 0.392.

- FCC –

Impact of the June 2012 Derecho on Communications Networks and Services

Report and Recommendations

A Report of the Public Safety and Homeland Security Bureau
Federal Communications Commission
January 2013

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Executive Summary

In June 2012, portions of the Midwest and Mid-Atlantic regions of the United States experienced a fast-moving, destructive windstorm called a derecho, resulting in twenty-two deaths and leaving millions without electrical power. Unlike hurricanes and superstorms, which are generally well-forecast, derechos are more like earthquakes, tornados, and man-made events for which there is little-to-no advance notice and opportunity to prepare.

The 2012 derecho severely disrupted 9-1-1-related communications. Seventy-seven 9-1-1 call centers (also known as "Public Safety Answering Points" or "PSAPs") serving more than 3.6 million people in six states lost some degree of connectivity, including vital information on the location of 9-1-1 calls, mostly due to service provider network problems. From isolated breakdowns in Ohio, New Jersey, Maryland, and Indiana, to systemic failures in northern Virginia and West Virginia, 9-1-1 systems and services were partially or completely down for up to several days. Seventeen PSAPs in three states lost service completely, affecting the ability of more than 2 million people to reach 9-1-1 at all.

Even in the context of a storm like the derecho, a large-scale failure of communications – particularly 9-1-1-related communications – is unacceptable, and action must be taken to prevent similar outages in the future. To this end, at the direction of Federal Communications Commission ("FCC" or "Commission") Chairman Julius Genachowski, the Public Safety and Homeland Security Bureau ("PSHSB" or "Bureau") conducted an inquiry into the causes of the communications failures that resulted from the derecho and ways to prevent them during future emergencies so we can make the public safer. The Bureau's inquiry included extensive review of confidential outage reports, public comments and related documents, as well as interviews of many service providers and PSAPs, equipment and backup power vendors, and public safety and community officials.

The Bureau found that above and beyond any physical destruction by the derecho, 9-1-1 communications were disrupted in large part because of avoidable planning and system failures, including the lack of functional backup power, notably in central offices. Monitoring systems also failed, depriving communications providers of visibility into critical network functions. In most cases, the 9-1-1 and other problems could and would have been avoided if providers had followed industry best practices and available guidance.

While important aspects of 9-1-1 service are under state and local jurisdiction, the Commission has a statutory obligation to ensure that our nation's communications networks "promot[e] safety of life and property," and action at the federal level could help prevent similar failures in the future.

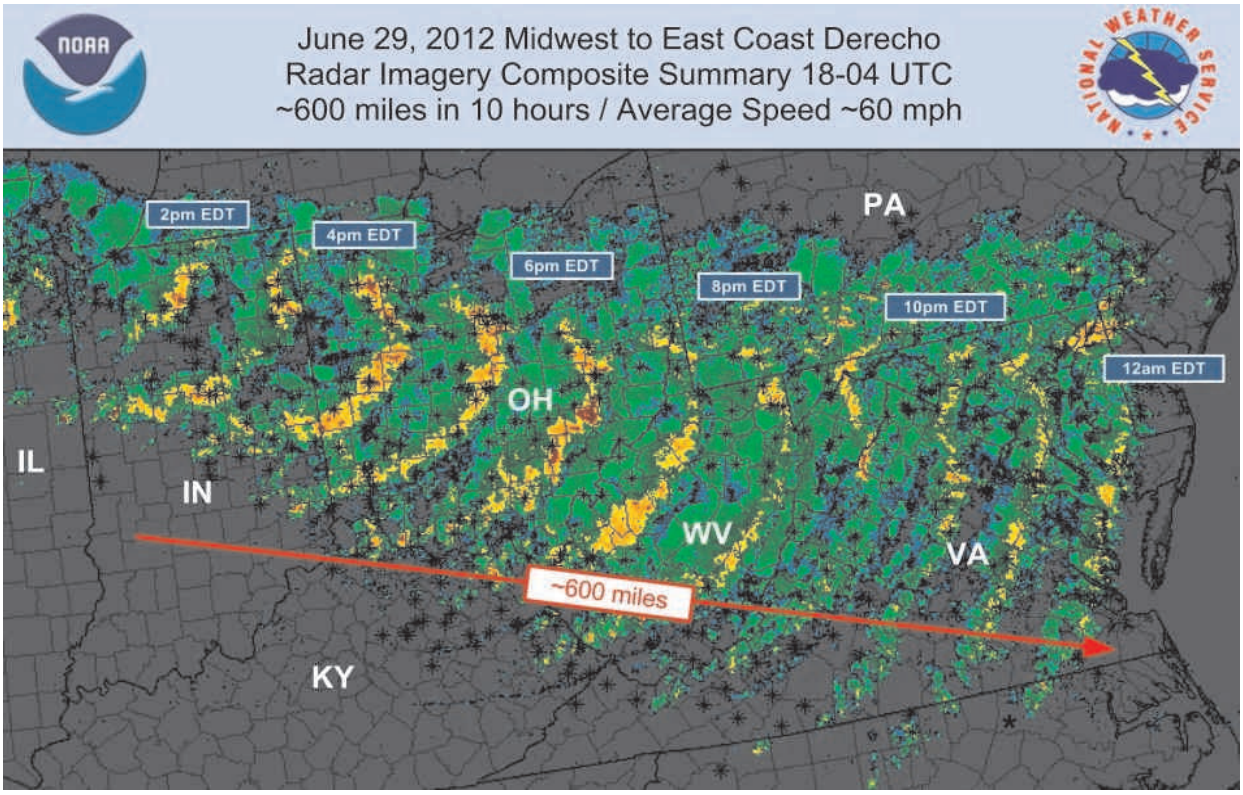
Thus the report recommends areas for the Commission to consider action to ensure the reliability, resiliency, and availability of 9-1-1 communications networks. These include ensuring that service providers: conduct periodic audits of 9-1-1 circuits; maintain adequate

backup power at central offices and follow regular maintenance and testing procedures; have adequate network monitoring links; and have a more specific obligation to notify 9-1-1 call centers of breakdowns of 9-1-1 communications. The report also notes the relative advantage in reliability and performance that migration to Next Generation 9-1-1 ("NG9-1-1"), which is based on Internet-protocol architecture, will bring over "legacy" 9-1-1 systems.

The Bureau's derecho inquiry gathered information relating to broader issues of network reliability and resilience that are also important to the ability of consumers to originate successful calls for help in emergencies, including the availability of wireless networks and of power for consumers' devices and equipment. Those issues were raised again when, during the preparation of this report, the Mid-Atlantic was hit by another devastating weather event: Superstorm Sandy. Accordingly, we will analyze these issues further, after the conclusion of the field hearings recently announced by Chairman Genachowski about that event. While Superstorm Sandy had widespread and severe impacts on communications, this report focuses on the derecho and, principally, its devastating impact on the networks that connect 9-1-1 call centers to people who need help.

1. Introduction

On June 29, 2012, a fast-moving, destructive, and deadly storm called a derecho[1] developed in central Iowa, worked its way across Illinois and Indiana, and by late afternoon and early evening, had moved quickly across Ohio, the central Appalachians, and the Mid-Atlantic states, continuing into the early morning of June 30. It resulted in twenty-two deaths and widespread damage, and left millions of citizens without electrical power for periods ranging from less than an hour to close to two weeks.[2] The radar map below shows the derecho's path over time.[3]



[1] The National Weather Service defines a derecho as "a widespread, long-lived wind storm that is associated with a band of rapidly moving showers or thunderstorms. Although a derecho can produce destruction similar to that of tornadoes, the damage typically is directed in one direction along a relatively straight swath. As a result, the term 'straight-line wind damage' sometimes is used to describe derecho damage. By definition, if the wind damage swath extends more than 240 miles (about 400 kilometers) and includes wind gusts of at least 58 mph (93 km/h) or greater along most of its length, then the event may be classified as a derecho." *See* http://www.spc.noaa.gov/misc/AbtDerechos/derechofacts.htm.

[2] *See, e.g.,* Schwartz, John, *Many Areas Still in Dark After Series of Storms*, N.Y. TIMES, July 2, 2012; Gresko, Jessica, *Mid-Atlantic Region Hammered by Storms, Too*, THE COLUMBUS DISPATCH, July 1, 2012. More than 3.7 million customers lost power, including approximately 1 million customers each in Ohio and Virginia and roughly 900,000 in Maryland, 632,000 in West Virginia, 68,000 in Washington, D.C., and 32,500 in Pennsylvania.

[3] Map by G. Carbin, National Weather Service Storm Prediction Center.

The derecho caused widespread disruptions to communications generally and 9-1-1 services particularly.[4] From isolated breakdowns in Ohio, New Jersey, Maryland, and Indiana, to systemic failures in northern Virginia and West Virginia, a significant number of 9-1-1 systems and services were partially or completely down for up to several days. In all, at least seventeen 9-1-1 call centers in three states lost service completely, affecting more than 2 million residents' ability to reach 9-1-1. One PSAP alone estimates that it did not receive approximately 1,900 emergency calls during the time it was down.[5] Across the storm's path, at least seventy-seven PSAPs serving more than 3.6 million people in six states lost some degree of connectivity, including vital information on the location of 9-1-1 calls; the overwhelming majority of these full or partial outages suffered by PSAPs were due to problems in providers' networks.

The public's inability to reach 9-1-1 and obtain emergency assistance during and after the derecho was not just a theoretical or abstract concern. Whether, and how quickly, help can be called and a first responder arrives might make the difference between life and death.[6] As *The Washington Post* reported, for example, a young man died after being struck by electrical wires brought down during the derecho. Bystanders who came to his aid and called 9-1-1 reportedly were not able to get through, even after calling for more than thirty minutes.[7] In another instance, a woman, just a few hundred feet from her Washington, D.C. apartment, was knocked off her motorcycle and pinned under a tree, leaving her partially paralyzed. She was saved when passersby, unable to get through to 9-1-1, flagged down an ambulance that provided help.[8] While it does not appear that the large-scale failures of service providers' 9-1-1 network infrastructure were factors in these two events (those failures occurred later), these real-life situations reinforce the critical importance of the successful completion of calls to 9-1-1.

Congress has given the Commission the responsibility under the Communications Act to ensure that communications networks of all types "promot[e] safety of life and property."[9] Central to

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[4] *See, e.g.*, Sullivan, Patricia, *911 Failure Affected 2.3 Million in Northern Virginia*, WASH. POST, July 11, 2012.

[5] *See* Comments of Fairfax County, Virginia at 2 (Aug. 17, 2012) ("Fairfax County Comments"). These comments came in response to the Bureau's July 18, 2012, Public Notice in Public Safety (PS) Docket No. 11-60 seeking input on the effects of the storm and potential remedies. *See* Public Safety and Homeland Security Bureau Seeks Comment On 9-1-1 Resiliency and Reliability in Wake of June 29, 2012, Derecho Storm in Central, Mid-Atlantic, and Northeastern United States, *Public Notice*, 27 FCC Rcd 8131, PS Docket No. 11-60, (PSHSB July 18, 2012) ("Derecho Public Notice.").

[6] One study of cardiac emergencies in Pennsylvania found that E9-1-1 adoption reduced the risk of mortality within six hours by 60 percent and the risk of mortality within 48 hours by 35 percent. *See* Athey, Susan and Stern, Scott, *The Impact of Information Technology on Emergency Health Care Outcomes*, January 2002, at 32, *available at* http://kuznets.fas.harvard.edu/~athey/itemer.pdf.

[7] Sullivan, Patricia, *Help Delayed For Electrocuted Man As 911 Calls Backed Up During Storm*, WASH. POST, July 19, 2012.

[8] Ruane, Michael E., *D.C. Woman Caught In The Derecho Storm Is Left Paralyzed, But Her Attitude Is Optimistic*, WASH. POST, Aug. 19, 2012.

[9] *See* 47 U.S.C. § 151.

this important responsibility is promoting the reliability, resiliency, and availability of communications networks at all times, including in times of emergency or a natural disaster such as the derecho. To that end, the Commission, through the Bureau, administers rules on communications outage reporting[10] and analyzes those reports to identify various communications outage trends nationwide, especially regarding 9-1-1 capabilities. We use this information to assess network reliability and make recommendations for both individual provider and industry-wide improvements.

The severity of the 9-1-1 outages that resulted from the derecho called for a more intensive review process for this inquiry. Accordingly, in July 2012, Chairman Genachowski instructed the Bureau to conduct a comprehensive inquiry into the impact of the derecho on 9-1-1 and other communications. In addition to reviewing data from more than 500 outage reports from twenty-two communications providers, the Bureau released a Public Notice seeking comment on issues including the cause of the outages, their effect on public safety, and the resiliency and reliability of 9-1-1 networks generally.[11] In response to that Public Notice, the Bureau received forty-five filings, including twelve comments and reply comments from communications providers and trade associations, thirteen from PSAPs and public safety groups, and twelve from individuals. The Bureau interviewed representatives of eight communications providers (some multiple times), twenty-eight PSAPs, three battery manufacturers, one generator manufacturer, numerous state and county entities, and obtained additional information through six supplemental data requests. In addition, the Bureau participated in several federal, state, and local meetings and hearings on the effects of the derecho.[12]

In this report, we present our findings and recommendations. Section 2 provides an overview of the Bureau's information gathering process. Section 3 offers a general description of the derecho's impact on communications. Sections 4, 5, and 6 describe the derecho's impact on three types of communications, specifically wireline, PSAP, and wireless communications. In Section 7, we offer our recommendations for addressing the specific problems identified in this report, as well as other suggestions we believe will promote the reliability of our Nation's 9-1-1 communications.[13]

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[10] *See* 47 C.F.R. §§ 4.1-4.13.

[11] *See* Derecho Public Notice, 27 FCC Rcd at 8131.

[12] *See, e.g.*, "Resilient Communications: Current Challenges and Future Advancement," Before the Subcomm. on Emergency Preparedness, Response, and Communications, House Committee on Homeland Security, 112th Cong. (Sept. 12, 2012) (statement of David S. Turetsky, Chief, Bureau of Public Safety and Homeland Security); "Reliability of the District's 911 Call System," Before the District of Columbia Council Comm. On the Judiciary (Sept. 20, 2012) (statement of David S. Turetsky, Chief, Bureau of Public Safety and Homeland Security); Metropolitan Washington Council of Governments – News Room, "COG to Review 9-1-1 Outages and Other Failures Resulting from 'Derecho'" (rel. Jul. 11, 2012) *available at* http://www.mwcog.org/news/press/detail.asp?NEWS_ID=584.

[13] This report not only provides our own assessments, but also includes in the attached appendices preliminary findings by the Virginia State Corporation Commission (Appendix A); recommendations by the Metropolitan Washington Council of Governments (Appendix B); and recommendations from various PSAPs interviewed by the Bureau (Appendix C).

2. PSHSB Information-Gathering Process

Outage Reporting and Developing the Record

The Bureau first became aware of the derecho's effects on communications infrastructure when providers began to submit derecho-related Network Outage Reporting System ("NORS") reports on June 29, the day the storm struck.[14] Communications providers filed a total of thirty-five NORS reports on June 29; the tally of NORS reports with outages beginning on June 29 would eventually reach 135. Under FCC rules, these reports are presumed confidential to protect proprietary information and data with sensitive national security implications. [15] Accordingly, outage report data in this public report is presented in the aggregate unless otherwise agreed by the source of the information or available through other public sources.[16] To the extent that information derived from outage reports or other confidential sources appears in this report, each provider has waived the presumption of confidentiality with respect to that information.

Figure 1 below shows the number of NORS reports[17] by incident date:

[14] NORS is the Commission's mandatory web-based filing system through which communications providers covered by the Part 4 outage reporting rules must submit reports to the FCC. This system uses an electronic template to promote ease of reporting and encryption technology to ensure the security of the information filed. The Cybersecurity and Communications Reliability Division of the Public Safety and Homeland Security Bureau administers NORS, monitors the outage reports submitted through NORS, and performs analyses and studies of the communications disruptions reported. Generally, a NORS report must be filed when the effects of an outage reach a certain threshold (*e.g.,* lasting at least thirty minutes and potentially affecting 900,000 user-minutes). Then, the filing party has up to thirty days to supplement the filing with more complete information. The NORS team aggregates the data in order to identify outage trends. *See* 47 C.F.R. §4.1 *et seq. See also* Network Outage Reporting System (NORS), http://transition.fcc.gov/pshs/services/cip/nors/nors.html.

[15] *See* 47 C.F.R. § 4.2.

[16] *See* New Part 4 of the Commission's Rules Concerning Disruptions to Communications, ET Docket No. 04-35, *Report and Order and Further Notice of Proposed Rulemaking*, 19 FCC Rcd 16830, 16855 ¶ 46 (2004) (noting that "the analytical substance of these reports is essential to the development and validation of best practices" and that "[a]s a consequence, we will also use information from those reports in analyses that will enable us to provide guidance to [advisory bodies and other organizations] in a way that does not provide sensitive information to those who might use it for hostile, or competitive, purposes").

[17] We note that providers filed in NORS on a rolling basis, with discrete providers filing multiple times during the event.

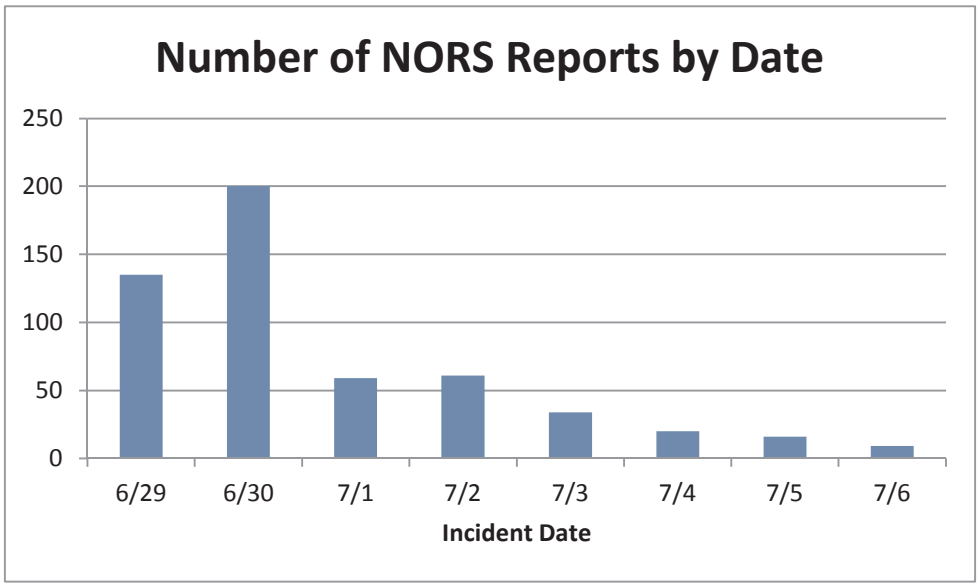

Figure 1: Number of NORS Reports by Date of Incident

Figure 2 provides a geographic breakdown of outage reports.[18] As this chart illustrates, the effects of the derecho were widespread geographically, from Illinois in the west, to New Jersey in the east, with West Virginia, Maryland, Virginia and Ohio experiencing the largest impact on communications.

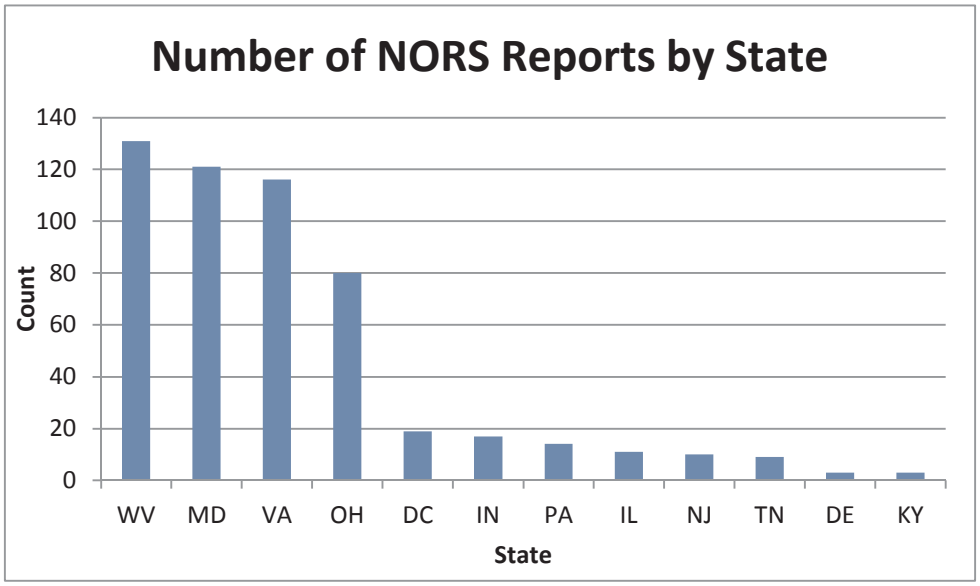

Figure 2: Number of NORS Reports by State

[18] There were 534 derecho-related NORS reports from June 29 to July 6, 2012. We included outage reports that mentioned the storm, or that indicated that the outage was power-related. Most of the outage reports were for events that occurred on June 29 or June 30. We included outage reports for events through July 6 because we believe that these reports included residual events from the restoration effort, although some of the reports from July 1 through July 6 may relate to other storms.

Of the 534 outage reports filed, 111 describe effects to wireline users, 161 describe effects to wireless users, 249 describe effects to transport facilities, and eight reports describe effects to cable telephone users. In addition, forty-five reports involve 9-1-1 outages. Although there were numerous outage reports, most of the reported effects were in Virginia, Maryland, Ohio, and the District of Columbia. West Virginia had many PSAPs affected but relatively few wireline or wireless users.[19] Other states experienced lesser – but not inconsequential – communications outages related to the storm. In total, more than 1.2 million wireline communications customers in twelve states experienced outages (not counting other residents affected by the inability to reach 9-1-1 on all platforms). In addition more than 30,000 high capacity transport lines ("DS3s")[20] were affected.

On June 30, 2012, the Commission activated a modified and targeted version of the Disaster Information Reporting System ("DIRS").[21] DIRS allows service providers in the designated area to submit reports on the status of their networks to the Commission during emergencies on a voluntary basis.[22] Working with the National Cybersecurity and Communications Integration Center ("NCCIC") at the U.S. Department of Homeland Security, the Commission activated this modified version of DIRS at 4:20 p.m. for the following cities and counties:

- West Virginia: Berkeley, Hampshire, Harrison, Jefferson, Kanawha, and Wood counties
- Virginia: Alexandria, Manassas Park, Prince William County, Loudoun County, Arlington County, Falls Church, and Fairfax County
- Maryland: Montgomery, Prince George's, Calvert, Charles, Anne Arundel, and Howard counties, Baltimore City, and Baltimore County
- The District of Columbia

[19] We note that the derecho's effects were widespread and severe across West Virginia, but its impact on population was greatest in densely-populated northern Virginia.

[20] A Digital Signal 3 ("DS3") line is a digital signal level 3 T-carrier. It may also be referred to as a T3 line. The data rate for this type of signal is 44.736 Mbit/s. *See* Digital Signal 3, WIKIPEDIA, http://en.wikipedia.org/wiki/Digital_Signal_3.

[21] DIRS is a voluntary, web-based system that communications companies, including wireless, wireline, broadcast, and cable providers, can use to report communications infrastructure status and situational awareness information during times of crisis. *See* Disaster Information Reporting System (DIRS), http://transition.fcc.gov/pshs/services/cip/dirs/dirs.html. Information submitted into DIRS is presumed confidential but may be shared with federal agencies such as the Department of Homeland Security on a confidential basis. *See* The FCC's Public Safety and Homeland Security Bureau Launches Disaster Information Reporting System (DIRS), *Public Notice*, DA 07-3871 (PSHSB 2007).

[22] Sometimes a modified version of DIRS is activated, which calls for only certain fields in the system to be completed and only by certain types of communications providers. During the derecho, for example, the Commission did not seek DIRS data from companies such as broadcasters, who were generally understood to be less adversely impacted by this storm.

Overall, the Bureau received DIRS submissions from seven communications providers.

Additional Information from Communications Providers

Shortly after the storm, the Bureau began a series of meetings with cable, wireline, and wireless providers, particularly those serving Virginia and West Virginia, and issued several follow-up requests for additional confidential information to supplement the NORS and DIRS data. In particular, the Bureau asked Verizon Communications, Inc. ("Verizon") and Frontier Communications Corporation ("Frontier"), the 9-1-1 service providers[23] in the most severely affected areas, to provide a detailed timeline of events relating to each PSAP in their service areas affected by the derecho. In addition to information about the cause of each outage, we asked for a description of the 9-1-1 architecture that supports each PSAP that lost service. The Bureau also asked the major wireless providers serving the affected areas—Verizon Wireless, AT&T, Sprint, and T-Mobile—for additional information on the causes of cell site outages during the storm and for information on cell site battery life. Follow-up requests were made of these and other providers, who supplied the Bureau with supplemental reports and explanatory e-mails.[24]

Providers generally were cooperative and responsive to our requests for information. One issue, however, affected the scope and timing of our inquiry. Information originally made available to the Bureau about whether the generators were in working order just prior to the storm at Verizon's Arlington central office, where a loss of power severely affected 9-1-1 service in northern Virginia, differed from later accounts. Verizon indicated to the Bureau and a number of governmental entities at a meeting of the Metropolitan Washington Council of Governments ("MWCOG"), and on other occasions in July 2012, as reported by *The Washington Post*, that the critical generators at its Arlington central office had functioned properly during a maintenance test just days prior to the derecho.[25] However, the Bureau learned from the Virginia State Corporation Commission ("SCC") Preliminary Staff Report ("Virginia SCC Report")

[23] "9-1-1 service providers" are responsible for routing and delivering 9-1-1 calls to PSAPs. In the current 9-1-1 system, the "provider" of 9-1-1 service and associated network facilities is typically the incumbent local exchange carrier ("ILEC") in a given area, which aggregates and delivers all incoming 9-1-1 calls (including those originating from other providers, such as wireless providers and VoIP providers) to the PSAP via selective routers. Next-generation technologies such as emergency services Internet protocol networks ("ESInets"), however, may change that pattern by more easily allowing entities other than ILECs to provide 9-1-1 service.

[24] At publication of this report, Verizon supplemented its responses with a series of documents not provided earlier that the Bureau will review.

[25] Verizon's statements about the generator test were reported in the press. *See* Sullivan, Patricia, *911 Failure Affected 2.3 million in Northern Virginia*, WASH. POST, July 11, 2012 (reporting that a Verizon representative told the MWCOG that "[b]oth generators underwent routine testing three days earlier"); Sullivan, Patricia and Flaherty, Mary Pat, *Verizon, 911 Service Providers Out of Sync on Storm Outage*, WASH. POST, July 12, 2012 (reporting that "one of the [Arlington] generators, which had worked smoothly in a routine test three days before, would not start"); Flaherty, Mary Pat, *Verizon Details Errors in Derecho, Calls Response to 911 Outages 'Insufficient,"* WASH. POST, August 13, 2012 (repeating Verizon's public statement that "the generators failed . . . despite having been tested three days earlier").

when it was publicly released on September 14, 2012, that the Arlington central office generator did *not* pass the test, as confirmed by Verizon's own maintenance logs.[26]

Additional Information from PSAPs

In order to gather information regarding PSAP responses to the derecho, the Bureau interviewed personnel from twenty PSAPs in West Virginia, five PSAPs in Virginia, and three PSAPs in Ohio. We also considered public comments filed by Fairfax County, Virginia, as well as reply comments filed by Loudoun County, Virginia, and Montgomery County, Maryland, and an *ex parte* letter from Arlington County, Virginia.[27] These comments, meetings, and telephone calls greatly improved our understanding of what happened during the storm and informed the recommendations we offer in this report to improve and strengthen 9-1-1 infrastructure and service.

Public Comments in Response to Public Notice

On July 18, 2012, the Bureau released a Public Notice seeking public comment on the background, causes, and restoration efforts related to communications services and facilities impacted directly or indirectly by the derecho.[28] Specifically, the Bureau sought to develop a complete and accurate record of all the facts surrounding the outages resulting from the storm as well as outages resulting from other relevant natural disasters in order to evaluate the overall resiliency and reliability of the Nation's 9-1-1 system and services. The Bureau also sought comment on the impact the outages had on various segments of the public, including consumers, hospitals and public safety entities.[29] In response, the Bureau received forty-five filings, including twelve comments and reply comments from communications providers and trade associations, thirteen from PSAPs and public safety groups, and twelve from individuals.[30]

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[26] *See* Virginia State Corporation Commission, In the Matter of Investigating 911 Emergency Call Service Outages and Problems, Case No. PUC-2012-0042, *Staff Report of Preliminary Findings* at 8 (Sept. 14, 2012) ("Virginia SCC Report") (finding that the generator that failed to start in the Arlington central office did not start during routine testing two days before the derecho and noting also that "[a] review of the maintenance logs for the backup generators in the Arlington and Fairfax central offices shows a lack of compliance with Verizon's maintenance and testing procedures"). *See also* Flaherty, Mary Pat, *Verizon 'Failures and Deficiencies' Blamed in Disruption of 911 Services During June Storm*, WASH. POST, Sept. 14, 2012 (quoting a Verizon spokesman as saying that the company's previous statement that the generator started successfully "was based on our knowledge at the time").

[27] *See Fairfax County Comments;* Reply Comments of Loudoun County, Virginia (Aug. 29, 2012); Reply Comments of Montgomery County, Maryland (Sept. 4, 2012); *Ex parte* Letter from Joseph N. Pelton, Chair, Arlington County (Virginia) Information Technology Advisory Committee, to FCC Chairman Julius Genachowski (Sept. 5, 2012).

[28] *See Derecho Public Notice*, 27 FCC Rcd at 8131.

[29] *See id.*

[30] *See, e.g.,* Comments of Dianna Arens, PS Docket No. 11-60 (urging undergrounding of wires and cutting back trees where undergrounding unfeasible) (Jul. 20, 2012); Comments of Robert F. Duffy, PS Docket No. 11-60 (raising issues related to battery lifespan) (Aug. 7, 2012); Comments of Phillip Wherry, PS Docket No. 11-60 (suggesting questions that the Commission ought to address to providers) (Jul. 20, 2012).

Industry Best Practices

The Commission and Bureau have worked with a variety of industry and public safety organizations to develop voluntary solutions and recommendations to improve the reliability of emergency communications. In 2011, for example, the Bureau joined with the Alliance for Telecommunication Industry Solutions ("ATIS") Network Reliability Steering Committee ("NRSC") to develop recommendations to prevent failure of centralized automatic message accounting ("CAMA") 9-1-1 trunks during mass call events, such as the spikes in 9-1-1 calling from natural disasters.[31] Similarly, the Communications Security, Reliability, and Interoperability Council ("CSRIC")[32] is a chartered federal advisory committee tasked with developing recommendations for the Commission on actions to enhance the security, reliability, and interoperability of communications systems.[33] Many CSRIC recommendations are voluntary "best practices" that the Bureau and stakeholders within the telecommunications industry encourage providers to implement at their discretion.[34] As such, these best practices are generally not codified in Commission rules, and the Bureau gauges their implementation primarily through its review of providers' mandatory outage reports.

For reasons explained below, communications failures during the derecho revealed that many providers failed to implement crucial best practices developed by CSRIC that could have mitigated or prevented many of the storm's most serious effects on communications networks, including 9-1-1 service outages. This failure, and the resulting damage, was costly.

3. Overview of the Derecho's Impact on Communications

The derecho affected communications in eleven states and the District of Columbia, with the greatest effects felt in Virginia, West Virginia, Maryland, and Ohio. Most significantly, the derecho disabled 9-1-1 service in counties in Virginia, West Virginia and Ohio, with the greatest number of people affected living in northern Virginia. Four northern Virginia PSAPs lost 9-1-1 service completely: Fairfax and Prince William Counties, Manassas, and Manassas Park. These

[31] *See* NRSC 9-1-1 CAMA Trunk Throughput Optimization Analysis (ATIS-0100034) (rel. Aug. 2011), *available at* http://www.atis.org/legal/Docs/NRSC/CAMATrunk_Transmittal_Final.pdf.

[32] *See* FCC Encyclopedia, Communications Security, Reliability, and Interoperability Council,http://www.fcc.gov/encyclopedia/communications-security-reliability-and-interoperability-council-iii. CSRIC replaces the Network Reliability and Interoperability Council ("NRIC"), which performed a similar role from 1992 until CSRIC's creation in 2007. Members for each CSRIC have been selected from among commercial communications entities, public safety agencies, and consumer or community organizations or other non-profit entities to provide a diverse balance of expertise and viewpoints.

[33] *See* CSRIC Charter, http://transition.fcc.gov/pshs/docs/advisory/csric/CSRC_charter_03-19-2009.pdf.

[34] The volume of CSRIC best practices (including those developed by CSRIC's predecessor organization NRIC) has grown to several thousand and covers a wide range of issues involved in providing communications services. In January 2011, CSRIC prioritized these best practices in an effort to help communications providers focus their application. All of the best practices and the prioritization are available on the Commission's website. *See* https://www.fcc.gov/nors/outage/bestpractice/BestPractice.cfm.

9-1-1 communications failures resulted, in significant part, from the loss of commercial power followed by generator failures in Verizon's Arlington and Fairfax central offices. Under current 9-1-1 architecture, the networks of incumbent wireline providers typically connect 9-1-1 call centers to those seeking help, whether the call for assistance originates on a landline or a wireless phone. Wireline outages, therefore, can have a more sweeping impact on 9-1-1 service than wireless outages. Below is a more detailed summary of our findings.

Most Significant Wireline Service Impacts:

- The derecho had significant effects on wireline communications infrastructure and resulted in partial or complete 9-1-1 service outages lasting up to several days for customers in large swaths of northern Virginia, West Virginia, and Ohio. The 9-1-1 connections affected by the derecho in Virginia are served by Verizon and CenturyLink. Frontier serves the affected PSAPs in West Virginia. Ohio's affected PSAPs are served by Frontier, CenturyLink, and AT&T.

- The greatest service losses occurred in northern Virginia as the result of backup power failures in Verizon's Arlington and Fairfax central offices. The service losses included multiple switches in Virginia that became "SS7 isolated,"[35] isolated 9-1-1 switches, and major transport system failures.

- More than a dozen of Verizon's host switches and more than three dozen remote switches in Virginia went out of service or were SS7 isolated from the telecommunications signaling network.

- A significant amount of transport equipment failed, according to Verizon, because of power surges and low voltages in central offices. For example, more than 200 circuit boards in one of Verizon's digital cross-connect systems[36] failed and had to be replaced.

[35] SS7 is a global standard for telecommunications defined by the International Telecommunication Union ("ITU"). The standard defines the procedures and protocol by which network elements in the public switched telephone network ("PSTN") exchange information over a digital signaling network to effect wireless and wireline call setup, routing and control. *See* Performance Technologies, Inc., *SS7 Tutorial*, http://pt.com/resources/tutorials/ss7-tutorial. A switch becomes "SS7 isolated" when it cannot communicate with the rest of the SS7 network, meaning that interoffice calls cannot be completed. In practical terms, this means that only the most local of calls that originate and terminate through the same central office will go through.

[36] A digital cross-connect system is a piece of circuit-switched network equipment that allows lower-level time-division multiplexing ("TDM") bit streams to be rearranged and interconnected among higher-level TDM signals. These devices can be used for switching traffic from one circuit to another in the event of a network failure, supporting automated provisioning, and other applications. *See* Digital Cross Connect System, WIKIPEDIA, http://en.wikipedia.org/wiki/Digital_cross_connect_system.

Most Significant Wireless Service Impacts:

- Overall, the wireless networks in the path of the derecho were adversely impacted, but performed better than during other powerful storms that the Bureau has tracked since establishing NORS, with just about 11 percent of all cell sites in the affected area down at the peak and a rapid restoration of service from July 2 through July 4. Among the states affected by the derecho, West Virginia suffered the greatest percentage of cell sites lost. No mobile switching centers were down during the storm. Failure of cell site infrastructure was a bigger concern during Superstorm Sandy than in the derecho, and the Bureau expects to learn considerably more on this issue through upcoming field hearings and related work.[37]

- The two main reasons reported for cell site outages were loss of power and the disabling of transport facilities that carry calls from cell sites to mobile switching centers. Cell sites were as likely to fail because of disruptions to landline backhaul communications as due to backup power exhaustion in the first days following the derecho. Still, backup power remains a serious concern for cell sites. The Bureau also learned that many service providers do not retain and analyze over time data concerning how long batteries called upon to power cell sites actually last. This information would seem helpful when making plans to replenish power to sites before battery power is exhausted.

- Even where wireless networks remained operational, data and anecdotal evidence suggest that many wireless customers still could not reach 9-1-1 or complete calls to landlines because of coverage or congestion problems in wireless access networks and disruptions across the PSTN as a whole.[38]

- Less densely-populated West Virginia suffered the greatest percentage of cell sites lost, making that state susceptible to having sizeable areas in which some residents may not have had any wireless coverage at all.[39] More urban areas, with their higher cell density, are more likely to get coverage during disasters – although any such service may suffer from higher network congestion during disasters since the available resources are shared across more users.

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[37] *See* FCC Chairman Genachowski Announces Post-Superstorm Sandy Field Hearings to Examine New Challenges to Resiliency of U.S. Communications Networks During Natural Disasters & Other Times of Crisis, *News Release* (Nov. 21, 2012) ("Superstorm Sandy Field Hearings PN").

[38] *See, e.g.,* Sullivan, Patricia, *After Storm, 911, Phone Service Remains Spotty*, WASH. POST, July 2, 2012 (reporting that a Washington, D.C., resident's cell phone "dropped half a dozen calls" and could not receive text messages for several hours).

[39] *See* Cart, Kallie, *Metro 911 Outage Causes Problems at Emergency Operations Center*, WCHS EYEWITNESS NEWS, July 1, 2012 (reporting that "in some areas, cell service is sketchy," and "the best thing to do is rely on your neighbors").

Other Communications Issues

The key role broadcasters played during and following the derecho should also be recognized. As in many times of crisis, broadcasters served as "first informers," providing the public with information on the storm's path, the damage it caused, and its effects on other communications services.[40] Even where citizens affected by the storm lost commercial power, many could still receive radio and television broadcasts on battery-powered devices.[41] PSAPs and other public safety entities took advantage of this capability by working together with broadcasters to provide updates on 9-1-1 service and alternate ways of obtaining emergency assistance.[42] For instance, some reports advised residents to call 9-1-1 only for true emergencies, and provided ten-digit administrative numbers for other questions about cooling shelters and restoration of power.[43]

Since the June derecho, other regions of the United States have experienced significant weather-related disasters. In August 2012, Hurricane Isaac struck the Gulf Coast,[44] and in October 2012, Superstorm Sandy struck the Eastern Seaboard – most destructively in New York and New Jersey.[45] While all three of these events had major impacts on communications, the aftermath of the derecho stands out for having the most devastating impact on networks connecting citizens to 9-1-1 call centers. As discussed in depth below, the derecho resulted in switch failures and massive outages to 9-1-1 communications; the derecho thus revealed critical 9-1-1 and core backup power issues. In contrast, available data indicates that problems with 9-1-1 communications networks, including switches, were not as glaring in the regions impacted by Isaac or Sandy; powerful as those storms were, most of the basic 9-1-1 infrastructure appears to have held, and there were no reports of widespread, prolonged inability to reach emergency services through 9-1-1 due to network outages. There were, however, problems receiving location information and other data with some calls, and individual PSAPs may have had isolated, non-network issues.

Because the derecho was swift and unanticipated, it differed from hurricanes and superstorms, like Isaac and Sandy, for which there typically is advance warning and an opportunity for communications providers to prepare by testing equipment, adjusting staffing levels and

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[40] *See* Comments of the National Association of Broadcasters, PS Docket No. 11-60, at 1-2 (Aug. 17, 2012).

[41] *See id.*

[42] *See* Fairfax County Comments at 12-13, Exhibit 3 (describing Fairfax County's efforts to communicate with residents during the derecho through social and traditional media). *But see No Answer at 911*, WASH. POST, July 20, 2012 ("Local officials, desperate to get the word out, resorted to traditional and social media – which in turn were not accessible to many people who lost power and cellphone service.").

[43] *See* Cart, Kallie, *Metro 911 Outage Causes Problems at Emergency Operations Center*, WCHS EYEWITNESS NEWS ONLINE, July 1, 2012 (providing ten-digit numbers for non-emergency questions).

[44] *See, e.g.,* Robertson, Campbell and Severson, Kim, *Isaac Drenches Gulf Coast and High Water Cuts Off Many,* N.Y TIMES, Aug. 29, 2012.

[45] *See, e.g.*, Barron, James, *Storm Barrels Through Region, Leaving Destructive Path*, N.Y. TIMES, Oct. 29, 2012.

supplementing training over an extended period of time. As noted, the derecho arrived with very little notice, and in that sense, had more in common with an earthquake, tornado, or man-made event. Nonetheless, all three events (*i.e.,* the derecho, the hurricane, and the superstorm) highlighted shortcomings in the reliability and resiliency of communications, and raised concerns about commercial power and telecommunications providers' implementation of procedures to ensure adequate backup power.[46] Moreover, such events shed light on the possible impact of power outages on consumers who rely at their premises on communications devices that operate on commercial power (as opposed to power through a copper telephone line) and/or have a limited battery life (*e.g.*, cordless phones, Voice over Internet Protocol ("VoIP")[47] equipment, and cell phones).[48] These and other vital issues will be considered more fully after the Commission has concluded its field hearings, which will include those topics.

4. The Derecho's Effects on Wireline Networks

In this section, we review the derecho's impact on core wireline networks. This impact was widespread and severe not only for wireline customers, but also for users of other communications services that rely on the wireline network. Most notably, because certain wireline infrastructure supports 9-1-1 calls placed from wireless as well as wireline phones, the failures discussed in this section affected 9-1-1 service for both wireless and wireline customers.

4.1 Backup Power Problems

The derecho exposed significant vulnerabilities in wireline providers' central-office infrastructure, specifically backup power systems designed to maintain service during commercial power outages. Verizon in particular reported a significant number of backup generator failures, resulting in the failure of key network components and the loss of vital communications services to customers across much of the Mid-Atlantic region. According to Verizon, nine out of 136 central-office backup generators in Verizon's service area affected by

[46] *See, e.g.,* Chen, Brian, *Cellphone Users Steaming at Hit-or-Miss Service*, N.Y. TIMES, November 2, 2012. *See also* Press Release, U.S. Senator Charles E. Schumer, *Schumer Calls on Federal Communications Commission To Ensure That Vital Communications Networks Aren't Cut After Storms or Power Failures* (Nov. 19, 2012) (stating that "thousands of residents and first responders [were] left without vital cell service in the wake of Sandy, hindering response and endangering lives," and calling for a "plan to ensure continuation of cell service in the wake of disasters").

[47] VoIP can refer to facilities-based services, interconnected services, and services that do not connect to the PSTN. VoIP technologies generally differ from traditional telephone service in that VoIP operates on commercial power rather than power from a central office through a copper line. This can have impacts for customers if commercial power is lost for long periods of time.

[48] *See* Metropolitan Washington Council of Governments 9-1-1 Telecommunications Network Steering Group, Preliminary Report of 9-1-1 Service Gaps During and Following the Derecho Storm on June 29, 2012 (Nov. 14, 2012) at 16 ("MWCOG Report") (calling for increased awareness of the "vulnerability of newer technologies that require battery or backup power").

the derecho did not operate properly.[49] Thus, about 7 percent of Verizon's generators in central offices failed to operate properly when needed.

Frontier also reported generator failures in West Virginia and Ohio, causing service disruptions in those states. Some 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.

4.1.1 Backup Power Problems in Virginia

Verizon acknowledges 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.[50] In addition, these backup power failures caused widespread communications disruptions across Virginia. For example, critical switching and transport equipment was lost when the Arlington central office went down, seriously impacting Verizon's network in northern Virginia. In Fairfax, loss of transport equipment made inter-switch communications impossible, which also had broad impacts on customers and PSAPs alike. Together, these problems resulted in more than a dozen switches being SS7 isolated. Because of their importance, we discuss the effects at each office separately.

4.1.1.1 Verizon's Arlington Central Office

The Arlington central office played an important role in the delivery of 9-1-1 services in much of northern Virginia, yet it is not clear Verizon understood the extent of this vulnerability until after the derecho. The failure of backup power at the Arlington central office directly resulted in the loss of 9-1-1 service to residents in northern Virginia, key switching capabilities, and virtually all of Verizon's network monitoring capabilities in the area. These high-impact failures could have been prevented, or at least mitigated, through the application of CSRIC best practices and other sound engineering practices.

The specific events leading to the loss of 9-1-1 service are as follows: At 10:55 p.m. on June 29, the Arlington central office lost commercial power. The backup power system at the Arlington site includes two generators that must operate in tandem to power the facility, which contravenes CSRIC best practice 8-7-5281.[51] According to Verizon, one of the two generators

[49] *See Verizon, 911 Service and the June 29, 2012, Derecho* at 1, footnote 1 (Aug. 13, 2012) ("Verizon Public Report").

[50] *See* Comments of Verizon and Verizon Wireless at 2 (Aug. 17, 2012) ("Verizon Comments"); Verizon Public Report at 2.

[51] CSRIC Best Practice 8-7-5281 provides that "[n]etwork operators, service providers and property managers with buildings serviced by more than one emergency generator, should design, install and maintain each generator as a standalone unit that is not dependent on the operation of another generator for proper functioning, including fuel supply path." *See* https://www.fcc.gov/nors/outage/bestpractice/DetailedBestPractice.cfm?number=8-7-5281.

failed to start because air had entered the fuel system.[52] Consequently, the second generator became overloaded and automatically shut down.[53] A power technician arrived at 12:28 a.m. on June 30 but could not start the generator.[54] Verizon personnel also attempted to connect a mobile replacement generator, but commercial power was restored before the portable generator could be brought online.[55] Without any power from backup generators, Verizon's Arlington central office ran on battery power for approximately six hours until the batteries ran out around 5:00 a.m. on June 30.[56] According to Verizon, some network equipment is particularly sensitive to low voltages and failed even before the batteries were completely exhausted.[57] Commercial power was restored to the Arlington central office at 12:45 p.m. on June 30, about eight hours after the batteries fully depleted.[58]

Although it contravenes a best practice to rely on two generators in tandem to power an entire central office, providers should at a minimum develop procedures to power critical equipment with one generator if the other fails, or to add a third generator, thereby preventing a complete loss of service. In Arlington, according to Verizon, the procedures for getting the working generator online were complicated and were not available to the on-site technicians during the derecho. Verizon has since developed procedures for bringing one generator online and shedding non-essential electrical loads when the other generator in a pair fails. Verizon also states that it is adding a third generator backup, and may take steps to make additional backup generators easier to connect.

Generators are critical equipment needed during disasters, when commercial power often fails. Here, Verizon's Arlington generators powered a key central office with critical network equipment. An important central office such as this should not be left in a vulnerable state in which a commercial power failure could result in all the equipment in a central office failing. Worse, Verizon allowed this critical facility to operate with effectively *no* backup generator power because one Arlington generator had failed to start during routine testing before the derecho and a single generator could not power the entire office.

Verizon also stated that actual load testing of the Arlington generators had been suspended since at least 2011 because of a problem with the uninterruptible power supply ("UPS") in that office. Verizon's standard operating procedures appear to require monthly generator tests

[52] *See* Verizon Public Report at 3-4.

[53] *See id.* at 3.

[54] *See id.*

[55] *See id.*

[56] *See id.*

[57] *See id.*

[58] *See id.*

under actual site load.[59] Yet, it does not appear that Verizon corrected the UPS problem at the Arlington central office to permit actual site load testing of the generators until after the derecho. That fact means that, for at least several months, Verizon failed to follow its own maintenance procedures.

Finally, the Arlington office was crucial to Verizon's ability to use its geographically distributed network operations centers ("NOCs") to monitor the status of equipment at thirty-four sites across its northern Virginia network.[60] For example, multiple Verizon NOCs provided visibility about the operating status of critical assets in northern Virginia, but these NOCs were interconnected only through the Arlington hub, which Verizon is now in the process of diversifying. Having a single point of vulnerability that affects monitoring of such a large and densely populated service area is unwise because communications providers rely heavily on telemetry data to identify failing equipment, determine staffing levels, and prioritize repairs during a disaster. Backup power for the monitoring equipment in Arlington was provided by a UPS that lasts only thirty minutes.[61] Thus, thirty minutes after losing commercial and generator power in Arlington, and shortly after the rest of the Arlington office went on battery power, Verizon lost the ability to monitor its network in northern Virginia, crippling its repair efforts and ability to receive alarms that signal additional equipment failures.[62] Accurate telemetry is essential to restoring service effectively after an outage, and leaving network monitoring equipment solely supported by a thirty-minute UPS, let alone at such a critical point, is not adequate backup power.

4.1.1.2 Verizon's Fairfax Central Office

Like Arlington, Verizon's Fairfax central office is a major hub for routing calls in northern Virginia. In addition to housing several switches, the Fairfax central office also hosts a large collection of transport equipment used to route 9-1-1 calls in the area.

The Fairfax central office has two backup generators, each powering different network components on different floors.[63] When commercial power failed at 10:35 p.m. on June 29, the generator on the second floor failed to start because of a malfunction in the auto-start mechanism.[64] The second floor of the Fairfax office was powered for several hours by

[59] Testing under actual site load means that the office is switched off the commercial power grid onto generator power. Unlike testing with simulated load banks, this method verifies that the generator can power the office in an emergency.

[60] *See* Verizon Public Report at 3; Virginia SCC Report at 9.

[61] *See* Virginia SCC Report at 9. The telemetry equipment used to terminate the monitoring links apparently requires line power, not the direct current ("DC") power provided by the battery plant typically deployed in central offices like Arlington.

[62] *See* Verizon Public Report at 3; Virginia SCC Report at 9.

[63] *See* Verizon Public Report at 3.

[64] *See id.* at 4.

batteries. However, by 2:30 a.m. on June 30, the battery voltage had dropped below the level needed to power some equipment on the second floor, and by 6:15 a.m. on June 30, the voltage was too low to power any equipment.[65] According to Verizon, when a technician arrived in the office around 7:30 a.m. on June 30, the technician noticed that the generator on the lower floor was functioning but failed to check the generator on the second floor.[66] By 12:15 p.m. on June 30, according to Verizon, the technician noticed the problem and manually restarted the second generator.[67]

The error that Verizon describes could – and should – have been prevented through better internal procedures and training and improved communication with technicians in the field. Of course, it is not clear that the technician knew about equipment failures in the Fairfax office in light of Verizon's inability to monitor its network. For important buildings with more than one generator, the procedures for determining the effects on power should include verifying that each generator is functioning.

Furthermore, a miscommunication within Verizon about the severity of the problem in the Fairfax office appears to have hindered restoration efforts. Although Verizon received a "battery on discharge" alarm signifying a power failure at the Fairfax office, the alarm was labeled "major" rather than "critical," reducing its priority in the maintenance process.[68] When batteries in a central office are draining because of a generator failure, the alarms for these conditions should be labeled "critical" and resolved urgently.[69]

4.1.1.3 Other Verizon Generator Problems

As noted previously, Verizon reported nine generator failures out of 136 central office backup generators in its impacted service area.[70] In addition to the failures mentioned above at the Arlington and Fairfax central offices, there were generator failures at Verizon facilities in Virginia and Maryland resulting from factors such as blown fuses, exhausted start batteries, a faulty voltage regulator, and failure of an auto-refueling mechanism. One generator initially started but failed to produce adequate power under load until a technician manually shed non-essential loads. At one location, Verizon personnel were able to connect a portable replacement generator before commercial power was restored.

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[65] *See id.* at 3.

[66] *See id.* at 4.

[67] *See id.*

[68] *See* Virginia SCC Report at 9.

[69] It is our understanding that Verizon has committed to do this. *See* Verizon Comments at 32 (stating that "[w]e have enhanced our notification and mobilization procedures to trigger activity more quickly when batteries are activated or when telemetry is lost").

[70] *See* Verizon Public Report, at 1, footnote 1.

Notably, Verizon could not locate maintenance logs for one of the generators that failed when the Bureau requested that information. Although Verizon states that its "rigorous network resiliency and service restoration practices largely worked as designed throughout most of the area affected by the Derecho,"[71] the Bureau has serious concerns regarding Verizon's actual repair practices and compliance with its own maintenance policies.

4.1.2 Backup Power Problems in West Virginia

In West Virginia, generator failures also led to disruptions in communications over Frontier's network, affecting more than 15,000 wireline customers. Commercial power outages following the derecho forced 126 of Frontier's 230 wireline facilities in the state to operate on generator power.[72] Many Frontier remote terminals are not equipped with backup generators due either to their small size or physical location. In St. Albans, West Virginia, a central-office backup generator operated for approximately twenty-two hours before failing because of a broken belt, resulting in telephone service outages to over 8,600 customers for more than three hours.[73] Generator problems in Petersburg and Worthington, West Virginia, affected more than 3,300 customers, and issues with four smaller generators in remote facilities disrupted service to another 3,700 customers across the state. Although Frontier deployed mobile generators in some locations, as many as twenty were stolen from Frontier facilities in the storm's aftermath, causing additional backup power failures.[74]

4.2 Switch Effects

4.2.1 Verizon Switch Effects

During the derecho, more than a dozen Verizon host switches went out of service in areas ranging from Baltimore, Maryland, to Richmond, Virginia. Ten of these were SS7 isolated[75] due to transport failures in Verizon's network, and four lost power because of generator failures. Over three dozen of Verizon's remote switches also went out of service during the storm. In all, nearly 1 million wireline customers lost service for durations ranging from two hours to more than two days.

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[71] *See* Verizon Comments at 2.

[72] Comments of Frontier Communications Corp. at 2 (Aug. 17, 2012) ("Frontier Comments").

[73] *See generally* Frontier Comments at 4 (stating that "generator use . . . was not a foolproof solution" and that "[i]n some instances back-up generators pre-placed in the [c]entral [o]ffices failed, which led to outages while Frontier replaced those generators").

[74] *See* Frontier Comments at 5; Workman, Megan, *Frontier, Suddenlink Bills Will Be Prorated*, THE CHARLESTON GAZETTE, July 10, 2012 (reporting that "[t]hieves stole generators at multiple Frontier facilities, which affected service to customers"); Staff Report, *Eleven Arrested in Storm Generator Thefts*, THE CHARLESTON GAZETTE, July 26, 2012.

[75] *See supra*, note 35.

In the Bureau's view, Verizon could not initially explain the routing of key circuits in its network when the Bureau inquired how failures in one office could affect communications in other areas. Based on this uncertainty and the time that passed before we received this information, it is clear to the Bureau that Verizon was not fully aware of the routing of its own critical circuits until a considerable time after they failed.

4.2.2 Switch Effects in West Virginia

According to Frontier, the derecho caused five host switches and more than thirty remote switches to fail or become isolated across West Virginia, impacting more than 50,000 wireline customers. The major causes of these failures included fiber cuts and extended commercial power outages leading to drained backup batteries. Not all power-related switch outages involved generator failures, however, because it is not always feasible to equip smaller switching hubs with backup generators. Frontier also lost the ability to monitor its network in West Virginia, preventing it from receiving network alarms and disrupting its ability to reroute 9-1-1 calls. Frontier attributed this problem to a combination of a fiber cut, which caused the initial outage, and the fact that it had disconnected a backup circuit, which would have provided needed redundancy, a week prior to the storm. Without functional network monitoring, Frontier's NOCs obtained network access through a more time-consuming dial-up network before they could begin rerouting 9-1-1 calls.

Individual Frontier host switch outages affected between 870 and 8,600 customers each and lasted from 3.3 hours to more than seven days. Frontier also experienced more than thirty remote switch outages affecting approximately 31,000 customers. Individual remote switch outages affected between 127 and 4,800 customers for five hours to nearly ten days and were caused by loss of commercial power and subsequent exhaustion of backup power, SS7 isolation, and transport network failures.

4.3 Effects on Transport Equipment

The derecho had a significant effect on transport equipment. This equipment supports network traffic of all kinds, from 9-1-1 calls to everyday communications. For example, more than 600 circuit boards in high-capacity digital cross-connect systems in Verizon's network were destroyed, likely by power surges or the low voltage that occurred as batteries drained. With one digital cross-connect system, approximately 200 circuit packs failed when fuses mounted on each circuit board blew.

4.4 Proposed Corrective Actions from Wireline Providers

4.4.1 Corrective Actions Proposed by Verizon

Since the Bureau began its inquiry, Verizon has submitted materials to the FCC and other regulatory bodies indicating that it has repaired defective equipment, revised internal policies,

and taken other measures to prevent similar failures in the future. Some of these changes have already occurred in areas affected by the derecho, while others are planned to be implemented over time in other service areas.

In July 2012, Verizon and metropolitan Washington PSAPs agreed on a set of immediate actions, including adoption of the National Incident Management System ("NIMS") model for disaster response; use of a Reverse 9-1-1® type system to notify PSAPs of known or suspected 9-1-1 outages; semi-annual 9-1-1 outage drills; and a current contact list of Verizon personnel, escalating to the vice-president level, that PSAPs can reach directly in the event of an outage.[76] Area PSAPs also requested a Verizon representative to be physically present at each jurisdiction's operations center during an emergency, although Verizon has said it is exploring "virtual participation" through electronic communications. As of November 2012, Verizon and MWCOG reported that these steps are in "various stages of completion."[77]

According to filings in PS Docket No. 11-60 and other fora, Verizon also has committed to the following remedial actions:

- Backup power system audits of "mission critical" facilities in the Washington metropolitan region, including the Arlington and Fairfax central offices.[78]

- A complete review and update of monthly and annual preventative maintenance requirements for generators, batteries, and rectifiers that supply power at host central offices. Power technicians will be trained in critical facility "blackout" testing to simulate total commercial power failure, as well as manual generator start procedures and "prioritized system load transfer" scenarios to distribute backup power to critical equipment.[79]

- A redesign of its telemetry network to ensure that it conforms to new diversity guidelines adopted by Verizon in August 2012, after the derecho. Verizon has committed to redesigning its E-9-1-1 tandem architecture in Virginia according to these guidelines.[80]

- Meetings with the Fairfax County, Prince William County, Manassas, and Manassas Park PSAPs to discuss 9-1-1 trunk diversity improvements specific to each jurisdiction.[81]

[76] *See* Verizon Public Report at 7-9; MWCOG Report at 9.

[77] *See* MWCOG Report at 9.

[78] *See* Verizon Comments at 5.

[79] *See* Verizon Public Report at 5; Verizon Comments at 5.

[80] *See* Verizon Comments at 5.

[81] *See* Verizon Public Report at 6 (stating that "Verizon will work directly with the specific PSAP partners to decide on improvements").

Verizon also notes that its wireline division's practices for follow-up when a generator fails a routine test are being incorporated into a standard, company-wide policy. Specifically:

- The power technician immediately contacts the supervisor if a power equipment deficiency is identified that has potential for broader impact on network power or network reliability, prior to leaving the site.

- The power technician and supervisor jointly assess the criticality of the problem and formulate and implement a multi-solution "action plan." The action plan can involve the purchase of new parts, contacting appropriate vendors, procuring a portable generator, and escalating service restoration with the utility, as appropriate. The supervisor will provide the area manager with initial notification, and the area manager, in turn, will communicate the information upward to director-level management and above as necessary.

- The power technician updates the National Power Network Operations Center and e-mails other members of the local power team, advising them of the abnormal condition and current action plan. The supervisor and/or vacation coverage supervisor (if applicable) are copied on the e-mails.

- The supervisor updates the area manager with the action plan, and the area manager will communicate the information upward to director-level management and above as necessary.

- The supervisor submits a "jeopardy report" (depending on the nature and impact of the outage) following site stabilization.

The Bureau believes that these actions are appropriate steps, but are not yet sufficient based on the Bureau's assessment of the information it has received thus far. Verizon correctly notes positive changes in its backup power and network diversity policies and progress in implementing improvements, particularly in the region that includes Virginia, with respect to the facilities most relevant to the provision of connections vital to 9-1-1 service, even as it recognizes it has more to accomplish. It also has much more to do nationwide. For example, we have not received information that would lead us to conclude that Verizon has determined yet whether it has other generator configurations similar to Arlington across its entire footprint, although it states that it is working to do so, with a specific budget and timetable, and has made that determination in some areas. There also are metrics as to which we have not received information to assess—*e.g.*, whether Verizon has committed to maintain central-office backup power for any specific length of time or established specific timeframes for generator repairs. Valuable progress on the auditing of 9-1-1 circuits in some areas has been made, even as further information is sought about the timetable and budget for completing the task throughout Verizon's relevant service areas. Moreover, this inquiry has raised significant concerns about the extent to which Verizon has followed its stated maintenance procedures in

the past. It would be beneficial if Verizon provided additional clear and specific commitments, with budgets and specific timetables for implementation of upgrades and improvements.

4.4.2 Corrective Actions Proposed by Frontier

Frontier's public comments provided the following list of "lessons learned" based on its investigation into the derecho's impacts on PSAPs. Generally, the Bureau agrees with Frontier's commitments to provide alternate ways to monitor its network, audit 9-1-1 circuits for diversity, and ensure that backup generators are available in locations affecting PSAPs. These commitments, however, still require additional specificity, budget, and timetables. Moreover, the derecho revealed instances where many of these procedures should have been followed already, and Frontier must demonstrate that it is committed to implementing them in practice as well as in theory.

- Enhancing preventative maintenance plans to include proactively testing its backup modems monthly.
- Performing quarterly checks via dial-up modems on host offices to ensure network reliability.
- Reviewing Frontier's network to determine where additional redundancy would be feasible.
- Adding additional remote access to Points of Presence ("POPs") to ensure increased ability to monitor the network.
- Prioritizing 9-1-1 center sites and facilities for generator back-up.
- Revising and augmenting Frontier's generator plan.
- Establishing alternate dial-up access to key switches and exploring other backup options.[82]

4.5 Wireline Outages in Other States

More than 300,000 wireline customers in Ohio, Maryland, Illinois, Pennsylvania, Indiana, Tennessee, New Jersey, and the District of Columbia lost service to some degree during the derecho, according to an analysis of aggregated NORS data. The bulk of those outages occurred in Ohio, with more than 170,000 wireline customers affected for periods ranging from one hour to more than five days, and in Maryland, where roughly 100,000 wireline customers lost service for as long as six days.

[82] *See* Frontier Comments at 6-7.

Most of the Ohio outages resulted from loss of commercial power followed by failure of backup power systems, based on an analysis of NORS data. At least two backup generators in Ohio failed to start, leading to central office outages once backup batteries ran out. Repair crews attempted to distribute portable generators to remote terminals without dedicated backup power, but in some cases had to "rotate" available generators between multiple locations until commercial power was restored. The outages in Maryland were caused by a number of factors, such as transport and switching failures, in conjunction with loss of commercial power. A lesser number of reported outages in Maryland resulted from lightning strikes, cable cuts, and storm-related damage to network infrastructure.

5. The Derecho's Effects on Public Safety Answering Points

5.1 Description of the 9-1-1 Network

The 9-1-1 network, which is shown at a high level as typically configured in Figure 3, was designed so that anyone dialing 9-1-1 will have his or her call answered by the geographically appropriate PSAP. The primary function of the 9-1-1 network is to route the call to the PSAP serving the caller. The calling number and the location of the caller are also sent to the PSAP to assist in responding to the emergency.

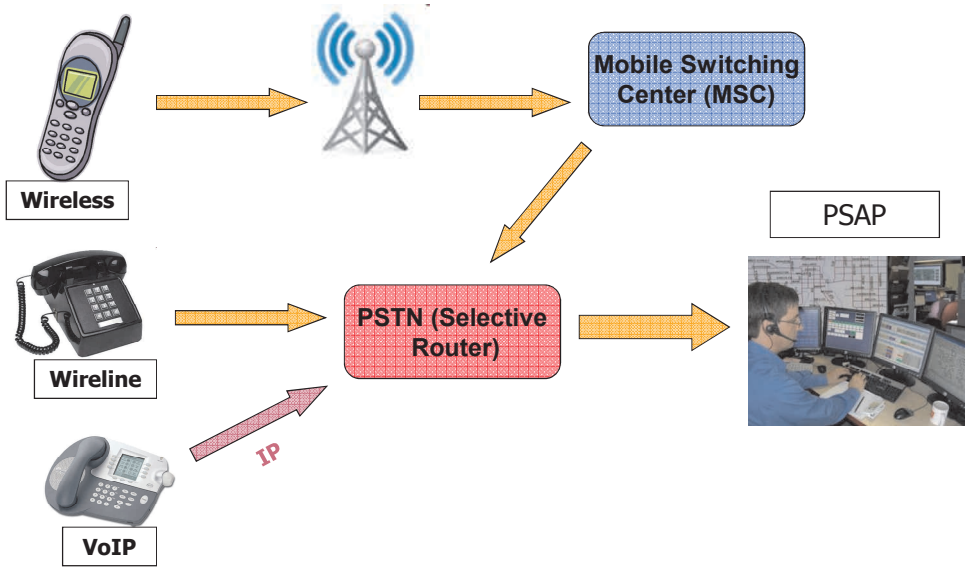

Figure 3: 9-1-1 Network Architecture

When a caller dials 9-1-1 on a wireline telephone, the call is handled similarly to any other call and goes to the local switch serving that caller. The local switch then sends the call to an aggregation point called a selective router, which uses the caller's phone number and address to determine to which PSAP the call should be sent. Calls to 9-1-1 from wireless phones flow through a switch called a mobile switching center before reaching the selective router. For

wireless calls, the sector of the cell tower serving the call provides the approximate location of the caller and is used to determine to which PSAP the call is sent. To complete the call, a circuit is set up between the selective router and the appropriate PSAP. If all the usual circuits are busy or out of service between a selective router and the PSAP, the selective router implements an alternate path called a reroute.

Once a call reaches the PSAP, the PSAP queries an automatic location information ("ALI")[83] database to determine the location of the caller. For wireline calls, this location is based on the address associated with the caller's phone number. For wireless calls, providers use various technologies to determine the caller's location based on global positioning system ("GPS") data from the caller's phone and/or other network resources. Because ALI information is passed to the PSAP along a different path than the one carrying 9-1-1 calls, it is possible for a PSAP to lose ALI links without losing 9-1-1 service completely.

5.2 Network Effects on PSAPs

Because PSAPs typically rely on the incumbent wireline communications provider's infrastructure to receive emergency calls placed from any device, failures in Verizon and Frontier's wireline networks also disrupted 9-1-1 service to many PSAPs. While any communications breakdown raises concerns, disaster-caused breakdowns affecting 9-1-1 service heighten those concerns because they directly affect the public's ability to call for help at a time when it is likely that the greatest number of people will need emergency service. During and after the derecho, at least seventy-seven PSAPs experienced adverse effects ranging from a complete loss of 9-1-1 service to failures of ALI and/or automatic number information ("ANI")[84] and other partial disruptions.

The following table shows the location and causes of complete or partial service disruptions to PSAPs in various states:

[83] ALI provides the PSAP with the caller's telephone number, the address/location of the telephone, and supplementary emergency services information. *See* Glossary of Technical Terms: Wireless E 9-1-1, http://www.apcowireless.com/library/ICMAGlossary.pdf.

[84] ANI provides only the telephone number associated with the access line from which a 9-1-1 call originates. *See* Glossary of Technical Terms: Wireless E 9-1-1, http://www.apcowireless.com/library/ICMAGlossary.pdf.

State	Completely down	ALI/reroute/9-1-1 circuits failed	CAMA trunk issue[85]	Total
West Virginia	11	15	1	27
Virginia	4	21	1	26
Ohio	2	11	1	14
New Jersey		6		6
Maryland		3		3
Indiana		1		1
Total	17	57	3	77

Table 1: Summary of PSAP Effects

5.3 Network Effects on PSAPs in Virginia

The most significant impact of Verizon's network problems in northern Virginia was to cause the total loss of 9-1-1 service connectivity to the Fairfax County, Prince William County, City of Manassas, and Manassas Park PSAPs. Specifically,

> [t]he failure of one of two back-up generators to start at each of [Verizon's] Arlington and Fairfax central offices following the loss of commercial power caused the Northern Virginia 911 disruptions. Multiple failures cascading from these specific generator problems and damage to the transport network combined to cause the outages for the four PSAPs. Included among those failures were systems that enable [Verizon] to monitor the condition of [its] network facilities in Northern Virginia, and that loss of visibility over [Verizon's] network hindered [its] initial efforts to assess and repair damages.[86]

PSAPs, lacking information from Verizon, at times arranged reroutes to non-working routes after the regular route again became operational, or continued to attempt to reroute even though service could have been restored on the original route.[87]

[85] Centralized Automatic Message Accounting ("CAMA") trunks are a legacy technology used to route 9-1-1 calls to PSAPs in many jurisdictions. During times when a PSAP receives a large volume of calls, a timing mismatch between the selective router and the customer premises equipment ("CPE") at the PSAP results in trunks being taken out of service even though these trunks have not failed. Whenever a trunk is taken out of service, the number of 9-1-1 calls that can be processed is reduced.

[86] Verizon Public Report at 2. *See also* Fairfax County Comments at 14-18 (noting that the 9-1-1 outage was caused by the failure of Verizon's backup power sources and equipment failure/damage, and that the outage was compounded by Verizon's failure to provide prompt and effective notice to the Fairfax PSAP).

[87] *See* Verizon Public Report at 6 (certain PSAPs "would have been better off [not rerouting calls], but without the appropriate information, they were unable to make that determination at the time").

5.4 Virginia PSAPs

5.4.1 Fairfax County

Fairfax County has a population of more than 1.1 million people, about 20 percent of the entire population of the Washington, D.C. metropolitan area.[88] Its PSAP, the largest in Virginia and among the ten largest in the United States, receives approximately 1 million 9-1-1 calls per year.[89] According to Fairfax County's comments in response to the Bureau's Public Notice:[90]

> [T]he derecho hit Fairfax County at approximately 10:30 at night on Friday, June 29, 2012. At 7:36 the next morning, as hundreds of thousands of County residents awoke to assess the full extent of the damage in daylight, the phones stopped ringing. Over the next seven hours, no calls were completed to the County's 9-1-1 Call Center. On the afternoon of Saturday, June 30, sporadic, incomplete service was restored. Three additional days passed before 9-1-1 service was fully restored at 11:30 a.m. on Tuesday, July 3, 2012.
>
> Fairfax County's 9-1-1 Call Center operated exactly as it was designed, intended, and constructed to operate. Verizon has told the County that the 9-1-1 failure was caused primarily by a loss of power in two key Verizon central offices (Arlington and Fairfax). Many other Verizon central offices in the region lost power as well, which exacerbated the effects of the loss of Verizon's Arlington and Fairfax central offices. The 9-1-1 failure affected several other Northern Virginia jurisdictions in addition to Fairfax County. The data Verizon has provided the County to date show that nearly 1,900 calls made to 9-1-1 entered Verizon's system but were not routed to the County during the first 29 hours. The County is awaiting the receipt of additional data from Verizon.[91]

The Fairfax County PSAP is served by redundant selective routers. However, this redundancy was compromised as a result of the transport failures caused by the generator failure in Verizon's Fairfax central office and other single points of failure in Verizon's network. According to Fairfax County:

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[88] Fairfax County Comments at 3.

[89] *Id.* at 4.

[90] *See* Derecho Public Notice, 27 FCC Rcd at 8131.

[91] Fairfax County Comments at 2 (footnotes omitted; emphasis in the original.)

> [P]ortions of [Verizon's] transport network, in effect one of the "main communications highways" used to complete 9-1-1 calls, and in many cases even regular phone calls, were not operational for more than seven hours on [June 30, 2012]. Power equipment in Verizon's Fairfax central office also failed, isolating the Fairfax E9-1-1 tandem switch and preventing the routing of 9-1-1 calls to the Fairfax County PSAP through the Fairfax network route. The Alexandria E9-1-1 tandem switch, a secondary route for 9-1-1 call transport, remained operational but the capability to route 9-1-1 calls to the Fairfax County PSAP failed. Essentially, the Verizon-provided 9-1-1 telephone switching systems into Fairfax County facilities were not operating, even though the Fairfax County PSAP staff and Fairfax County telephone and computer systems were operational and unaffected by the power outages (Fairfax County has power-fail systems implemented in its PSAP).[92]

A diversity audit by Verizon, as called for in CSRIC best practice 8-7-0532,[93] might have identified these single points of failure and prevented the loss of service to the Fairfax County PSAP through additional redundant connectivity.

According to Fairfax County, Verizon also did not provide adequate notification of the existence and scope of problems in its network affecting 9-1-1 service. Instead:

> Verizon sent a cryptic e-mail to designated Fairfax County staff saying that the Arlington central office was without power or backup battery/generator. The references to Arlington suggested that 9-1-1 service was affected only in Arlington County. Without a corresponding phone call explaining the situation and the e-mail, Fairfax County's PSAP staff continued with their normal operations, unaware that incoming 9-1-1 call service from Verizon was about to rapidly deteriorate.[94]

Fairfax County also identified multiple previous outages where Verizon failures affected PSAPs in the region.[95] It asserts that this outage "was the latest in a series of recent 9-1-1 problems in

[92] Fairfax County Comments at 15.

[93] CSRIC Best Practice 8-7-0532 provides that "[n]etwork operators should periodically audit the physical and logical diversity called for by network design and take appropriate measures as needed." *See* https://www.fcc.gov/nors/outage/bestpractice/DetailedBestPractice.cfm?number=8-7-0532.

[94] Fairfax County Comments at 7.

[95] *See* Fairfax County Comments at 18-20. Disruptions to 9-1-1 service availability included during a January 2011 snowstorm in the Washington, D.C., metropolitan area; a February 2011 equipment failure at Verizon's Fairfax central office; and a May 2011 power failure in Verizon's Newark, New Jersey, central office that affected wireless ALI data for PSAPs in Maryland, Virginia (including parts of Fairfax County), Delaware, and Pennsylvania.

the National Capital Region that demonstrate that the 9-1-1 infrastructure is not as resilient or as reliable as it needs to be."[96]

5.4.2 Prince William County

Prince William County has a population of 420,000. The PSAP is served by redundant selective routers. In June 2012, before the derecho, the Prince William County PSAP received 15,940 calls to 9-1-1, and 25,698 non-emergency calls. [97]

The Prince William County PSAP told the Bureau that by 8:07 a.m. on June 30, PSAP staff had determined that they were not receiving 9-1-1 calls. The PSAP attempted unsuccessfully to reroute the calls to backup phones, but found that the only lines working were the area code 703 non-emergency numbers. At that point Prince William County PSAP officials contacted Verizon to let it know that circuits were down. At the same time, they began to inform the public via media and alerting systems to use the non-emergency numbers to contact the PSAP.

At about 10:00 a.m., the Virginia Communications Coordinator ("VCC") contacted the Prince William PSAP to see if it was having a problem. The VCC then contacted the FCC Operations Center, which also contacted Prince William County. A half-hour later, at 10:30 a.m., Verizon's technical service manager contacted the PSAP to say Verizon was experiencing 9-1-1 problems and was working on the problems. Verizon tried unsuccessfully to reroute 9-1-1 calls to the Prince William County PSAP's administrative lines.

By the afternoon of June 30, the PSAP began receiving intermittent wireless calls, and by early morning on July 1, it received intermittent wireless and landline calls. Around 11:17 a.m. on July 1, the PSAP was processing most 9-1-1 calls, albeit without ANI or ALI. By early on July 2, Verizon had restored ANI and ALI.

5.4.3 City of Manassas

The City of Manassas, Virginia, has a population of approximately 38,000 and is surrounded completely by Prince William County. The Manassas PSAP is served by redundant selective routers and normally receives fifty to sixty 9-1-1 calls per day from wireline users. Wireless 9-1-1 calls generated from Manassas are normally processed by the Prince William County PSAP, which then routes them to Manassas if the caller needs police. Prince William County dispatches fire and other emergency personnel.

Representatives of the Manassas PSAP told the Bureau that on June 30 between 6:00 and 6:55 a.m., the Manassas PSAP realized it was not receiving 9-1-1 calls, and contacted Verizon to alert them to the outage. At about the same time, the Manassas PSAP received an e-mail from

[96] *Id.* at 3.

[97] Approximately 60 percent of these calls were wireless, and 40 percent were wireline.

Verizon stating that it was aware of the situation. Despite the 9-1-1 service outage, all non-9-1-1 landlines within the Manassas PSAP worked.

The Manassas PSAP requested that Verizon reroute 9-1-1 calls to the non-emergency lines, where they could get ANI but not ALI information. Verizon tried, but was unable to deliver 9-1-1 calls to the overflow lines or the administrative lines. Normally if there is a problem with overflow lines, calls to Manassas will reroute to Prince William County. However, Prince William County's lines were not restored until July 1. At that time, the Manassas PSAP's calls were rerouted to Prince William County. By July 1 between 7:00-8:00 p.m., PSAP trunks were partially restored at the Manassas PSAP, and by 9:00 a.m. on July 2, the Manassas PSAP was fully operational.

5.4.4 Manassas Park

Manassas Park has a population of about 15,000. The Manassas Park PSAP receives certain 9-1-1 calls and others go to or are sent by Manassas Park to PSAPs in either Prince William County or Fairfax County. The Manassas Park PSAP receives about 900 wireline 9-1-1 calls per month.

The Manassas Park PSAP told the Bureau that it realized that its 9-1-1 lines were not working on June 30, at 8:00 a.m., and attempted, unsuccessfully, to call Verizon for assistance. It was six hours before the Manassas Park PSAP finally reached Verizon to report the outage. According to PSAP officials, Verizon was unaware of the outage but agreed to try to reroute landline 9-1-1 calls to another PSAP. The Manassas Park PSAP informed Verizon that other Virginia PSAPs had problems as well.

On July 1 at 4:00 p.m., the PSAP rerouted 9-1-1 calls to Prince William County following an e-mail from Verizon stating that 9-1-1 calls to the Manassas City and Manassas Park PSAPs were still not getting through. On the afternoon of July 2, the PSAP routed 9-1-1 calls back to Manassas Park's administrative lines without ANI or ALI functionality. On July 3 at 12:15 p.m., Verizon fully restored 9-1-1 service to the Manassas Park PSAP. By July 6, Verizon confirmed that the 9-1-1 system was fully functional.

5.4.5 Arlington County

Arlington County has a population of approximately 213,000. The design of the Arlington County PSAP was based on state-of-the-art concepts, including redundant access "from two different exchanges, for purposes of diverse routing, to ensure 9-1-1 service even if one access route were severed or otherwise failed."[98] Consequently, Arlington County is "quite concerned that Verizon's commercial service failed despite these precautions and resulted in major telecom and network facility outages of extended duration."

[98] See *Ex parte* Letter from Joseph N. Pelton, Chair, Arlington County (Virginia) Information Technology Advisory Committee, to FCC Chairman Julius Genachowski (Sept. 5, 2012).

The Arlington County PSAP is served by redundant selective routers and has four ALI links to redundant ALI servers. During the derecho, both links to one ALI server and one of the links to the other failed. All three of these links passed through transport equipment in one Verizon central office. The Bureau believes that a diversity audit by Verizon of these ALI links may have revealed these diversity problems.

The Arlington County PSAP told the Bureau that while it never lost service completely, it experienced intermittent problems and made multiple test calls to 9-1-1 that did not go through. PSAP officials stated that on June 30 around 5:00 a.m., three of the PSAP's four ALI links and all of its administrative lines failed, although not necessarily simultaneously. Around 9:40 a.m., Verizon's Fairfax central office had failed, and that failure took down half of the Arlington County PSAP's 9-1-1 trunks. At the same time, the 9-1-1 trunks coming from a second selective router experienced intermittent problems but were always able to deliver some calls to the PSAP, which did not reroute calls to other jurisdictions. Although ten-digit administrative lines were back in service by July 1, the Arlington County PSAP could not receive 9-1-1 calls from Verizon Wireless customers for at least part of July 2. Verizon's service to the PSAP finally became stable on July 3.

5.4.6 Other PSAPs in Virginia Supported by Verizon

According to Verizon, in addition to the four PSAPs that experienced total 9-1-1 outages (*i.e.,* Fairfax and Prince William Counties, and Manassas City and Manassas Park), and the Arlington PSAP, which had substantial difficulties but to which 9-1-1 service was not completely lost, 9-1-1 service to twenty additional PSAPs partially failed. Most of these problems resulted from service disruptions in Verizon's network, although some were caused by power or CPE issues at the PSAP. Twelve of these PSAPs suffered ALI outages, and eight more experienced various other issues such as failure or partial failure of 9-1-1 trunks, problems with CPE, and power loss.

5.4.7 Albemarle County

The PSAP in Albemarle County, Virginia, which is served by CenturyLink, also was affected by the derecho. At least some 9-1-1 trunks to the Albemarle County PSAP experienced CAMA trunk throughput issues[99] discussed in a 2011 report by the ATIS/NRSC. [100] Recommendations in the ATIS/NRSC Report were widely communicated to industry, and CenturyLink was a member of the industry team that created them. The report provided detailed recommendations to prevent CAMA trunks from mistakenly being removed from service during mass call events. CenturyLink adopted the recommendation to provide more active monitoring of the network to identify service issues, but it chose not to implement the recommendation to consider changing the trunk busy percentage parameters in its selective router serving the Albemarle County PSAP to prevent trunks from being removed from service. Based on the

[99] *See supra*, note 85.

[100] *See supra,* note 31 and accompanying text.

experience of other providers that followed both of these recommendations, the Bureau believes that fewer 9-1-1 trunks would have been taken out of service and more 9-1-1 calls would have been received by the Albemarle County PSAP had CenturyLink taken additional actions as included in the ATIS/NRSC report. CenturyLink argues that the Bureau's conclusion does not account for the fact that changing the trunk busy percentage parameters increases the potential for other service-affecting issues to occur.

5.5 Effects on PSAPs in West Virginia

Of the fifty PSAPs in West Virginia served by Frontier, twenty-seven experienced adverse effects from the derecho.[101] Eleven West Virginia PSAPs lost 9-1-1 service completely for durations ranging from less than one hour to more than twelve hours, affecting approximately 400,000 residents. Other PSAPs lost ALI links or had to reroute 9-1-1 calls to administrative lines or PSAPs in other jurisdictions. In all, storm-related 9-1-1 issues potentially affected approximately 1.2 million West Virginia residents. Service to most of the affected PSAPs was fully restored by July 1, two days after the storm; however, two PSAPs had to reroute 9-1-1 calls for more than three days.

According to Frontier, "[t]he lack of commercial power was the predominant cause of PSAP interruptions, both because it affected Frontier's ability to provide communications services, and also because it affected the ability of the PSAPs to use their own equipment."[102] Problems with backup power to Frontier's network after commercial power outages led to service impacts at twelve West Virginia PSAPs.[103] Widespread commercial power outages forced 126 of Frontier's 230 wireline facilities in the state to run on generator power.[104] Frontier acknowledges, however, that "[g]enerator-use . . . was not a foolproof solution" and that "[i]n some instances back-up generators pre-placed in the Central Offices failed, which led to outages while Frontier replaced those generators."[105] Frontier's other PSAPs were affected by physical damage to the network, including one PSAP that lost service when a truck struck an aerial fiber which was hanging low because of the storm. Another PSAP served by Frontier experienced CAMA trunk throughput problems addressed in the ATIS/NRSC report described above.[106]

Eight of the twenty-seven affected PSAPs lost service because of issues at the PSAP itself rather than in Frontier's network. These issues included loss of power, lightning strikes, and failure of CPE. Although many PSAPs were able to operate on generator power and continue operations

[101] *See* Frontier Comments at 3-4.

[102] *Id.* at 4.

[103] *Id.* at 5.

[104] *Id.* at 2.

[105] *Id.* at 4.

[106] *See supra,* notes 31, 85, and accompanying text.

despite commercial power failures, backup generators at several PSAPs failed to start. As power was slowly restored, power surges created problems with CPE at some PSAPs, hindering Frontier's ability to reroute traffic. Staff members' personal cell phones were essential at several of the PSAPs. However, wireless service in several counties was down or was unreliable during the storm, adversely affecting the ability to seek 9-1-1 assistance in instances where customers relied on wireless phones to make emergency calls.

Frontier was delayed in repairing transport failures by a lack of monitoring access to damaged sites.[107] Frontier's NOC lost connectivity to a key monitoring circuit, which prevented it from communicating with the various networks in the area and remotely accessing selective routers to reroute calls to the PSAPs that were down due to storm damage. This circuit was the only way Frontier could directly monitor the status of network equipment in West Virginia from its NOC. Several days before the derecho, as part of a circuit rearrangement, Frontier had disconnected a redundant circuit that would have provided it an alternate way to monitor the network equipment in West Virginia. Apparently due to a miscommunication within Frontier, this circuit was not reconnected prior to the derecho and the only remaining circuit was lost during the storm, isolating the Frontier NOC from critical network assets in West Virginia. The NOC management system was fully restored two days after the storm.

Due to the loss of monitoring access, Frontier walked its on-site field technicians through the restoration process via phone. Where possible, Frontier used a front-end processor, which collects alarms and allows for remote access into the offices, to access the offices in West Virginia via dial-up. This technique also allowed Frontier to make the 9-1-1 translation changes necessary to reroute the calls for the PSAPs. Though this process worked, it was slower and more difficult to implement than using the direct monitoring that had failed.

Although most PSAPs we contacted have concerns about the overall 9-1-1 architecture in West Virginia, they generally were pleased with Frontier's responsiveness during the derecho. Nevertheless, the majority of the PSAPs made the initial call to Frontier to report their outages before Frontier initiated contact with the PSAP. This was mainly due to the fact that Frontier lost the ability to monitor its network in West Virginia, preventing it from seeing network alarms and disrupting its ability to perform reroutes of the 9-1-1 calls to the PSAPs.

5.6 Effects on PSAPs Outside of Virginia and West Virginia

Beyond its effects in Virginia and West Virginia, the derecho also disrupted communications to PSAPs in Ohio, New Jersey, Maryland, and Indiana, according to state regulators and our analysis of NORS data.

[107] *See* Frontier Comments at 5 (noting that "disruptions on Frontier's major transport facilities led to lost visibility and remote access to some parts of the network, which in turn resulted in communication impacts to some PSAPs").

5.6.1 Ohio

In Ohio, two PSAPs served by Frontier lost 9-1-1 service completely for durations ranging from three hours to twelve hours, affecting more than 13,000 residents. One PSAP was not receiving 9-1-1 calls because of a transport failure between the PSAP and a Frontier selective router. Another PSAP lost commercial power within the PSAP and went to battery backup immediately since it had no generator onsite. When the batteries were exhausted, the PSAP lost connectivity until commercial power was restored twelve hours later. Later that day, commercial power was again lost and, since the batteries had not had time to recharge, the PSAP did not receive 9-1-1 calls for another two hours.

CenturyLink also reported that the Warren County, Ohio, PSAP had CAMA trunk throughput problems,[108] resulting in diminished 9-1-1 call capacity. While CenturyLink adopted the recommendation to provide more active monitoring of the network to identify service issues, it chose not to implement the recommendation to change the trunk busy percentage parameters in the selective router serving the Warren County PSAP to prevent trunks from being removed from service – had it done so, it may have reduced the impact of that problem without causing other service-affecting issues.

Four Ohio PSAPs served by AT&T lost ALI for up to four days after commercial power failures disabled equipment in the network.

5.6.2 Maryland

According to the Maryland Emergency Number Systems Board, several Maryland PSAPs experienced communications issues during and after the derecho, although none appear to have impacted the public's ability to reach 9-1-1.[109] In Garrett County, for example, U.S. Cellular mistakenly routed a cellular trunk to a wireline 9-1-1 trunk, although this had no immediate impact on ALI or the public's ability to reach 9-1-1.[110] In Caroline County, wireless 9-1-1 calls were temporarily rerouted to another PSAP.[111] In Montgomery County, Verizon implemented a "mass call mitigation plan" that prevented CAMA trunk issues[112] from impacting 9-1-1 service during the derecho. The PSAP later discovered, however, that Verizon failed to return four 9-1-1 trunks to service for "several days after the storm,"[113] a condition that increased the probability that 9-1-1 calls would be lost. Verizon has since updated its

[108] *See supra,* notes 31, 85, and accompanying text.

[109] *See* Maryland Emergency Number Systems Board, *Derecho Storm – Maryland Interim Report* (Oct. 23, 2012) at 1 ("Maryland ENSB Report").

[110] *Id.*

[111] *Id.*

[112] *See supra,* note 85 and accompanying text.

[113] Maryland ENSB Report at 2.

procedures to ensure that all trunks are restored following mass call events before closing the associated trouble ticket.[114]

5.6.3 Other States

Some PSAPs in Indiana and New Jersey retained at least some 9-1-1 functionality but lost ALI links or had to reroute calls through other PSAPs. Most of these PSAPs cited commercial power outages as the cause of their problems, although some ALI equipment also failed. Partial disruptions in 9-1-1 service ranged from approximately one hour to more than four days. For example, one PSAP served by Frontier in Indiana lost ALI for almost an hour and a half, potentially affecting more than 73,000 people. In New Jersey, five PSAPs served by Verizon lost ALI for periods ranging from two hours to more than two days, while a sixth PSAP lost commercial power and rerouted calls to another PSAP.

6. The Derecho's Effects on Wireless Networks

Commercial wireless networks generally withstood the derecho much better than their wireline counterparts. Cell site outage rates during and after the storm varied by provider and jurisdiction, but were modest both in number and duration in comparison to other superstorms or hurricanes. That being said, wireless customers reported service problems and lost calls immediately after the storm,[115] and many likely suffered from cascading effects of wireline service outages. Yet, compared with our observations in other events of similar magnitude, impacts on service were not nearly as pervasive as might have been expected, and most outages were rectified relatively quickly.

Issues arose throughout the affected region as cell towers began to lose all sources of power (commercial, battery, generator) in the hours and days after the storm had dissipated. Generally, cell cites operate on batteries charged either by commercial power or, in some cases when commercial power fails, a backup generator. When commercial power fails and no generator is available, cell site operation depends on the life of the site's batteries as a backup power source. Depending on their battery and generator configurations, some wireless providers reported a majority of cell site outages caused by power failures at the site, while others reported more outages due to transport failures between cell sites and the rest of the network. In general, increased deployment of generators at cell sites reduces the probability of outages due to power loss.

The major wireless providers that serve the area most affected by the storm are the nation's four largest: Verizon Wireless, AT&T, Sprint, and T-Mobile. The Bureau sought information

[114] *Id.*

[115] *See* Sullivan, Patricia, *After Storm, 911, Phone Service Remains Spotty*, WASH. POST, July 2, 2012 (reporting that a Washington, D.C., resident's cell phone "dropped half a dozen calls" and could not receive text messages for several hours).

from each of these providers on the performance of their networks during and immediately after the storm, including information on battery backup systems implemented at cell sites.

Our analysis of the information we received shows that outages were most extensive on June 30, when roughly 10.8 percent of cell sites were out of service in the affected reporting area.[116] Hurricane Isaac, which hit the gulf coast in August, resulted in 21.8 percent of area cell sites out of service, and during Hurricane Gustav in 2008 that figure was 28.9 percent—with outages comparable to the worst of the derecho still lingering even four days after restoration efforts had begun. By contrast, only roughly 2 percent of cell sites in the derecho's affected area remained out of service as of July 3.

The comparatively favorable performance of wireless networks during the derecho as compared to other major storms, and the severe impacts of the wireline network issues on the basic functionality of 9-1-1 service, has led the Bureau to focus most (but not all) of its recommendations in this report on wireline network enhancements and other efforts to improve 9-1-1 service reliability. But the Commission's examination of the resiliency of wireless networks in the face of major storms will continue through field hearings planned for early 2013[117] and a series of other activities planned by the Bureau. As the Bureau collects information through these mechanisms, the Bureau may, as appropriate, recommend additional areas for the Commission to consider.

6.1 High-Level Snapshot of Wireless Network Effects

As previously noted, the percentage of cell sites unable to provide service as a result of the derecho reached 10.8 percent on June 30 but declined steadily thereafter. The most heavily affected jurisdictions were portions of West Virginia and Virginia, the jurisdictions that also experienced the most extensive wireline and 9-1-1 service disruptions.

[116] *See supra*, Section 2. The Bureau collected data from an area including six counties in West Virginia, seven jurisdictions in Virginia, eight jurisdictions in Maryland, and the District of Columbia.

[117] *See* Superstorm Sandy Field Hearings PN.

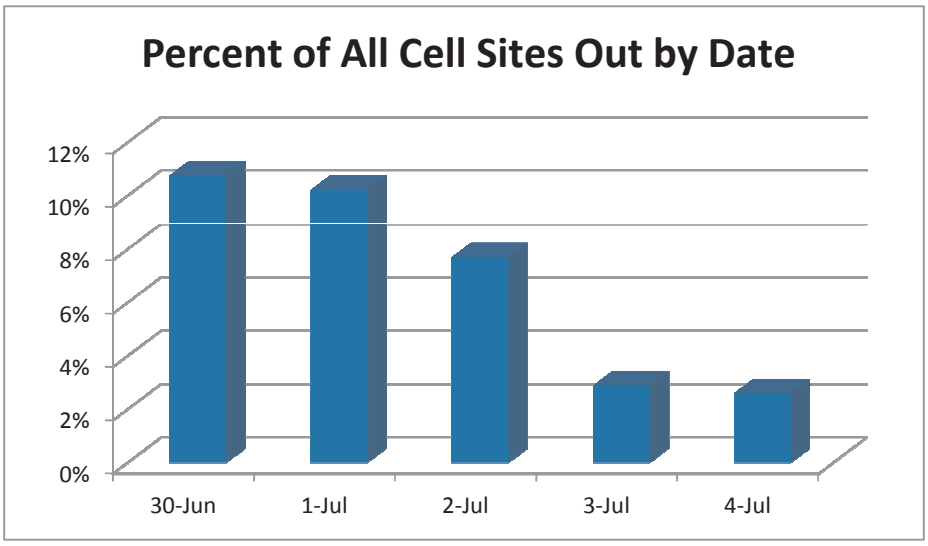

Figure 4: Percent Cell Sites Out by Date

Loss of power and failure of transport (*i.e.*, backhaul) facilities each accounted for approximately one-half of the overall site outages in the first days; physical damage to cell sites was a minimal factor.

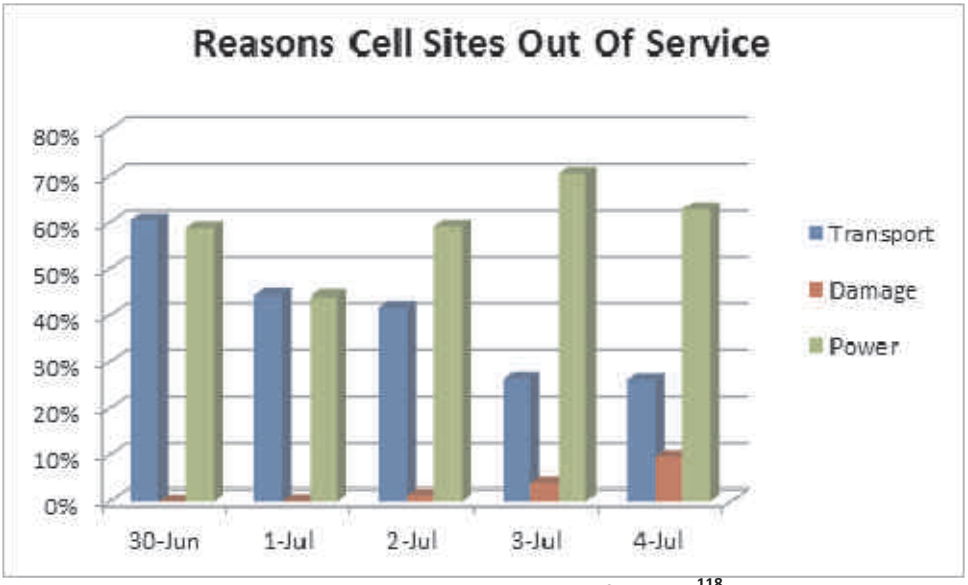

Figure 5: Reasons Cell Sites Out of Service[118]

6.2 Cell Site Battery Life

Batteries provide a critical source of backup power for cell sites. In the event that commercial power is unavailable, providers rely on other forms of power (generators and batteries) to keep

[118] This graph reflects the most common causes of cell site outages in the area affected by the derecho. In some cases, cell sites experienced unspecified problems or more than one problem simultaneously (*e.g.* power and transport failures). Thus, some daily percentages may be greater or less than 100 percent.

their systems operating. We note that most cell towers have backup battery power, ranging from several hours to a few days.

It appears that most of the major wireless providers do not retain records of or analyze the actual lifespan of their cell site batteries when they support the site during a loss of commercial or generator power, and thus were unable to provide the Bureau with usable data on battery life during the derecho. We understand that actual battery life depends on a number of factors, including the specifications of the battery, its age, whether it has been used previously without commercial or generator power, the extent of usage of the site it supports, and other factors. This collection and review of actual performance information as a tool in assessing how long batteries will likely last during a storm when relied on as the sole source of power for a cell site would be useful to know. But providers appear to lack this relevant data and cannot statistically analyze the information to estimate battery life and guide their maintenance strategies. It seems that providers should collect and analyze this information. The Bureau recommends further research, both within the Commission and by wireless providers, to better understand the many issues related to the lifespan of these vital batteries.

7. Recommendations

For many years, the Commission has worked with industry stakeholders to promote the implementation of industry-led best practices to ensure the availability and reliability of 9-1-1 communications. As a result of our inquiry following the derecho, it became apparent that service providers' implementation of best practices was neither as diligent nor consistent as needed, and the result was costly for 9-1-1 service. Consequently, in this section, the Bureau recommends consideration of specific action by the Commission to supplement the current best-practice approach in key areas. We also emphasize the need for providers to implement established best practices, and suggest how the Bureau can promote improved engineering through additional best practices to address apparent shortfalls. Finally, we encourage the continued implementation of NG9-1-1, which could lessen a future storm's impact on emergency communications.

7.1 Recommendations for Possible Commission Action

The Bureau recommends that the Commission consider action to ensure improved 9-1-1 circuit auditing, central office backup power, and diversity of monitor and control links. Each of these areas has already been addressed in vital CSRIC best practices, but it appears that service providers have not consistently or fully implemented those practices, and problems have resulted.[119] Consequently, the areas we suggest to the Commission include:

[119] In addition to information learned through this inquiry, the Bureau had already issued public notices that emphasized the need for compliance after it received information suggesting that providers may not have been following some relevant best practices. *See, e.g.,* FCC's Public Safety and Homeland Security Bureau Reminds Telecommunications Service Providers of Importance of Implementing Established 9-1-1 and Enhanced 9-1-1 Services Best Practices, *Public Notice*, DA 12-891, 27 FCC Rcd 6085 (PSHSB rel. June 6, 2012) ("June 2012 Best

- **9-1-1 Circuit Auditing:** Auditing should lead to fewer 9-1-1 outages and enhance the reliability of 9-1-1 communications. If providers do not regularly audit the physical routes of 9-1-1 circuits and ALI links, they will be ill-equipped to verify diversity and understand, avoid, or address instances where a single failure causes loss of all E9-1-1 circuits or all ALI links for a PSAP. The derecho and other experiences in recent years[120] call into question the extent to which providers are implementing these important audits. We believe the benefits of this recommendation will likely outweigh the 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. The burden would be modest because this obligation would apply only to a limited number of high-priority circuits rather than to the entire commercial wireline network. Nor would auditing necessarily encompass a requirement that providers diversify all circuits in areas that are particularly expensive.

- **Central Office Backup Power:** The derecho experience makes clear how important it is for the provision of emergency service and reliable and resilient communications to ensure that providers maintain robust, resilient backup power in central offices, supported by appropriate testing, maintenance, and records retention. As the Commission has recognized previously,[121] reliable central office backup power is essential for communications during large-scale emergencies. Failure of central office backup power during a commercial power outage can disable wireline communications for a community, including emergency communications. It is likely that the benefits of this recommendation will outweigh the costs, given the significant public-safety concerns and the limited number of central offices; moreover, providers most likely can comply affordably given that much of the needed infrastructure may already be in place.

- **Diversity of Monitor and Control Links:** The derecho makes clear how vital it is for a provider's network operations center to have diverse monitor and control links and capabilities throughout the network to ensure network reliability, resiliency, and rapid recovery. We believe the benefits of this recommendation will likely outweigh the costs due to the relatively small set of links involved in network monitoring and control, and the potentially serious impacts of a loss of these links. Some points at which these monitoring networks gain access to the equipment they monitor can become single points of failure,

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Practices Public Notice") (reminding telecommunications service providers of the "importance of providing diversity and redundancy in the provisioning of 9-1-1/E9-1-1 services"). *See also* FCC's Public Safety and Homeland Security Bureau Reminds Telecommunications Service Providers of Importance of Implementing Advisory Committee 9-1-1 and Enhanced 9-1-1 Services Best Practices, *Public Notice*, DA 10-494, 25 FCC Rcd 2805 (PSHSB rel. March 24, 2010) ("March 2010 Best Practices Public Notice") (noting that "the Bureau has observed a significant number of 911/E911 service outages caused by a lack of diversity that could have been avoided at little expense to the service provider").

[120] *See* June 2012 Best Practices Public Notice; March 2010 Best Practices Public Notice.

[121] *See, e.g.,* In the Matter of Reliability and Continuity of Communications Networks, Including Broadband Technologies, *et al., Notice of Inquiry*, PS Docket No. 11-60, *et al*., 26 FCC Rcd 5614 (2011).

but many can be fortified at modest cost. Only modest, but important, changes from existing practices may be required.

- **Revised PSAP Notification Rule:** Section 4.9 of the Commission's rules[122] requires that providers suffering an outage of facilities that potentially affect a PSAP must notify the PSAP as soon as possible. The Commission should consider stating what is expected of providers with more specificity, including, for example, methods of notification and a minimum level of detail in the information provided to PSAPs. Such clarification may improve compliance and result in greater situational awareness for PSAPs.

7.2 Diligent Implementation of Best Practices

Over the years, the FCC has worked with industry stakeholders to promote development and implementation of best practices, and we expect this process to continue. The CSRIC best practices have been developed on the basis of widespread industry participation. This creates a strong presumption that providers would be inclined to implement them—particularly those recommendations that are deemed most vital. Still, many providers failed to implement crucial best practices throughout the area affected by the derecho, which includes the densely populated National Capital Region. We call on providers again to review and implement CSRIC and other best practices and emphasize the importance of doing so. **The 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.**

The Bureau's inquiry revealed multiple failures to implement CSRIC best practices including:

- Network operators, service providers and property managers with buildings serviced by more than one emergency generator, should design, install and maintain each generator as a standalone unit that is not dependent on the operation of another generator for proper functioning, including fuel supply path. (**CSRIC best practice 8-7-5281)**

- Network operators, service providers and property managers should exercise power generators on a routine schedule in accordance with manufacturer's specifications. For example, a monthly one-hour engine run on load, and a five-hour annual run. **(CSRIC best practice 8-7-0662)**

- Network operators, service providers and property managers should design standby generator systems for fully automatic operation and for ease of manual operation, when required. **(CSRIC best practice 8-7-0657)**

- Network operators, service providers, equipment suppliers and property managers should ensure that all critical infrastructure facilities, including the security equipment,

[122] *See* 47 C.F.R. § 4.9.

devices and appliances protecting it, are supported by backup power systems (*e.g.*, batteries, generators, fuel cells). **(CSRIC best practice 8-7-5058)**

- Network operators should periodically audit the physical and logical diversity called for by network design and take appropriate measures as needed. **(CSRIC best practice 8-7-0532)**

7.2.1 Actions by CSRIC

The Bureau recommends charging CSRIC with the development and modification of solutions with respect to certain issues, such as low voltage effects, that are addressed in this report but are not covered by the Bureau's recommendations for consideration of Commission action. The Bureau also recommends that CSRIC consider adopting additional best practices consistent with sound engineering practices identified in this report. Finally, the Bureau may discuss with CSRIC ways to increase the adoption and effective implementation of best practices. As a result of the information already available in the aftermath of the derecho, the Bureau recommends asking CSRIC to address these issues at the earliest opportunity.

7.3 Recommendations for PSAP Action

Our meetings with PSAPs also produced constructive recommendations to ensure 9-1-1 remains in service during future storms. Although PSAPs were not responsible for the widespread breakdown of emergency communications during the derecho,[123] the Bureau recommends that to the extent not already done, they take this opportunity to consider several proactive improvements.

Recommendations:

- **PSAPs should have several different means of communication available, such as mobile phones from different providers, to provide as many alternate means as possible of communicating during an emergency.** Some PSAPs may already follow this recommendation, and others that do not could implement it immediately.

- **As many do already, PSAPs should have multiple means of backup power, such as multiple generators, and run periodic tests under actual load.** Where not already in place, PSAPs should consider installing a simple disconnect switch to permit taking out one generator and installing another.

[123] *See* MWCOG Report at 19 (finding that "[b]y all indications during this event, the systems and processes in place by the public safety agencies in the COG region, operated as designed, and the 9-1-1 centers were fully prepared to provide service to the public," but encouraging PSAPs "to perform a full assessment of their current 9-1-1 systems and operations to assure reliability and continuity of 9-1-1 service").

- **Several PSAPs left reroutes in place for longer than necessary after the derecho.**[124] In some cases, after the E9-1-1 trunks into a PSAP fail, the PSAP will attempt to activate a reroute, only to discover that the backup route is also out of service. In such instances it is impossible to predict whether the provider will restore the original route or the backup route first. When the provider restores either route, it should notify the PSAP; however, in some cases the provider may not notify the PSAP and may not even realize that it has restored a route used for emergency calls. In other instances the provider may believe that it has restored a route even though problems remain on that route. **Therefore, even if the PSAP is not notified, after a few hours, it should consider deactivating the reroute, then reactivate it a few hours later, and repeat until service is restored or until it is notified about a working route by the provider.** This recommendation could be implemented immediately whenever reroutes are necessary.

7.3.1 PSAP Voluntary Reporting to the FCC

Under NORS and DIRS, the Commission currently is informed by network providers of outages meeting specified criteria that adversely impact PSAPs. The Bureau also has frequently engaged in outreach to PSAPs in disasters, particularly PSAPs identified as having been adversely impacted, to hear directly about their status. In some instances, including after the derecho, PSAPS have contacted the Bureau directly to advise us of issues that they are facing. There currently is no specific channel or template for PSAPs who may voluntarily wish to report information to the Commission, and thus provide a direct source of information on their status. We are consulting with public safety organizations, and plan to work on a voluntary basis with PSAPs to establish a standardized format and channel that they can use, if they choose, to report network concerns directly to the Commission.

7.4 NG9-1-1 Implementation

NG9-1-1 relies on IP-based architecture rather than the PSTN-based architecture of legacy 9-1-1 to provide an expanded array of emergency communications services that encompasses both the core functionalities of legacy 9-1-1 and additional functionalities that take advantage of the enhanced capabilities of IP-based devices and networks.[125] While this report focuses on recommendations for improving the reliability of existing E9-1-1 systems, we note that NG 9-1-1 architecture offers certain advantages over legacy technologies, including greater redundancy and reliability,[126] the ability to provide more useful information for first responders, wider

[124] *See* Verizon Public Report at 6 (noting that certain PSAPs "would have been better off [not rerouting calls], but without the appropriate information, they were unable to make that determination at the time").

[125] For an overview of NG9-1-1 architecture, s*ee* Framework for Next Generation 911 Deployment, PS Docket No. 10-255, *Notice of Inquiry*, 25 FCC Rcd 17869, 17877-80, ¶¶ 18-26 (2010) ("*NG9-1-1 NOI"*).

[126] As described in the *NG9-1-1 NOI*, NG9-1-1's use of IP-based architecture provides far more routing options than legacy circuit-switched architecture because it is not constrained by the location of the caller or the nearest PSAP to the caller. For example, in circuit-switched networks, selective routers must be relatively close to the PSAPs they serve, whereas in NG9-1-1, 9-1-1 traffic can be easily rerouted to servers and locations outside the affected

public accessibility (including to those with disabilities), and enhanced capabilities for sharing data and resources among emergency responders.[127] Had these NG9-1-1 architectures and capabilities been in place in the affected areas, they likely could have significantly lessened the derecho's impact on emergency communications. Below, we summarize some of the most notable potential benefits of implementing NG9-1-1. The Commission should encourage jurisdictions that implement NG9-1-1 to take advantage of these and other capabilities.

- NG9-1-1 routers are being designed to handle fail-over automatically, which would eliminate the need for manually activating and sometimes manually de-activating reroutes. While NG9-1-1 has yet to be widely implemented, its ultimate deployment would likely have helped to avoid or mitigate some derecho-related issues at PSAPs that lost connectivity.

- With E9-1-1, the PSAP generally needs to rely on E9-1-1 trunks and ALI links provided by the ILEC. With NG9-1-1, the PSAP can obtain and combine links from a variety of providers. Typically, at least five diverse IP access link options are available at most PSAP locations: ILEC services; DOCSIS-based[128] services provided by the local multiple systems operator; fixed wireless or line-of-sight laser to large institutions, such as a university, hospital, other government agency or multi-tenant office building, located within about a two-mile radius; one or more 4G (LTE) offerings; and satellite. Large PSAPs can also add their own dark fiber providers for additional physical diversity. Thus, it is generally possible for PSAPs to improve access reliability. We encourage PSAPs to take advantage of increased access diversity opportunities when they implement NG9-1-1; we note that we also have seen NG9-1-1 designs where PSAPs fail to do this and instead depend on just one access link from the ILEC rather than diverse links from diverse providers.

- Calls on NG9-1-1 systems can be rerouted, both partially and completely, to any number of backup PSAPs, including out-of-area PSAPs.

- NG9-1-1 service logic (*e.g.,* call routing, databases) can be housed in professionally-managed data centers which may be more reliable than ILEC central offices and/or data centers.

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area, providing more resiliency and redundancy in disaster situations. *See NG9-1-1 NOI*, 25 FCC Rcd at 17880-81, ¶¶ 26, 29.

[127] *See id.*, 25 FCC Rcd at 17878-79, ¶¶ 21-25.

[128] Data Over Cable Service Interface Specification ("DOCSIS") is an international telecommunications standard that permits the addition of high-speed data transfer to an existing cable TV system. It is employed by many cable television operators to provide Internet access over existing hybrid fiber-coaxial infrastructure. *See* DOCSIS, Wikipedia, http://en.wikipedia.org/wiki/DOCSIS.

- With NG9-1-1, wireless, VoIP and landline providers can connect their 9-1-1 systems to several networks, at multiple locations, rather than all going through the ILEC selective router as with the current system. This would improve reliability for customers and PSAPs that today depend on only one selective router or one route between the PSAP and both routers.

- With NG9-1-1, network monitoring becomes easier and less subject to single points of failure. For example, servers can "ping" other servers and "traceroute" can identify out-of-order network segments.

8. Conclusion

The June 2012 derecho that affected so much of the central and Mid-Atlantic regions of the United States was unusual in that it hit with very little warning, leaving both communications providers and the public little time to prepare. As such, the storm tested the readiness and day-to-day reliability of a large portion of the Nation's critical communications infrastructure. The effects of the storm revealed considerable flaws in system design, personnel management, policies, and procedures of the primary providers of the 9-1-1 networks in the affected region.

The storm also revealed that the major wireline providers serving the affected region had not fully implemented best practices and industry-developed solutions relating to backup power, 9-1-1 circuit diversity, and 9-1-1 trunk design – issues with a direct link to the loss of 9-1-1 service after the Derecho. Accordingly, the Bureau recommends that the Commission, while continuing to promote use of vital best practices, consider taking additional action to ensure the reliability of the communications infrastructure, especially with respect to 9-1-1 service.

Appendix A: Preliminary Findings from Virginia State Corporation Commission

The Virginia State Corporation Commission Staff Report of Preliminary Findings released September 14, 2012, announced numerous findings consistent with this report and helpful to the Bureau in its inquiry. Below, we include selected findings by the SCC regarding 9-1-1 failures in Virginia:[129]

- Verizon was the only LEC in Virginia that experienced significant 9-1-1 service problems following the June 29 Derecho.

- The total loss of 9-1-1 capabilities to the Prince William County, Fairfax County, Manassas, and Manassas Park PSAPs was an extremely serious event and it is very fortunate that there were not catastrophic consequences to any citizens in Northern Virginia.

- The Prince William County, Fairfax County, Manassas, and Manassas Park PSAPs were fully prepared to respond to the June 29 Derecho and were not responsible for the 9-1-1 - service failures.

- The cause of the 9-1-1 service outages in Northern Virginia from the June 29 Derecho began with the failure of two backup generators that did not start automatically when commercial power was lost. Specifically, a generator in each of Verizon's Arlington and Fairfax central offices did not start.

- A review of the maintenance logs for the backup generators in the Arlington and Fairfax central offices shows a lack of compliance with Verizon's maintenance and testing procedures.

- The generator that failed to start in the Arlington office did not start during routine testing conducted two days before the June 29 Derecho. The maintenance log indicated that work to the generator was needed. Verizon confirmed with the FCC that this information is correct; the generator did fail the test two days before the storm.

[129] *See* Virginia SCC Report at 7-10.

- A total of nine generators (out of 136) failed to operate properly during the commercial power outages from the June 29 Derecho in Verizon's Mid-Atlantic region.

- The scope of 9-1-1 problems went well beyond the calling areas served by the Arlington and Fairfax central offices.

- ALI is an important component of 9-1-1 service. The lack of delivery of ALI to many PSAPs could have put citizens across Virginia at greater risk.

- The initial battery on discharge ("BOD") alarm 13 for the Fairfax central office was sent to the National Power Network Operation Center ("NPNOC") at 10:29 PM on June 29, 2012 when the one generator failed to start. Under Verizon's procedures, any BOD alarm should have been seen as a critical power alarm requiring immediate action. However, according to Verizon, this alarm was incorrectly categorized as a major power alarm condition when sent to the NPNOC.

- The Regional Network Center ("RNC") received a repair ticket (identified as a major alarm as mentioned above) from the NPNOC for the Fairfax central office at 10:32 PM on June 29, 2012. At that time, and on the morning of June 30, the RNC was only working critical alarms and a power technician was not dispatched to the office until after the backup batteries had drained completely.

- The telemetry system (alarm monitoring) in the Arlington central office was only supported by the Uninterruptible Power Supply ("UPS") (*i.e.,* battery power source) which was designed with a 30 minute reserve. The UPS failed at 11:23 PM on June 29, 2012.

- The very early failure of the telemetry system resulted in Verizon being unable to receive further alarms and remotely access its switches to monitor, test, or reroute traffic to 34 sites in the area. Verizon's inability to monitor its facilities and network in the Northern Virginia area significantly impacted the restoral process from the June 29 Derecho.

- The delay in identifying and repairing the critical conditions in the Fairfax and Arlington offices resulted in unnecessary

damage to Verizon's network and extended the 9-1-1 problems and outages. There were hundreds of damaged or impacted pieces of equipment in those two offices (i.e., circuit cards and digital cross connects).

- The loss of the transport systems in the Arlington and Fairfax central offices was profound and collectively resulted in 17 switches becoming SS7 isolated, and therefore incapable of completing (originating or terminating) any interoffice local, long distance, or 9-1-1 emergency calls. The loss of those transport systems was also responsible for the loss of ALI to the PSAPs. 9 Verizon did not activate its emergency Area Control Center located in Maryland until 10 AM on June 30, 2012.

- Verizon did not always provide sufficient, accurate, or timely communications to the affected PSAPs regarding its 9-1-1 problems and outages following the June 29 Derecho.

- Some battery reserves supporting major equipment systems in the Arlington (other than telemetry) and Fairfax central offices were depleted within approximately 3 to 5 hours. In addition, some equipment in those offices failed even before the batteries exhausted because of sensitivity to low voltage conditions.

- In many instances, Verizon's workforce was not timely dispatched, prepared, or trained to recognize or correct the critical conditions from the June 29 Derecho.

- Verizon is making progress in implementing its corrective action plan, however, at this time, not all items have been fully defined or timelines determined.

Appendix B: Recommendations of the Metropolitan Washington Council of Governments

In July 2012, 9-1-1 directors in the MWCOG region (including City of Alexandria, Arlington County, Fairfax County, Prince William County and Stafford County) agreed on five immediate recommendations to Verizon based on their experience during the derecho. All of these recommendations, which are listed below, have been accepted by Verizon and are in "various stages of completion," according to MWCOG.[130]

1. Verizon adopt, embrace, instruct, train and utilize the National Incident Management System (NIMS) model, to address and mitigate any and all significant events/incidents impacting providing 9-1-1 service to the aforementioned jurisdictions.

2. Verizon obtain and utilize a Reverse 9-1-1® type system to notify, via voice and text, those persons identified by the above jurisdictions, as soon it is known or suspected by Verizon that there is or may be an interruption of 9-1-1 service to any or all of the above jurisdictions. The immediately transmitted voice and text message should contain, in plain language, the nature of the problem, current or potential impact of the problem, what Verizon is doing to address the problem, recommend actions the impacted 9-1-1 center(s) should take and other appropriate information and include the name of the sender and the telephone number (business and mobile) at which the sender can be reached, and their email address.

3. Verizon work with the jurisdictions to develop, by no later than December 31, 2012, a method to semi-annually, conduct a drill/exercise with each jurisdiction on actions to be taken by Verizon and the impacted jurisdiction(s) in the event of a potential or actual 9-1-1 outage.

4. Verizon provide the above jurisdictions, during the first week of each month, a current contact list; beginning with the name and contact information (email, business telephone number, business mobile telephone number and any other appropriate information) for the Verizon account manager assigned to the jurisdiction and four immediately escalating Verizon personnel up to a Vice President level.

[130] *See* MWCOG Report at 18.

5. Verizon, if/when requested by any of the above jurisdictions, have a Verizon representative with authority to act/react; respond to and to be present at the jurisdictions Emergency Operations Center (EOC), to provide current accurate information concerning 9-1-1 service and outages, other telephone service, etc. and liaison with other parties staffing the EOC, when the EOC is activated.

On November 14, 2012, MWCOG released a preliminary report of its own findings and recommendations regarding 9-1-1 failures during the derecho. In addition to the initial recommendations noted above, the MWCOG Report calls for the following actions:[131]

1. Federal and State Regulatory Authorities should strongly encourage Verizon and other 9-1-1service providers to perform a comprehensive independent audit of **the entire** infrastructure, processes and procedures that support 9-1-1 service and related systems, to assure the reliability and continuity of 9-1-1 service under any circumstance. Based on the results of these audits, comprehensive plans and strategies should be developed to immediately resolve any findings. The results of these audits and resolution plans should be made available to the 9-1-1stakeholders.

2. It is highly recommended, that Verizon and other 9-1-1 service providers should provide subject matter expertise and make recommendations to the 9-1-1 centers and their stakeholders to assure reliability and continuity of 9-1-1 service. This should include, but not be limited to, network redundancy, 9-1-1 center equipment and systems, and best practices and procedures.

3. It is critical, that Verizon review their communications and public notification plans with each 9-1-1 center's communicators and/or Public Information Officers (PIO) regarding the dissemination of emergency messages (using both traditional and social media) to the public during 9-1-1 outages and update as needed. This process should also explore alternative methods to communicate with the public in case of widespread power and telephone outages. Verizon should coordinate with National Capital Region

[131] *See id*. at 17-19.

communicators/PIOs during any future outages, to inform and keep the public updated, and amplify the 9-1-1 center-specific public messages and information.

4. Verizon should keep the public informed of any service issues, the extent of the outage and time for resolution.

5. Federal and State Regulatory Authorities should evaluate the steps and actions of Verizon, related to this event, and the above audits, to ensure Verizon has adequately resolved all issues and continues to improve their processes and infrastructure to ensure reliability and continuity of 9-1-1 service.

6. COG members and localities should work with their State and Federal regulatory authorities and Legislators, as needed, to assure, through proper oversight, best practices and procedures by establishing service level agreements to ensure reliability and continuity of 9-1-1 service.

7. It is recommended that there be further investigation by State and Federal Regulators, on whether the 9-1-1 supporting infrastructure of other telecommunications providers other than Verizon, was also impacted by the Derecho. As an example, AT&T Wireless in their comments to FCC PS Docket No. 11-60, indicated there was some impact to their infrastructure during and after the Derecho.

The MWCOG Report noted that "[b]y all indications during this event, the systems and processes in place by the public safety agencies in the COG region, operated as designed, and the 9-1-1 centers were fully prepared to provide service to the public."[132] It did, however, make the following recommendations to state and local governments:[133]

1. State and local 9-1-1 authorities should be encouraged to perform a full assessment of their current 9-1-1 systems and operations to assure reliability and continuity of 9-1-1 service.

2. It is recommended that State and Federal regulatory authorities, review current laws and regulations related to 9-1-1 service, to assure it places emphasis and favors public

[132] *Id.* at 19.

[133] *Id.*

safety versus the 9-1-1 service providers or telecommunications providers. The interest of the public and public safety should come first over the interest of commercial providers.

3. State and local 9-1-1 authorities should work with their Legislators to ensure that the funding required to support the current 9-1-1 services and future Next Generation 9-1-1 are adequate and available, and that the fees and funds collected from the citizens of their States for 9-1-1 services are dedicated and used solely for the purpose as intended for the implementation, operation and maintenance of 9-1-1 emergency telephone services as required by the Enhance911 Act of 2004 (Pub. Law 108-494). In addition, the fees collected should be fairly and equally distributed to the 9-1-1 authorities.

Appendix C: Recommendations from PSAPs

During the preparation of this report, the Bureau interviewed personnel from twenty-eight PSAPs and considered public comments filed by several jurisdictions affected by the derecho. Several recurring themes emerged from these conversations, which are consistent with the Bureau's conclusions and recommendations in this report. Although PSAPs often suggested actions by communications providers to improve the reliability of the 9-1-1 network, they also identified areas for proactive action by PSAPs themselves. Below is a summary of the recommendations we received from PSAPs:

- Multiple Virginia PSAPs commented that Verizon needs to improve the circuit diversity and redundancy in its network to eliminate single points of failure. They also stated that Verizon should have more reliable backup power, including central-office backup generators that are properly maintained and tested regularly. Some PSAPs stated that Verizon should consider additional backup generators at critical points in the network, and that employees must be trained to manually restore critical equipment when automated systems fail. Fairfax County in particular asserted that Verizon could have avoided failures during the derecho by implementing CSRIC best practices and should perform an audit of its own operating procedures in relation to those best practices. [134]

- West Virginia PSAPs also called for improved redundancy and circuit diversity in Frontier's network. Some PSAPs asserted that Frontier should have backup generators at all points in the network affecting 9-1-1 service, or at least more portable generators available for remote locations.

- Several PSAPs recommended that PSAPs themselves should have redundant backup generators with enough fuel to last through a prolonged failure of commercial power. PSAPs in some locations recommended that staff members should maintain at least one traditional copper telephone connection and cell phones from a variety of wireless providers to ensure that some devices remain operational if other networks fail.

- PSAPs in both states requested better notification and communication from Verizon and Frontier when problems in their networks have a current or potential effect on 9-1-1 service. PSAPs stated that they should be informed directly of outages, including the specific areas affected, rather than having to infer problems from reroutes or changes in call patterns. They also suggested that providers should use a variety of communications platforms (*e.g.* telephone, text, e-mail) to ensure that PSAP personnel actually receive notifications. Some PSAPs also requested help from providers when notifying the public of 9-1-1 outages, including alternative numbers they can call for assistance until 9-1-1- is restored.

[134] *See* Fairfax County Comments at 22-23.

ORDER NO. 85013

IN THE MATTER OF THE ELECTRIC SERVICE INTERRUPTIONS IN THE STATE OF MARYLAND DUE TO THE JUNE 29, 2012 DERECHO STORM.	* * * * * * * *	BEFORE THE PUBLIC SERVICE COMMISSION OF MARYLAND _____ CASE NO. 9298 _____

Issued: July 6, 2012

To: Maryland Investor-Owned Electric Companies; Southern Maryland Electric Cooperative; Choptank Electric Cooperative; Office of People's Counsel; Technical Staff of the Maryland Public Service Commission; and Interested Persons

The Public Service Commission ("Commission") notes that the June 29, 2012 Derecho storm severely impacted electrical service to a significant portion of the State of Maryland beginning on June 29, 2012 and, in some instances, the lack of electrical service continues as of the date of this Order.

Pursuant to the Code of Maryland Regulations ("COMAR") 20.50.12.13, a utility is required to file a written report with the Commission within three weeks of the end of a major outage event.[1] Based on the definition of "major outage event" in this regulation, most of the electric utilities in the State had an interruption of service to a sufficient number of customers in each of their service territories to classify the outages resulting from the June 29, 2012 Derecho storm as a "major outage event." Accordingly, the

[1] "Major outage event" is defined as "an event during which: (a) Both: (i) More than 10 percent or 100,000, whichever is less, of the electric utility's Maryland customers experience a sustained interruption of electric service; and (ii) Restoration of electric service to these customers takes more than 24 hours; or (b) The federal, State, or local government declares an official state of emergency in the utility's service territory and the emergency involves interruption of electrical service." COMAR 20.50.01.03B(27).

Commission hereby directs that the Maryland Investor-Owned Utilities,[2] Southern Maryland Electric Cooperative, Inc., and Choptank Electric Cooperative, Inc., to the extent required by COMAR 20.50.12.13, submit an original and 17 paper copies, and an electronic copy, of a major outage event report pursuant to COMAR 20.50.12.13 to the Commission within three weeks after the end of this major outage event.[3]

The Commission will issue a separate notice to establish dates and locations for legislative-style and evening public hearings that the Commission may conduct in this matter.

IT IS THERFORE, this 6th day of July, in the year Two Thousand Twelve by the Public Service Commission of Maryland,

ORDERED: (1) That, within three weeks of the end of the major outage event in this matter, the utilities identified in this Order, to the extent applicable, shall each deliver to the Commission an original and 17 copies of a major outage event report pursuant to COMAR 20.50.12.13.

By Direction of the Commission,

/s/ David J. Collins

David J. Collins
Executive Secretary

[2] The Maryland Investor-Owned Utilities are: Baltimore Gas and Electric Company; Delmarva Power & Light Company; Potomac Electric Power Company; and The Potomac Edison Company.

[3] The reports shall be submitted to: the Executive Secretary, Maryland Public Service Commission, William Donald Schaefer Tower, 6 St. Paul Street, Baltimore, Maryland 21202. Five of the paper copies shall be three-hole punched. The public version of the electronic copy may be submitted via the Commission's "e-file" system, which can be accessed via the Commission's website, www.psc.state.md.us.

STATE OF MARYLAND

PUBLIC SERVICE COMMISSION

July 11, 2012

In the Matter of the Electric Service Interruptions in the State of Maryland due to the June 29, 2012 Derecho Storm.	* * * *	Case No. 9298

** *** **

NOTICE OF HEARINGS

Pursuant to Order No. 85013, issued July 6, 2012, the Maryland Public Service Commission ("Commission") will conduct legislative-style hearings on Thursday, September 13, 2012 and Friday, September 14, 2012 (if needed) to review the major outage event reports to be filed by the applicable electric distribution utilities pursuant to COMAR 20.15.12.13 to better understand the utilities' performance associated with the June 29, 2012 Derecho storm. The hearing on each day shall begin at 10:00 a.m. in the Commission's 16th Floor Hearing Room, William Donald Schaefer Tower, 6 St. Paul Street, Baltimore, Maryland 21202.

For the purpose of receiving public comment in this matter, the Commission is currently in the process of scheduling a total of eight evening public hearings to be held during August, 2012 in the service territories of Baltimore Gas and Electric Company, Potomac Electric Power Company, Potomac Edison Company, and Southern Maryland Electric Cooperative, Inc. The Commission will issue a separate notice identifying the dates and locations of such public evening hearings as soon as possible. In addition, written public comments in this proceeding may be submitted by September 10, 2012 to David J. Collins, Executive Secretary, Maryland Public Service Commission, William Donald Schaefer Tower, 6 St. Paul Street, 16th Floor, Baltimore, Maryland 21202.[1]

By Direction of the Commission,

/s/ David J. Collins

David J. Collins
Executive Secretary

[1] The Commission encourages participants to use the Commission's "e-Filing" system for electronic filing. Details of the "e-Filing" system are on the Commission's web page, www.psc.state.md.us.

WILLIAM DONALD SCHAEFER TOWER • 6 ST. PAUL STREET • BALTIMORE, MARYLAND 21202-6806

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STATE OF MARYLAND

PUBLIC SERVICE COMMISSION

July 19, 2012

IN THE MATTER OF THE ELECTRIC SERVICE INTERRUPTIONS IN THE STATE OF MARYLAND DUE TO THE JUNE 29, 2012 DERECHO STORM.	* * * * * * *	BEFORE THE PUBLIC SERVICE COMMISSION OF MARYLAND CASE NO. 9298

NOTICE OF EVENING HEARINGS FOR PUBLIC COMMENT

In response to major outages caused by the June 29, 2012 Derecho Storm, evening hearings for the purpose of receiving public comment on the performance of Baltimore Gas and Electric Company, Potomac Electric Power Company, The Potomac Edison Company and Southern Maryland Electric Cooperative, Inc. (each "Utility") have been scheduled as follows:

Potomac Electric Power Company

Tuesday, August 7, 2012 Beginning at 7:00 p.m.	-	Third Floor Large Hearing Room Montgomery County Office Building 100 Maryland Avenue Rockville, Maryland 20850
Wednesday, August 8, 2012 Beginning at 7:00 p.m.	-	Rennie Forum Prince George's Community College 301 Largo Road Largo, Maryland 20772

WILLIAM DONALD SCHAEFER TOWER • 6 ST. PAUL STREET • BALTIMORE, MARYLAND 21202-6806
410-767-8000 • Toll Free: 1-800-492-0474 • FAX: 410-333-6495
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Baltimore Gas and Electric Company

Monday, August 13, 2012 Beginning at 7:00 p.m.	-	Joint Hearing Room Legislative Services Building 90 State Circle Annapolis, Maryland 21401
Tuesday, August 14, 2012 Beginning at 7:00 p.m.	-	Paul C. Wolman Assembly Room War Memorial Building 101 N. Gay Street Baltimore, Maryland 21202
Wednesday, August 15, 2012 Beginning at 7:00 p.m.	-	Banneker Room George Howard Building 3430 Court House Drive Ellicott City, Maryland 21043
Thursday, August 16, 2012 Beginning at 7:00 p.m.	-	Hearing Room No. 106 Baltimore County Office Building 111 West Chesapeake Avenue Towson, Maryland 21202

Potomac Edison Company

Monday, August 20, 2012 Beginning at 7:00 p.m.	-	Winchester Hall 12 East Church Street Frederick, Maryland 21701

Southern Maryland Electric Cooperative, Inc.

Wednesday, August 22, 2012 Beginning at 7:00 p.m.	-	Commissioners Hearing Room Charles County Government Building 200 Baltimore Street La Plata, Maryland 20646

Each Utility is directed to: (1) cause a display advertisement to be published in a newspaper(s) of general circulation throughout its service area at least once two weeks prior to the hearing date(s) in its service area; and (2) place on its home page a notice of the evening hearings in a manner that a customer need not click on a link to determine the time, date, location and the purpose of the hearing.

Written public comments in this proceeding may also be submitted by September 10, 2012 to David J. Collins, Executive Secretary, Maryland Public Service Commission, William Donald Schaefer Tower, 6 St. Paul Street, 16th Floor, Baltimore, Maryland 21202.[1]

By Direction of the Commission,

Robert Cain
Assistant Executive Secretary

[1] The Commission encourages participants to use the Commission's "e-Filing" system for electronic filing. Details of the "e-Filing" system are on the Commission's web page, www.psc.state.md.us.

MARYLAND
9-1-1
EMERGENCY
NUMBER SYSTEMS BOARD

STATE OF MARYLAND

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Emergency Number Systems Board
115 Sudbrook Lane – Suite 201, Pikesville, Maryland 21208-4199
(410) 585-3015 • FAX (410) 764-4136 • www.dpscs.state.md.us/ensb/

October 23, 2012

Mr. David McMillion
Director, Department of Public Safety and Health
Metropolitan Washington Council of Governments
777 North Capitol Street, NE
Suite 300
Washington, DC 20002-4290

RE: Interim Report on the June 29, 2012 Derecho Storm Impact on 9-1-1 in Maryland

Dear Mr. McMillion:

Attached please find an interim report outlining the Maryland Emergency Number Systems Board's efforts to date relative to the June 29, 2012 Derecho storm. I am also attaching various items from the Maryland Public Service Commission's docket regarding its ongoing investigation into the Derecho Storm Electric Service Interruptions (Case No. 9298).

If you have any questions or require any additional information, please feel free to contact at (410) 585-3019.

Sincerely,

Gordon Deans, Executive Director
Emergency Numbers Systems Board

cc: Anthony Myers, Chair ENSB
ENSB Members (Electronic Distribution)

ORDER NO. 85385

IN THE MATTER OF THE ELECTRIC SERVICE INTERRUPTIONS IN THE STATE OF MARYLAND DUE TO THE JUNE 29, 2012 DERECHO STORM	* * * * * * *	BEFORE THE PUBLIC SERVICE COMMISSION OF MARYLAND CASE NO. 9298

Issued Date: February 27, 2013

On June 29, 2012 a Derecho[1] storm ("Derecho") hit the mid-Atlantic region, interrupting electrical service to a significant portion of the State of Maryland. In some instances, the electrical outages lasted more than eight (8) days. Even before all of the storm damage was repaired and service was restored to all customers, two things were immediately evident: *one*, the electric utility distribution infrastructure in Maryland, built up over the previous hundred years, is not resilient enough to withstand unscathed a storm the magnitude of the Derecho; and *two*, a public increasingly dependent on electricity to meet their daily needs is not satisfied with the vulnerability of the current infrastructure. Since mid-2010, the Public Service Commission has focused a great deal of attention on distribution system reliability and taken concrete steps to improve it, not least by adopting comprehensive new reliability regulations for Maryland's electric companies and closely reviewing the companies' performance in the wake of other

[1]A derecho (pronounced "deh-REY-cho") is "a widespread, long-lived wind storm that is associated with a band of rapidly moving showers or thunderstorms." The damage from a derecho is "typically in one direction along a relatively straight swath." A storm event may be classified as a derecho if the wind damage swatch extends more han 240 miles with wind gusts of at least 58 mph along most of its length. htttp://www.spc.noaa.gov/misc/AbtDerechos/derechofacts.htm

storms.[2] If we have learned anything from the Derecho, however, we have learned that there is more work to do.

In this proceeding, we review the performance of Baltimore Gas and Electric Company ("BGE"), Delmarva Power & Light Company ("Delmarva"), Potomac Electric Power Company ("Pepco") (Delmarva and Pepco together, as "PHI"), the Potomac Edison Company, ("Potomac Edison" or "PE"), Southern Maryland Electric Cooperative, Inc. ("SMECO"), and Choptank Electric Cooperative, Inc. ("Choptank") (collectively, "the Companies") in the hours leading up to, during, and in the aftermath of the Derecho storm. As we explain below, we direct the Companies to take certain actions now, to propose shorter term plans to improve the reliability of their systems further, to undertake detailed studies regarding their infrastructure and systems and conduct cost/benefit analyses of plans for more major transformations of Maryland's electric infrastructure into the future.

First, we find that nothing in the Companies' general preparedness or specific response to the Derecho gives rise by itself to violations of the Public Utilities Article or the Code of Maryland Regulations ("COMAR") that justifies further proceedings to consider civil penalties. We note, however, that the restoration performance standards contained in COMAR 20.50.12.11B are measured on an annual basis, not storm-by-storm. As the new Rulemaking 43 ("RM 43") regulations require, the Companies will be filing annual performance reports on or before April 1, 2013 that will contain, *inter alia*, service restoration requirement information and results for the entire year. Based on our

[2] See, e.g.: Case No 9240, *In the Matter of an Investigation into the Reliability and Quality of the Electric Distribution Service of Potomac Electric Power Company;* Case No. 9279, *In the Matter of the Electric Service Interruptions Due to Hurricane Irene in the State of Maryland Beginning August 27, 2011;* Rulemaking 43 ("RM 43"), *Service Supplied by Electric Companies – Proposed Reliability and Service Quality Standards.*

review of all of the Companies' annual performance reports, we will determine whether further action is justified based on the Companies' overall reliability performance for the year and, if appropriate, impose civil penalties pursuant to §13-201 of the Public Utilities Article, *Annotated Code of Maryland* ("PUA") for violations of COMAR 20.50.12 as reflected in the Companies' filings.

Second, we find that a significant and unsatisfactory disconnect exists between the public's expectations of distribution system reliability (and restoration efforts resulting from Major Outage Events), and the ability of the present-day electric distribution systems to meet those expectations. Based on the testimony at the hearings, we understand the Companies are taking incremental steps to improve reliability. Some of the Companies are studying selective hardening of their systems; at least one Company continues to perform limited undergrounding of distribution lines in locations where feasible. We have determined, however, that the Companies should make a number of further improvements in the shorter-term to improve reliability, and conduct a comprehensive study of long-term improvements to improve reliability to an even greater extent.

For the shorter term, we direct each Company to file, on or before May 31, 2013, plans outlining measures that could be completed in the next five (5) years to accelerate reliability improvements to its distribution system, along with a cost/benefit analysis for each measure. The Companies shall consider the recommendations of the Grid Resiliency Task Force ("Task Force") in conjunction with those plans, as further described within this Order.

For the longer term, and in parallel with the above, we direct each Company to undertake more detailed studies that will serve as a platform for further proceedings to consider the appropriate standards for distribution system resistance and resilience. We direct the Companies to perform, and to submit on or before August 30, 2013, detailed and comprehensive studies of their respective distribution systems to determine what infrastructure or operational investments would be needed in order to reduce the number and duration of service interruptions after a Major Outage Event to much lower levels and to determine the costs, both economic and environmental, of achieving a system that is sufficiently durable and resilient. Each Company is to assess how and in what locations, and what elements of its system may need to be enhanced or hardened to result in restoration of service following a Major Outage Event within a specified time frame to at least 95 percent of its customers, even for storms in which the total number of sustained interruptions is greater than 400,000 or 40% of the Company's total number of customers. These reports shall also include a comprehensive cost-benefit analysis that weighs the costs of improving the distribution system to the different levels of resilience against the costs to customers and our State, even with RM 43-compliant systems. These analyses will be submitted for review to an independent consultant funded by the Companies and selected by the Commission, who will present its findings and recommendations in a further proceeding during which we will determine whether our electric reliability regulations should be amended or enhanced.

Third, we find that the frequency of Major Outage Events and their impacts on customers require that a certain level of Major Outage Event data be included in the

SAIDI[3] and SAIFI[4] Service Quality and Reliability standards. Further, based on testimony at our public hearings concerning recurring outages in select areas, we find that requirements to remediate poorly performing feeders should be strengthened. Accordingly, we direct the Commission Staff to draft proposed regulations revising COMAR 20.50, Service Supplied by Electric Companies, Chapter 12, Service Quality and Reliability Standards, to include Major Outage Event data, and to strengthen the Poorest Performing Feeder standard.

Fourth, we direct each Company to perform a three-part analysis of its distribution system staffing: (1) an historical analysis; (2) a detailed analysis of personnel dispatched during the Derecho; and (3) an assessment of its Major Outage Event preparedness, based on current staffing levels. The detailed analysis of personnel dispatched during the Derecho should illuminate whether the Company had a sufficient number of appropriately trained personnel available to it, either through its own personnel, contractors, or through mutual assistance, or whether more - or differently equipped - personnel might have been able to safely restore service more quickly. As part of its overall analysis, each Company shall determine the number and qualifications of personnel that are required to restore service within a specified time frame to at least 95% of its customers, even after storms in which the total number of sustained interruptions is greater than 400,000 or 40% of the Company's total number of customers, *after* taking into account the impact of full implementation of Advanced Metering Infrastructure ("AMI") and RM 43 standards;

[3] "System-average interruption duration index" or "SAIDI" means the sum of the customer interruption hours divided by the total number of customers served.
[4] "System-average interruption frequency index" or "SAIFI" means the sum of the number of customer interruptions divided by the total number of customers served.

Fifth, we direct each of the Companies to submit, on or before March 29, 2013, a report on any improvements made to communications systems since the Derecho; and to submit, on or before May 31, 2013, a report on any further improvements planned and a timetable for completing such improvements;

Sixth, we find that following the Derecho, communication associated with special medical needs customers was inadequate, especially given the duration of the outages and the dearth of accurate estimated times of restoration ("ETRs"). We direct each of the Companies to participate in work group sessions with Commission Staff to gather from the appropriate State and local officials and emergency responders the information they need, and the method and format in which the information should be transmitted during emergencies; and to address legitimate concerns about customer privacy. Staff is to prepare a report containing its findings and recommendations from the work group sessions for submission to the Commission, which shall include any recommended changes to statutes or regulations and such information as how frequently Companies should update special medical needs customer information. Upon review and consideration of the Staff report, we will direct the Companies further with regard to the sharing of customer information with emergency management agencies and government agency responders during Major Outage Events; and

Seventh, we find that customers need to be able to more effectively plan their actions during outage events and that the ETRs provided by the Companies remain inadequate. The Companies need to get their best information out to their customers as soon as it is available, and it must be updated regularly. Accordingly, we direct Commission Staff to draft proposed regulations revising COMAR 20.50, Service

Supplied by Electric Companies, Chapter 12, Service Quality and Reliability Standards, to establish objective standards for ETRs, for review and comment by the parties.

The dates applicable to each of the above directives are set forth below as well as summarized in Attachment I to this Order.

I. OVERVIEW

As required by our regulations, the Companies filed Major Outage Event reports with the Commission beginning on July 24, 2012. Staff filed comments and reports on August 16 and September 10, 2012, respectively. OPC filed comments on September 11, 2012. Hundreds of written comments (nearly 800 hardcopy pages and nearly 800 emails) were also received by the Commission from the public and elected officials.[5]

The Commission held eight (8) evening public hearings in each of the Companies' territories to hear directly from customers about their personal experiences during and after the Derecho.[6] To our dismay, we heard concerns similar to those expressed in the aftermath of Hurricane Irene and other storms, including but not limited to, failures in Companies' communication systems and inaccurate estimated times of restoration ("ETRs").

The stress of living without electricity was worsened by the extreme heat in the days following the Derecho when the loss of air conditioning caused many to suffer greatly, especially the elderly and those with special medical conditions. Loss of food

[5] After the time for written comments to be filed and after our hearings were concluded, on October 3, 2012 the Office of the Governor filed the Report of the Grid Resiliency Task Force ("Task Force Report") in this case [Item No. 53]. Although we do not rely on the Task Force Report for any of our findings or conclusions in this case, we do note that the measures we order here track the Task Force Report's recommendations closely in many instances. We intend to consider the Task Force Report's recommendations in further proceedings in this matter, in future rulemakings and specific cases as they arise.

[6] In total, 164 people testified at the 8 evening public hearings.

and the burdens associated with relocating to hotels or other locations where service was available were prominent concerns for many. Fallen trees and downed wires presented grave public safety concerns, and people even expressed concern for their personal safety and the security of their homes because of the lack of functioning security systems. Customers testified about their difficulties in trying to report outages, as well as inaccurate automated messages received at inconvenient times of the day and night. Customers requested that internet and mobile web applications be more detailed so as to be useful. Comments received after the Derecho also included comments about the Bill Stabilization Adjustment ("BSA") to be reflected on customer bills; many people expressed that they should not have to pay for the distribution costs of electric service that they don't receive when power is out.[7]

II. RECENT OUTAGE AND RESTORATION DATA

The U.S. Department of Energy ("DOE") analyzed five Mid-Atlantic regional storms occurring over the past five years, including Hurricane Irene and the Derecho. In its report released in August 2012, the U.S. Department of Energy concluded that the Derecho was the worst major summer storm to affect utilities in several states over the past 5 years, measured by reported power outages.[8] DOE Staff compared the outages caused by the Derecho to four other major storms that hit Maryland over the past 2 years (2011 Hurricane Irene, January 2011 Snow Storm, July and August 2010 Thunderstorms, and 2010 "Snowmageddon"). The Derecho resulted in a peak customer outage of

[7] In response to these comments, we convened a hearing in Case Nos. 9257 – 9260 on the application of the BSA to major storms, in which we found, in Order 85177 and 85178, issued October 26, 2012, that the Companies will be disallowed from collecting any lost revenues due to Major Outage Events.

[8] *A Review of Power Outages and Restoration Following the June 2012 Derecho*, Infrastructure Security and Energy Restoration, Office of Electricity Delivery and Energy Reliability, U.S. Department of Energy, August 2012.

approximately 992,000 Statewide, which was almost 100,000 more outages than the second largest storm, Hurricane Irene.[9] A total of 854 poles and 807 distribution transformers had to be replaced due to the Derecho as compared with 790 poles and 591 distribution transformers after Hurricane Irene. As with Hurricane Irene, fallen trees or tree limbs interfering with overhead distribution lines were overwhelmingly the leading cause of power outages after the Derecho, accounting for approximately 32 million total interruption hours.[10]

The Major Outage Event reports filed by the Companies pursuant to COMAR 20.50.12.13B were to contain, among other things:

> (1) The total number of Maryland customers served by the Company;….
> (4) The total number of Maryland customers who experienced a sustained interruption of service related to the Major Outage Event;
> (5) The total number of customer interruption hours experienced by customers reported under §B(4);
> (6) The average duration of customer service interruption;
> (7) The maximum number of Maryland customers who concurrently experienced a sustained interruption; and
> (8) The number of Maryland customers who experienced a sustained interruption recorded at a maximum of 6-hour intervals throughout the Major Outage Event;

Of the Companies, Pepco, BGE and SMECO experienced the greatest percentages of customers affected at the peak at 77%, 35%, and 37%, respectively.[11] According to Pepco's Major Storm Report, Pepco has 534,601 Maryland customers, 410,679 of whom were without power at the peak (77%).[12] Pepco reported the total number of Maryland customers who experienced a sustained interruption under COMAR 20.50.12.13B as the

[9] *Comments of De Andre T. Wilson on Behalf of the Staff of the Public Service Commission of Maryland*, September 10, 2012.
[10] *Comments of De Andre T. Wilson on Behalf of the Staff of the Public Service Commission of Maryland*, September 10, 2012.
[11] *Comments of Chinyere J. Tucker on Behalf of the Staff of the Public Service Commission of Maryland*, September 10, 2012.
[12] Pepco's Major Storm Report dated July 30, 2012.

total number of Maryland customer outages - 786,766.[13] According to its Report, 24 hours after the Derecho, Pepco had 283,078 Maryland customers without power; 171,343 after 48 hours; 50,686 without power 4 days after the Derecho.[14] The average duration of a customer service interruption was 26 hours.[15]

While Pepco experienced double the number of outages after the Derecho as compared to Hurricane Irene, BGE had very similar numbers of outages with the Derecho as with Hurricane Irene. However, BGE's average customer outage duration was almost 1 day longer that Pepco's. According to its Major Outage Event Report, BGE's average customer outage duration was 37.5 hours.[16] BGE reported that a total of 762,781 customers experienced a sustained interruption of service;[17] 429,841 at the peak (35%). According to its Report, 24 hours after the Derecho BGE had 347,900 customers without power; 243,914 after 48 hours; 107,535 without power 4 days after the Derecho.[18]

According to SMECO's Major Storm Report, its average customer outage duration was 14.5 hours. SMECO reported that it serves approximately 151,800 customers; that a total of 83,250 customers experienced a sustained interruption; 56,424 at the peak (37%). According to its Report, 24 hours after the Derecho SMECO had approximately 20,000 outages; approximately 5,500 outages remained 48 hours after the Derecho.[19]

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[13] Some customers experienced more than one sustained interruption and were counted as additional outages.
[14] *Id.*
[15] *Id.*
[16] BGE's Major Outage Event Report, filed July 30, 2012.
[17] According to BGE's June Derecho Response presentation at the September hearings, BGE's figure of 762,781 customer interruptions includes not only outages related to the Derecho, but also outages related to subsequent heat-related events and thunderstorms in the week following the Derecho.
[18] *Id.*
[19] SMECO's Major Storm Report, filed July 24, 2012.

To the extent the figures reported under COMAR 20.50.12.13B(4) in the Companies' Major Outage Event Reports re-counted customers who experienced more than one sustained interruption following the Derecho, the Companies are directed to clarify their Derecho storm reporting in their Annual Performance Reports filed in accordance with COMAR 20.50.12.11 to breakout customer outages directly related to the Derecho versus outages related to subsequent events.

III. COMMISSION ACTION AND REGULATION

A. Historical Regulation of Reliability and Quality of Service

Until recently, the reliability of electric distribution systems in Maryland was governed by broad regulatory principles, but not specific, measurable reliability standards or requirements. Before 2011, electric reliability standards were defined in statute by the overarching obligation owed by all public service companies to customers to "furnish equipment, services and facilities that are safe, just, reasonable, economical, and efficient, considering the conservation of natural resources and the quality of the environment."[20] Pursuant to our authority to promulgate regulations "as necessary to carry out any law that relates to the Commission,"[21] we had long required Maryland's electric companies to operate their systems "in accordance with accepted good engineering practice in the electric industry,"[22] to follow relevant provisions of national safety and engineering codes,[23] to maintain written operation and maintenance procedures,[24] and to file various reports with us.[25]

[20] PUA § 5-303.
[21] PUA § 2-121; *see also* PUA §§ 2-112 and 2-113.
[22] COMAR 20.50.02.01.
[23] COMAR 20.50.02.02.
[24] COMAR 20.50.02.04.
[25] *See, e.g.*, COMAR 20.50.03.

Specific regulatory standards for electrical service quality had already been adopted for voltage requirements.[26] Since 2002, electric companies have been required to annually report their previous year's SAIDI and SAIFI.[27] We also required Major Outage Event Reports to be filed when sustained outages exceeded 10 percent of a company's customers or 100,000, whichever was less.[28] Reliability and restoration of service was governed by a set of requirements that: "[e]ach utility shall make reasonable efforts to avoid interruptions of service, but when interruptions occur, service shall be re-established within the shortest time practicable, consistent with safety."[29] This provided a guideline for, and the required reporting provided insight into, restoration performance of the Companies, as well as the challenges faced in restoring service after major events. However, we found our existing regulations did not go far enough to meet the Commission's obligation to ensure safe, adequate, and reasonable electric service to all ratepayers.

B. Rulemaking 43 - Regulations Establishing Objective Reliability Standards

In the course of reviewing the Companies' (primarily, but not exclusively, Pepco's) performance following the summer storms of 2010, we found that a gap existed between the Companies' and the public's expectations of "reasonable efforts to avoid interruptions" and "shortest [restoration] time practicable." Most notably, we found that Pepco's SAIDI and SAIFI figures ranked – and had ranked for a period of years – in the

[26] COMAR 20.50.07.02.
[27] COMAR 20.50.07.06 (Adoped effective April 15, 2002; repealed and re-adopted effective May 28, 2012 at COMAR 20.50.12.02).
[28] COMAR 20.50.07.07 (Adopted effective April 15, 2002; repealed and re-adopted effective May 28, 2012 at COMAR 20.50.12.13).
[29] COMAR 20.50.07.05.A.

bottom quartile of an industry-sponsored survey.[30] Pepco professed to not be happy about this ranking,[31] but testified to having only long-term plans that it hoped would improve reliability,[32] which did not rise, in our view, to the level of making "reasonable efforts to avoid interruptions of service." We learned in the evening hearings that a great many of Pepco's customers graded Pepco's efforts as poor, both in terms of its performance after those summer storms and more generally even during normal "blue sky" times of operation.[33]

Beyond the specific concerns the investigation revealed regarding Pepco – issues we addressed in Case No. 9240 – these revelations identified a more fundamental problem: our laws and regulations did not hold electric companies to an objective, let alone objectively high, standard of reliability performance. Accordingly, on January 12, 2011 we initiated Rulemaking 43 ("RM 43") – with a proposed set of new regulations – to remedy this problem by establishing concrete and objective reliability standards.

Shortly after rulemaking began, the General Assembly considered and ultimately passed the Maryland Electricity Service Quality and Reliability Act (the "Act"). The Act incorporated into statute the need for the same reliability-oriented regulations we were promulgating: regulations to implement specified service quality and reliability standards, including standards relating to service interruption, downed wire repair, service quality customer communications, vegetation management, periodic equipment inspections, and annual reliability reporting. The Act also increased the Commission's authority to impose

[30] Case No. 9240 August 17, 2010 Hearing Transcript, p. 34-38.
[31] Case No. 9240 August 17, 2010 Hearing Transcript, p. 145.
[32] Case No. 9240 August 17, 2010 Hearing Transcript, generally.
[33] See Case No. 9240 Order No. 84564, p. 6.

penalties from $10,000 per violation per day to $25,000 per violation per day.[34] Pursuant to the Act, we were directed to adopt regulations by July 1, 2012 that were cost-effective. We fulfilled this statutory directive by adopting the regulations under development through RM 43, and which became effective May 23, 2012. Thus, as the Derecho approached, we and the General Assembly had taken concrete, fundamental and critically important actions to improve the reliability of electricity delivery in Maryland.

It is important to note that the RM 43 regulations will take time to produce results. Moreover, even fully effectuated, these regulations cannot guarantee 100% reliability under all conditions, nor instantaneous restoration of interrupted service in all circumstances. As long as major storms such as hurricanes, snow storms and Derechos occur, we will continue to experience widespread outages. However, we are not satisfied that the duration, extent and experiences of the outages faced by Marylanders are at an acceptable level, and RM 43 may need to be reopened to address methods of achieving even greater reliability results. A necessary first step in planning any significant changes to electric infrastructure, in order to achieve greater reliability results, is a cost/benefit analysis of the multitude of improvements that might be considered.

IV. COMMISSION DIRECTIVES

A. Corrective Action Plans in Annual Performance Reports for 2012

Through RM 43 (newly enacted COMAR 20.50.12) we now have specific standards designed to improve reliability and to ensure an objectively high level of performance tailored to each Company. Pursuant to PUA §7-213(g) and COMAR

[34]However, the General Assembly rejected proposals that would have granted us the authority to order electric companies to compensate customers for consequential damages from power outages, such as lost food or other economic damages.

20.50.12.11B, the Companies will be filing annual performance reports on or before April 1, 2013 which contain, *inter alia*, service restoration requirement information and results. Service restoration requirements as set forth in COMAR 20.50.12.06 provide that:

> During each calendar year, a utility shall restore service within 50 hours, measured from when the utility knew or should have known of the outage to at least 95 percent of its customers experiencing sustained interruptions during Major Outage Events where the total number of sustained interruptions is less than or equal to 400,000 or 40 percent of the utility's total number of customers, whichever is less.

We will hold the Companies accountable under these standards. If a Company fails to satisfy these requirements, it must provide a corrective action plan in its annual performance report.

Based on the Major Outage Event reports filed in this case, for BGE, Pepco, and SMECO, the total number of sustained interruptions was more than the lesser of 400,000 customers or 40 percent of their total number of customers. Still, these Companies were required to restore service as quickly and safely as possible.[35] For Delmarva, PE, and Choptank, the percentage of customers still without power 50 hours after the Derecho will be used in the computation required under COMAR 20.50.12.06B.[36] According to its Major Storm Report, forty-eight (48) hours after the Derecho, PE still had 15,906 customer interruptions out of the maximum on June 29, 2012 at 11:58 pm of 60,209. As this reflects only a 74% restoration rate,[37] PE may be unable to meet the calendar year requirement set forth in COMAR 20.50.12.06B of restoration to at least 95% of its

[35] COMAR 20.50.12.06D.
[36] COMAR 20.50.12.06C.
[37] It is not clear what portion of the 15,906 customer interruptions, if any, were new interruptions, i.e., interruptions that did not exist at the peak but rather occurred as a result of subsequent events.

customers within 50 hours. Upon review of all of the Companies' annual performance reports, we will direct further action as necessary, and, if deemed appropriate, impose civil penalties pursuant to PUA §13-201 for violations of COMAR 20.50.12 as reflected in the Companies' filings.

B. Comprehensive Review of System and Technologies

We learned from BGE and Pepco testimony at the September 13-14, 2012 hearings that even if we were to take into account the benefit to the Companies of an advance warning of an impending storm, which the Derecho came without; if we were to apply the soon-to-be-realized benefits of Advanced Metering Infrastructure ("AMI"); and if the work required to meet the objective standards of RM 43 were complete, restoration of service after the Derecho would still have taken three to four days.[38] In contrast to this assessment, the message we heard at the public hearings was that outages of even 3-4 days are unacceptable - not to mention the 8 days that some customers endured. While some may still argue that we cannot predict whether the current trend toward an increased frequency and severity of major storm events will continue, we find that the reasonable approach to this phenomenon is to prepare as though it will. Since our existing electricity infrastructure is susceptible to outages lasting 3-4 days or longer even after taking into account measures that have been approved but not yet fully implemented, if no additional measures are adopted or undertaken, we can only expect customers to experience the same level of outages, and to express similar concerns after the next major storm event. We need to understand, in concrete and real terms, what it would take to enhance the

[38] Testimony of Stephen Woerner, BGE Chief Operating Officer, Transcript of September 13, 2012 hearing, p. 92; testimony of George Nelson, Pepco Vice President of Operations, Transcript of September 14, 2012 hearing, p. 116-117.

resistance and resilience of our Companies' distribution systems to reduce storm-related outages dramatically.

We depend on electricity in our daily lives for food storage, to provide home medical services, to heat and cool our homes, in some instances for water and indoor plumbing to operate, and to connect with the outside world. The use of technology has increased exponentially in our daily lives. Telephone service for more and more people is dependent on electricity; computers, modems, and handheld devices may have backup battery capacity but eventually require a power source. As this use of the various appliances and technologies has increased, perhaps without being fully aware of it, our dependence on electricity has also increased. Perhaps we have reached a point where an outage of more than 2 days is unacceptable, given our dependence on electricity. However, the desire to not be without power for more than 2 days and the desired reliance on minimally interrupted service in the face of all storms, regardless of severity, will undoubtedly come at a cost. In order to make a fully informed decision as to the actions to be taken to accomplish meaningful reductions in outage durations, we must first analyze the costs and benefits associated with the vastly upgraded systems required for resiliency against storms having the magnitude of the Derecho, and then assess whether those benefits are worth the associated costs, which ultimately the ratepayers will have to bear.

1. Shorter Term Enhancements

We believe there are a number of improvements the Companies could make in the shorter term to improve reliability. Thus, in parallel with studies of potential long-term enhancements as directed in the next section, the Companies shall review their respective

systems to determine what enhancements or hardening could be completed within five (5) years, and conduct a cost/benefit analysis of those shorter-term improvements. We direct the Companies to, no later than May 31, 2013, file plans outlining measures that could be completed to reduce the frequency and duration of outages in the next 5 years, along with a cost/benefit analysis for each measure.

On October 3, 2012, the Report of the Grid Resiliency Task Force ("Task Force Report") was docketed in this case [Item No. 53]. The Companies are directed to file comments on the Task Force Report in conjunction with filing the above plans. Comments should include, but not be limited to, an assessment of reliability work that is currently not scheduled but that could be accelerated and accomplished over the next two years, and the cost of accelerating four years' worth of RM 43 compliance into two years, as the Task Force Report recommends.[39] As part of their comments, the Companies should identify any engineering, personnel, contractor or other limitations associated with performing such work on an accelerated basis, as well as any State or federal regulatory barriers.

2. Comprehensive Long Term Assessment

Significant improvements to the reliability and resiliency of an entire electric distribution system will require long term planning as well as shorter term actions. Therefore, in addition to the shorter term plan, we direct the Companies to perform a

[39] The Task Force Report also recommends the Commission allow tracker cost recovery for some reliability investments and implement performance-based ratemaking. (Recommendations 3 & 4) Although we appreciate the Task Force Report's recommendations regarding surcharge recovery for incremental additional reliability spending, it is more appropriate to address questions of cost recovery in the context of specific proposals in a rate case, not in a vacuum. With regard to performance-based ratemaking, we order Staff to study and evaluate ratemaking principles and methodologies that would more directly and transparently align reliable service with the Companies' distribution rates granted, and that reduce returns or otherwise penalize sub-standard performance. Staff should report its findings by September 30, 2013.

comprehensive review of their respective systems to determine how the duration of outages after a Major Outage Event, even those affecting more than 40% or 400,000 customers, might be reduced to a level deemed acceptable by residential, business and industrial customers and the resulting costs. To be useful, this assessment must include a cost/benefit analysis and thus we also direct the Companies to estimate the economic and environmental costs of achieving a system that is sufficiently durable and resilient. Measures to be considered include, but should not be limited to, selective undergrounding, line relocation, and more aggressive tree trimming in certain locations.[40] The Companies' assessments should also include a review of available and emerging technologies that might be used for innovative solutions to outages, *e.g.*, additional automation technology on the distribution system to reroute power. The Companies shall assess the adequacy of their damage modeling and projections related to weather forecasts to see if advancements in these areas could improve restoration. Generation solutions that might be applied to distribution, *e.g.*, micro-grids with generators, should be considered.

Each Company is to assess how and in what locations, and what elements of its system may need to be enhanced or hardened to result in restoration of service to at least 95 percent of its customers, even for storms in which the total number of sustained interruptions is greater than 400,000 or 40% of the Company's total number of customers. As a frame of reference for the below chart, 410,679 of Pepco's Maryland customers were without power at the peak (77%), and 429,841 BGE customers were

[40] System hardening shall not be limited to a discussion of undergrounding. As we unfortunately learned from Superstorm Sandy recently, flooding of underground facilities presents another set of restoration challenges.

without power at the peak (35%). We direct each Company to determine what it would take in terms of system-wide enhancements to restore at least 95 percent of its customers within the time periods reflected in the chart after a storm in which 400,000 or 40% of its customers (whichever is less) experience sustained interruptions; after a storm in which 500,000 or 50% of its customers (whichever is less) experience sustained interruptions, and after a storm in which 600,000 or 75% of its customers (whichever is less) experience sustained interruptions.

Completion of the following chart in terms of dollars will serve as a guide from which we will quantitatively be able to assess the costs of varying system designs:

	95% Restored within a Specified Time			
Lesser of % / # Interruptions	**24 hours (1 day)**	**48 hours (2 days)**	**72 hours (3 days)**	**96 hours (4 days)**
40% / 400,000				
50% / 500,000				
75% / 600,000				

The Companies should also estimate the corresponding likely increase in electric rates for each rate class resulting from the above costs of system enhancement.

In addition to the costs of new technologies, modeling and system enhancements, which will necessarily be passed on to ratepayers, the Companies' cost/benefit analyses should include a discussion of the costs in terms of adverse environmental impacts associated with certain enhancements, such as undergrounding. Benefits shall include, but not be limited to, reduction (if any) in system maintenance and increased revenues due to fewer hours of customer service interruption. The Commission recently received

a grant from the National Association of Regulatory Utility Commissioners to procure the services of a consultant to quantify customer costs associated with power outages: potential personal property damage (food, medicines, electronics and appliances, home floods due to inoperative sump pumps); costs associated with not having electricity (relocation/hotel/restaurant costs); reduction in lost productivity and wages; and reduction in lost revenue to businesses. So as to not duplicate efforts, the benefits associated with customers not experiencing sustained outages, negating the aforementioned property damage, relocation, lost productivity, and other costs can thus be qualitatively summarized by the Companies; once the consultant's findings become available, the Companies can perform more complete quantitative analyses and supplement their cost-benefit analyses.

Each Company shall prepare a report detailing its system-wide assessment and associated cost-benefit analyses which will be submitted for review to an independent, Company-funded consultant selected by the Commission who will present its findings and recommendations in a further proceeding. The Commission will be issuing a Request for Proposals ("RFP") for the review of the Companies' reports from potential independent consultants. The Companies should be prepared to submit their reports to the Commission for review by the Commission's chosen independent consultant on or before August 30, 2013.

C. Revisions to COMAR 20.50.12 for Major Outage Events

As set forth in Section IV.A above, pursuant to newly enacted Service Quality and Reliability standards (COMAR 20.50.12), Companies are held to objective service restoration standards on an annual basis, not storm-by-storm. Currently, SAIDI and

SAIFI reliability standards exclude Major Outage Events such as the Derecho. We find that the frequency of Major Outage Events and their impact on customers require that a certain level of Major Outage Event data be included in the SAIDI and SAIFI Service Quality and Reliability standards. To this end, the Grid Resiliency Task Force has suggested several methodologies that should be considered. Additionally, at the public hearings we heard numerous customers express concern about recurring outages in select areas. We believe that requirements to remediate poorly performing feeders should be strengthened so that the effects of Major Outage Events do not repeatedly recur in select areas. Accordingly, we direct the Commission Staff to draft proposed regulations revising COMAR 20.50.12, to include Major Outage Event data in those standards. COMAR 20.50.12.03, Poorest Performing Feeder Standard, should also be revised, e.g., requiring more frequent evaluations, increasing the percentage for feeders reported, and/or shortening the time period for remediation, for review and comment by the parties.

D. Staffing Analysis

At the public hearings, and in written comments, the public expressed concerns as to whether the Companies have reduced their numbers of in-house personnel, perhaps the most needed, experienced line workers. Testimony regarding the use of mutual assistance crews revealed a seeming disparity in the numbers allocated to Maryland utilities versus other states. Lastly, the use of reserve personnel was suggested by AARP, Montgomery County and others as a means of cost-effectively reducing outage durations.

We direct the Companies to perform a three-part analysis of its distribution system staffing: (a) an historical analysis, (b) a detailed analysis of the utilization of specific personnel during the Derecho, and (c) an analysis of Major Outage Event

preparedness based on present staffing levels. The historical analysis of each company's staffing should include, but not be limited to: (i) an accounting of the number of distribution system personnel for each of the last fifteen years, broken down by function (at least as detailed as primary overhead line, secondary overhead line, damage assessment, tree trimming, and customer service), with delineations as to numbers of personnel by category (internal and supplemental personnel, contractors, and mutual assistance forces) to whom the Company had access during outage events; (ii) its maximum number of customers in each of those fifteen years; (iii) a summary of personnel, broken down by the same functions and categories, that were actually deployed during Major Outage Events occurring over the past two years; and (iv) storm restoration personnel costs for each of the major storm events identified in (iii).

The more detailed analysis of utilization of personnel during the Derecho should include, but not be limited to (i) an analysis of the average number of outages restored per field personnel, broken down by the nature of the outage and required task profiles (i.e., work required on the main feeder, secondary feeder, distribution line tree trimming, damage assessment, etc.); (ii) the number of field personnel (by job function, expertise, experience and training) required to restore outages based on the nature of the outage; and (iii) the various personnel actually utilized to restore outages based on the nature of the outage. As part of this analysis, the Companies should evaluate their use of field teams or "pods." This more detailed analysis should illuminate whether the Company had a sufficient number of appropriately trained personnel available to it, either through its own personnel, contractors, or through mutual assistance, or whether more or

differently equipped personnel might have been able to safely restore service more quickly.

As part of its comprehensive long term assessment, each Company shall determine the number and variety of distribution system personnel that are required to restore service to at least 95 percent of its customers, even for storms in which the total number of sustained interruptions is greater than 400,000 or 40% of the Company's total number of customers. As a point of reference, at the peak of the Derecho, 410,679 of Pepco's Maryland customers were without power (77%), and 429,841 BGE customers were without power (35%). We direct each Company to determine, after taking into account the impact of any fully executed AMI system and RM 43 standards, the number and variety of distribution system personnel that are required to restore service within the same time periods after storms of the same magnitude as reflected in the chart in section IV.B.1. The costs associated with the necessarily high level of staffing should be quantified separately, then used in completion of the chart in section IV.B. Also in conjunction with its system-wide study outlined in Section IV.B, each Company shall perform a cost/benefit analysis of employing or contracting additional personnel having certain levels of training/expertise as compared with utilizing mutual assistance crews, as well the costs/benefits of purchasing additional equipment and/or vehicles for use by mutual assistance crews. Companies should report on the number of personnel of varying types of expertise needed to achieve and then maintain the greatly enhanced systems envisioned for the future.

Additionally, as part of its staffing analysis report, each Company shall provide any and all documentation governing the procedures of Regional Mutual Assistance

Groups. In addition, each Company is directed to identify opportunities in which reserve workers might safely and effectively assist in the restoration effort in order to reduce the duration of outages after Major Outage Events such as in the reporting and guarding of downed wires.

The Commission will be issuing a RFP for the review of the Companies' staffing reports from potential independent consultants to be selected by us and funded by the Companies. The independent consultant will be requested to assess not only the staffing of the Companies, but also whether additional expertise is needed at the Commission, perhaps to increase our modeling capabilities for example. The Companies should be prepared to submit their reports to the Commission for review by the Commission's chosen independent consultant on or before August 30, 2013.

E. Communications Improvement Plans

The Companies' witnesses unanimously stated that communications is an area of needed improvement, and we agree. This includes communications with the public, with field personnel, and with government emergency management personnel. Enhancements are necessary in order to, among other things, provide a means for reporting downed wires without delay; eliminate inconsistencies between telephonic and website messages; improve outage maps on websites in order to communicate available and useful outage information in as much detail as is feasible (number of customers affected, time of first notification, and probable cause) without jeopardizing home security; provide timely and accurate information as to restoration efforts that are underway (crew status with status levels clearly defined and ETR) via telephone, mobile application and website; download applications for mobile access to information with

such information updated at a defined minimum interval; and incorporate dynamic notification capabilities into customer information systems such as alternate contact information during outages, and choice of notification method (phone/text/email) and preferred time of day of notification.

Some of the Companies may have already made improvements to their communication systems. Accordingly, we direct each of the Companies to submit, on or before March 29, 2013, a report on any improvements made to communications systems since the Derecho. To the extent further improvements are advisable, such as enhanced granularity of online outage mapping systems, mobile applications for handheld devices and smartphones, and similar improvements, the Companies are directed to submit, on or before May 31, 2013, a report on any further improvements planned and a timetable for completing implementation of such improvements.

F. Restoration Prioritization

In the aftermath of the Derecho, the issue of prioritization of restoration again arose as it has after previous Major Outage Events. However, with the Derecho, the storm was followed by days of extreme temperatures, exacerbating the already difficult circumstances of living without electricity. People with certain medical conditions suffered greatly, as did many elderly.

Pursuant to COMAR 20.50.12.12A., the utilities were required, within 60 days of the effective date thereof, to file Major Outage Event Plans which include Major Outage Event restoration priorities, including, but not limited to: (a) how the utility prioritizes restoration customers; and (b) how and when the utility communicates with customers that are identified as high priority due to medical needs for electricity and how it

schedules restoration actions for such customers. Beginning on August 8, 2012, the Companies filed their Major Outage Event Plans, which included a description of their restoration priorities. According to their Major Outage Event Reports, the Companies followed their restoration priority protocols as set forth in their Major Outage Event Plans. As to whether the Companies' restoration priorities are appropriate, we are unwilling to direct them to choose between one very deserving special needs customer and another for restoration priority. The larger and more appropriate concern, in our view, is to improve the overall restoration time *to all customers* by improving Maryland's electric distribution system to a greater restoration design level.

We find, however, that following the Derecho, communication associated with special medical needs customers was inadequate, especially given the duration of the outages and the dearth of accurate ETRs. We were disturbed by testimony and accounts of local officials that certain Companies were not willing or able to share information as to certified special medical needs customers experiencing a sustained interruption of electric service with emergency officials.[41] Companies must be able to identify customers in their customer information systems that have been certified as having a serious illness or the need for life support pursuant to COMAR 20.31.03.01, else Companies might be in danger of violating COMAR 20.31.03.01A.[42] The Companies are

[41] Howard County Executive Ken Ulman expressed, through a representative of his office, frustration with BGE's refusal to provide outage information so that public safety personnel could check on citizens; Stephen Woerner, BGE's Chief Operating Officer acknowledged that while BGE gave officials address ranges or blocks of where outages were going to last the longest, they did not give specific individual customer names and addresses or medical issues. This decision was based on a long-standing policy aimed at protecting customer privacy. Transcript of September 13, 2012 hearing, p. 190-192.

[42] Indeed, BGE indicates in its Major Outage Event Plan that it places "certified customers on a list for proactive communications prior to and during events which are expected to result in prolonged service disruptions." *BGE Major Outage Event Plan*, p. 55. PHI indicates in its Major Outage Event Plan that customers who rely on electricity to power life support equipment in their homes can be enrolled in its

therefore in a position to provide this information to emergency officials upon request. To the extent Companies interpret COMAR 20.53.07.02 as prohibiting them from disclosing the addresses of customers certified under COMAR 20.31.03.01B, we direct the Companies to take steps to obtain those customers' consent to disclose their names and addresses to emergency management agencies in the event of a sustained interruption of electric service.

Similarly, COMAR 20.31.03.02, Restrictions for Elderly or Handicapped Individuals, provides in §A that "[u]pon receiving notice from the customer that he or an occupant of the premises to which the service is going to be terminated is an elderly or handicapped individual, a Company may terminate service to that premises only in accordance with the provisions of this regulation." The Companies should thus also be maintaining a list of customers who have notified them that they or an occupant of the premises is an elderly or handicapped individual. In the interest of protecting the public, the Companies should then, upon request, provide a list of these customers[43] experiencing a sustained interruption of electric service to emergency management agencies and government emergency responders. Pursuant to COMAR 20.31.01.07 a customer can designate a third person to receive notices of termination of service. Although this regulation is applicable to terminations of service, not interruptions of service, it has a similar purpose – to notify an individual who might be in a position to assist the customer that the customer is in need of assistance.

Emergency Medical Equipment Notification Program to be provided with notification of scheduled outages and notification of severe storms that could lead to extended outages in the system.

[43] After having obtained their consent at the time of notification under COMAR 20.31.03.02A.

We find the record in this case to be insufficient with respect to the particular information emergency management personnel might seek from the Companies during emergencies, the format of that information, and the logistics of transmitting that information while safeguarding personal customer information. Commission Staff is directed to form a work group to gather from the appropriate State and local officials and emergency responders the information sought, and the method and format in which the information should be transmitted during emergencies, and to address legitimate concerns about customer privacy. Staff is to prepare a report containing its findings and recommendations from the work group sessions for submission to the Commission by September 30, 2013. Upon review and consideration of the Staff report, we will direct the Companies further with regard to the sharing of customer information with emergency management agencies and government agency responders during Major Outage Events.

Other than the certification renewal which occurs on an ad hoc basis, there may not be a means for updating the information the Companies maintain with regard to special medical needs customers. We therefore direct the Companies, in the work group sessions, to propose a means for verifying and updating their special medical needs customer information. Staff should include in its report a recommendation of how frequently the Companies are to update special medical needs customer information to ensure accuracy of addresses, telephone numbers, and designated third party contact information.

G. Regulation of Estimated Time of Restoration (ETRs)

The accuracy of ETRs, or lack thereof, was a frequent topic at the public hearings and in the written comments received by the Commission. ETRs were discussed in detail after Hurricane Irene last year. We directed the parties to convene a work group to evaluate standards for utilities when establishing ETRs. The work group conducted a survey of best practices within the electric transmission and distribution industry, only to learn that there is no industry-wide standard for ETRs.

ETRs, by their very definition, are estimates. Having no ETR is frustrating to people who are trying to plan their families' and businesses' activities in a crisis, but having an *inaccurate* ETR is equally a source of frustration. The implementation of a full-scale AMI infrastructure will certainly assist the Companies with formulating more timely and accurate ETRs. We acknowledge that without AMI, utilities cannot independently verify restoration of service and must rely on direct feedback from individual customers, which takes time and resources away from other critical restoration tasks. Field personnel may even spend time traveling to locations, only to find out that power has already been restored. If a customer has a smart meter, the utility can know immediately if that customer has been restored. Because AMI will greatly reduce the time spent verifying restoration of service, the Companies will be able to focus more on actual restoration and to communicate more accurate ETRs in a shorter timeframe.

However, given the degree of dissatisfaction with ETRs expressed by customers after the Derecho, we are not content to rely on AMI alone to fix such a significant problem. Perhaps communication of the estimate needs to use less precise language, or a range of time period which is specific enough to be useful, but broad enough to convey

its estimated nature, so that customers better understand that the ETR is an estimate. Regardless, the Companies need to get their best information out to their customers as soon as it is available, and it must be updated regularly. This is not currently being accomplished under the qualitative regulations in place, and so the time has come for us to impose more quantitative standards with respect to ETRs. Accordingly, we will direct Staff to draft proposed regulations under COMAR 20.50, Service Supplied by Electric Companies, Chapter 12, Service Quality and Reliability Standards, to establish objective standards for establishing and updating ETRs, for review and comment by the parties. These proposed regulations should set standards related to ETRs for Major Outage Events, including storms in which at least 40% or 400,000 customers experience sustained interruptions. The proposed standards should include, but not be limited to, the time periods allowed for establishment of global ETRs, for subsequent localized ETRs, for job level ETRs, and for revisions of each type of ETR.

IT IS, THEREFORE, this 27th day of February, in the year Two Thousand Thirteen,

ORDERED: (1) That on or before May 31, 2013, each Company shall file a plan outlining measures that could be completed in the next five years to accelerate reliability improvements to its distribution system, including a cost/benefit analysis for each measure, along with comments on the Report of the Grid Resiliency Task Force, as set forth in part IV(B) of this Order;

(2) That each Company shall perform a comprehensive review of its system as set forth in part IV(B) of this Order to assess how and in what locations, and what elements of its system may need to be enhanced or hardened to result in

restoration of service to at least 95 percent of its customers, even for storms in which the total number of sustained interruptions is at least 400,000 or 40% of the Company's total number of customers and file a report with the Commission on or before August 30, 2013;

(3) That by September 30, 2013, Commission Staff shall draft proposed regulations revising COMAR 20.50, Service Supplied by Electric Companies, Chapter 12, Service Quality and Reliability Standards, to include Major Outage Event data, and to strengthen the Poorest Performing Feeder standard, as set forth in part IV(C) of this Order;

(4) That each Company shall perform a three-part staffing analysis in accordance with part IV(D) of this Order and file a report with the Commission on or before August 30, 2013;

(5) That each Company shall submit, on or before March 29, 2013, a report on any improvements made to communications systems since the Derecho; and submit, on or before May 31, 2013, a report on any further improvements planned and a timetable for completing such improvements; as more fully described in part IV(E) of this Order;

(6) That each Company shall participate in work group sessions with Commission Staff to gather from the appropriate state and local officials and emergency responders the information they need, and the method and format in which the information should be transmitted during emergencies; and to address legitimate concerns about customer privacy, and Staff shall submit a report containing its findings and recommendations from the work group sessions, including how frequently

the Companies are to update special medial needs customer information, on or before September 30, 2013;

(7) That Commission Staff shall study and evaluate performance-based ratemaking principles and methodologies that would more directly and transparently align reliable service with the Companies' distribution rates and that reduce returns or otherwise penalize sub-standard performance, and report its findings on or before September 30, 2013; and

(8) That by September 30, 2013, Staff draft proposed regulations under COMAR 20.50, Service Supplied by Electric Companies, Chapter 12, Service Quality and Reliability Standards, to establish objective standards for estimated times of restoration ("ETRs").

/s/ W. Kevin Hughes

/s/ Harold D. Williams

/s/ Lawrence Brenner

/s/ Kelly Speakes-Backman

Commissioners

ATTACHMENT I

	Due Date
Report on improvements to communications systems	March 29, 2013
Report on planned improvements to communications systems, timetable	May 31, 2013
Shorter term plan, comments on Task Force Report	May 31, 2013
Longer term comprehensive report	August 30, 2013
Staffing analysis report	August 30, 2013
Work group sessions - emergency information	next several months
Staff report - findings/recommendations from work group sessions	September 30, 2013
Staff report - performance-based ratemaking	September 30, 2013
Staff - proposed COMAR revisions (Major Outage Event data and Poorest Performing Feeder Standard	September 30, 2013
Staff - proposed new COMAR provisions for ETRs	September 30, 2013

Emergency Number Systems Board

Derecho Storm - Maryland Interim Report

October 23, 2012

Introduction

On June 29, 2012, the State of Maryland was struck by a fast moving storm with high winds known as a Derecho. The storm rapidly moved through Maryland and other parts of the Mid-Atlantic Region, causing widespread damage and disruptions of public utilities. This report summarizes the efforts of Maryland's Emergency Number Systems Board (Board), working in cooperation with Maryland counties, to understand the impact of the storm and how to improve the resiliency and redundancy of Maryland's 9-1-1 system. The report examines issues that occurred in Maryland as well as those occurring in Northern Virginia due to 9-1-1 architecture similarities. Also outlined are the efforts of the Board and counties to work with Verizon to fashion intermediate and permanent solutions to issues that arose. This report further examines a series of procedures and policies that were implemented in Maryland over the past several years, in cooperation with Verizon, intended to mitigate outages and enhance service delivery.

County Impact

Following the storm, the Board queried each of Maryland's counties to determine if any county suffered outages or disruptions to their 9-1-1 operations. Of the twenty-four (24) counties, only four reported that they had issues during or immediately after the Derecho.

Garrett County reported that two (2) of thirty-two (32) US Cellular of Cumberland cellular trunks were routed to the county's wireline 9-1-1 trunks, rather than the wireless trunks. Verizon assisted the county in contacting US Cellular, and the issue was resolved. Verizon reports that there was no loss of Phase II automatic location information (ALI). There was no impact to the public's ability to reach 9-1-1 services.

Caroline County reported issues with their wireless 9-1-1 trunks, which caused their wireless 9-1-1 calls to be routed to Talbot County through a predefined back-up routing scheme. The county attempted to contact the Verizon Customer Care Center (CCC) but experienced longer than normal hold times resulting from a high volume of calls to the CCC. In response to previous trouble reporting issues, an escalation process was collectively developed by Verizon, Maryland counties, and the Board. Utilizing this procedure, the PSAP employee was able to reach the service manager for the region and open a trouble ticket. The problem was corrected following a restart of the Caroline County PSAP's phone system.

Montgomery County experienced a high volume of calls in a short period of time, also known as a "mass call event", as a result of this storm. During a mass call event, requests for available trunks occur so frequently that there is a "wink failure" between the telephone switch and available 9-1-1 trunks. As a result of the wink failure, the Verizon network automatically takes the trunk out of service under the belief that the trunk is compromised. This can become a cascading failure that disables all of the trunks. Following a similar event in 2011, the Board worked with Verizon to develop a "mass call mitigation" plan. This plan allows only one trunk in a group to be taken out of service automatically during a mass call event, so that there is no cascading failure of all the 9-1-1 trunks going to a PSAP. As a result of this previously established mitigation procedure, Montgomery County experienced little impact on their 9-1-1 services.

A deficiency was discovered with the mass call mitigation plan where there was no follow-up by Verizon to ensure that all trunks were returned to service subsequent to the mass call event. This was discovered by Montgomery County when they determined that four 9-1-1 trunks (each from a separate trunk group) remained out of service several days after the storm. The trunks were returned to service by Verizon, and Verizon has since updated their mass call mitigation plan to include making sure all trunks are restored prior to closing the trouble ticket.

Prince George's County reported the loss of certain non 9-1-1 lines following the storm. It was determined that the Bowie Central Office had a power disruption, which took an optical carrier network card out of service. Verizon technicians reseated the card and service was restored on June 30. The same problem recurred on July 1, and was also remedied in a similar fashion.

Regional Issues

The effects of the Derecho storm also affected other jurisdictions in the Mid-Atlantic region, specifically Northern Virginia. The Board is sensitive to these outages due to similarities that may exist between Maryland and Virginia 9-1-1 architectures. In large measure, the outages in Northern Virginia were caused by commercial power outages, and failures with emergency power in the Arlington and Fairfax central offices.

Board Actions

This section outlines a series of meetings that the Board has conducted with the counties and Verizon.

- The Maryland Emergency Number Systems Board has met with Verizon at each monthly public meeting.
    - Verizon appeared at the July 26, August 31 and September 27 meetings to provide the Board with an update of the issues that occurred in Maryland, as well as the issues and remediation efforts that occurred in Northern Virginia.

- The Board has issued a series of data requests to Verizon to gain a better understanding of what occurred in Maryland and Virginia, and to remediate any potential problems in Maryland.
- The Board has participated in a number of meetings held by the Metropolitan Washington Council of Governments (COG).
    - Chairman Anthony Myers has provided updates to the COG relative to the activities of the Board and the Maryland Public Service Commission (PSC) with regards to Verizon 9-1-1 service, as well as the power utilities regulated by the PSC.
    - The Board has shared best practices and lessons learned from previous Verizon outages with both Virginia and the District of Columbia.
- The Board has met with representatives from the Office of the Governor and the Maryland Emergency Management Agency (MEMA) to provide updates regarding the efforts of the Board, and an overview of Maryland's 9-1-1 network.

Verizon Activities

This section outlines the actions taken by Verizon since the storm, in cooperation with the Board.

- Verizon responded to a host of written and oral data requests made by the Board.
- The Board has requested Verizon to examine and report on their electrical power backup systems in Maryland's central offices.
    - Verizon related that there are no issues like those discovered in Virginia, nor are there any outstanding issues with emergency power in Maryland.
        - Verizon is conducting a series of power audits in Maryland to determine vulnerabilities, and to remedy those vulnerabilities when discovered.
        - The audits are scheduled to be completed by October 31, 2012.
- Verizon will enhance their emergency power practices and procedures
    - Site specific back-up power system procedures at critical facilities will be done so that anyone entering such a facility will be able to determine if the site is on emergency power. This will be completed in the first quarter of 2013.
    - Verizon has created site specific manual generator starting procedures, including prioritized system loads, to ensure a rapid start in case of the failure of automatic starting systems.
    - Verizon has improved its training and testing compliance so that procedures are followed to ensure the rapid correction of issues that can compromise the individual offices.
- Verizon will conduct testing that involves the termination of commercial power into each central office. This process, known as blackout testing, assesses the emergency power's ability to automatically engage to keep the central office operating. This will be done on a continual basis starting in 2013.

- Verizon has committed to the Board to review the network design for 9-1-1 trunks and ALI links to ensure that where physically possible and with PSAP concurrence, there are no choke points or single points of failure in a central office that can inhibit a PSAP from receiving 9-1-1 calls or location information.
- This is a three step process.
    - High-level network drawings have been developed to determine if the 9-1-1 trunk groups or ALI links intersect in a common piece of equipment within a Verizon central office, such as a router or switch.
        - The 9-1-1 trunks are traced from the PSAP to each of the tandems, and the ALI links are traced from the PSAP to the Freehold and Fairland data centers.
        - Drawings have been completed for each PSAP (Primary and Back-Up), and will be reviewed with each county PSAP Director.
    - Verizon engineers will do a detailed review of each 9-1-1 and ALI circuit to make certain that there are no single points of failure, and if diversity violations are discovered, to design solutions to create diversity within the network, where physically possible.
        - It is anticipated that the detailed reviews will be completed in the first quarter of 2013.
        - Verizon is also developing an algorithm to expedite the process, and possibly complete the reviews by December 31, 2012.
    - Verizon will follow-up with each county to review the findings and recommendations made by the engineering group.
        - Verizon will then schedule the remediation with each county at a time that minimizes the impact to the county PSAP operations.
        - This entire process is being done concurrently with Virginia.
        - The remainder of the Verizon footprint will be done sometime after Maryland, Virginia, and the District of Columbia are completed.
- Verizon has implemented a new alerting system to provide voice, text message and e-mail communication to the PSAP community in the event of a major outage that affects multiple jurisdictions. This will provide each county with updated information as quickly as possible. This is not a substitute for any other notification processes agreed to by Verizon, the counties and the Board. The process augments previously established procedures, by adding text messaging.

Next Steps

The Board anticipates the following actions to be completed on the dates indicated.

- Continue to meet with Verizon and the counties to discuss new information regarding the impact of the Derecho storm on 9-1-1. **Ongoing**

- Receive updates from Verizon and the counties regarding the network diversity reviews as they are completed. **Estimated Completion Time: First Quarter 2013**
- Assist each county with making certain that they have Verizon network diversity from PSAP to tandem for 9-1-1 calls, and PSAP to data center for ALI data. **Estimated Completion Time: First Quarter 2013**
- Review with Verizon the results of the power audits at the mission critical Verizon facilities. **Estimated Completion Time of Audits: November 30, 2012**
- Follow up with Verizon to ensure all power remediation is completed at the mission critical Verizon facilities. **Estimated Completion Time: First Quarter 2013**
- The Board has requested from Verizon the revised diversity guidelines for network telemetry published on August 15, 2012. **Received October 22, 2012 to be reviewed at next Board meeting.**
- Continue to participate in the Metropolitan COG process. **Ongoing**

The Board's process is an iterative process. The Board continues to meet with Verizon and counties to enhance Maryland's 9-1-1 system to ensure its reliability and resiliency, and to provide the best service to Maryland's citizens.

Verizon, 911 Service and the Derecho

Moving Forward

Corrective Actions Update

COG 911 Directors Meeting
September 24, 2012

MaureenDavis
Vice President Network Operations
MidAtlantic

Power

The specific cause of the Northern Virginia 911 disruptions was the failure of one of two back-up generators to start in Arlington and Fairfax following the loss of commercial power. These problems are fixed.

Issue	Action Plan	Status
Arlington Back-up Power	• Install new start batteries on Generator 1 • Complete Generator 2 repairs • Complete full load transfer test (pending battery tests and run down testing) • Complete fuel system repairs • Update manual generator-starting procedure	Complete
Fairfax (Lee Hwy) Back-up Power	• Install a new UPS on the Generator 2 Auto Transfer Switch (this solves the Generator 2 start failure) • Install a permanent Auto Transfer Switch power source.	Complete

Power (cont'd)

Verizon's investigation revealed significant opportunities for improvement to ensure that best practices are followed and lessons learned are applied throughout Verizon's service territory.

Issue	Action Plan	Status
Generator system failures were different in each location. While the specific failures have been repaired, we have extended our review across the footprint to identify and address potential vulnerabilities.	• Conduct back-up power system audits in the mission-critical Verizon facilities supporting 911 in Virginia, Maryland and Washington, D.C. • These audits include ensuring the proper categorization of power alarms, as the investigation revealed that an alarm from Fairfax before the loss of network monitoring was mis-categorized and thus placed lower on the priority list. • Institute any corrective measures identified in those power audits. • Where multiple generators are present, we will institute automated controls to prioritize system loads so that critical elements (e.g., network monitoring) stay up or are restored first in case one of the two generators fails.	Estimated completion for all locations identified: 10/31/12 Estimated completion across the Verizon landline service area: 2013

Power (cont'd)

Issue	Action Plan	Status
<u>Emergency Power Practices and Procedures</u> Verizon will improve its speed of restoration of power, moving to manual starts where necessary without delay, prioritizing power to key network equipment (e.g., 911, monitoring systems) in multi-generator configurations, and improving its deployment of mobile generators.	• Implement site-specific back-up power system procedures at critical facilities to ensure real-time on-site accurate identification of power loss anywhere in the facility. • Create site-specific manual generator start and transfer procedures, including prioritized system loads, to ensure a rapid start in the case of failure of automated starting systems. • Enhance critical facility "Black Out" testing. We test our back-up power systems regularly, but will now include "failed automated controls" and "prioritized system load transfer" scenarios. • Improve training and testing compliance. Our investigation revealed that the generator in Arlington had been tested just prior to the Derecho, failed to start, and required service, but that procedures weren't followed that would have ensured speedy correction of those service issues and/or faster restoration of the office.	Potomac-Complete Footprint-1Q 2013 Potomac- Est. 9/30/12 Footprint- 2013 Field Blackout Tests 1Q13 Est. 9/30/12

Emergency Management Processes

More robust visibility into our network and crisis management processes will improve coordination and communication with PSAPs and other government/local officials.

Issue	Action Plan
Verizon has a standard practice of internal mobilization based on actual or potential service impacts. These are triggered by alarms. The loss of visibility into our network prevented us from receiving these alarms and delayed our response.	• We have enhanced our event criteria and procedures for notification and mobilization to trigger activity more quickly when batteries are activated or when network monitoring is lost in multiple offices in a geographic area. Complete
Rapid identification of emergencies and transition to Emergency Management. The Derecho was initially treated more like an internal network problem than like a hurricane-type problem, and this affected incident management.	• Emergency Management has been centralized and enhanced so that all emergencies, including network emergencies, are managed by Verizon's National Emergency Coordination Center (NECC), which utilizes the National Incident Management System (NIMS) principles as published by the U.S. Department of Homeland Security. Complete

Verizon Network

Telemetry systems allow Verizon to receive alarms, monitor its network, identify the cause and location of problems, and repair them rapidly.

Issue	Action Plan
Creating diverse connectivity and alternative telemetry sites will provide greater resiliency in crises. It will also improve the effectiveness of real-time communications with PSAPs. • This initiative will enhance visibility into the 911 network. For example, our investigation revealed that the Eastern portion of Loudoun County could not reach the County's PSAP for several hours on June 30, but the loss of telemetry impeded effective communication with the PSAP on the issue.	• We are redesigning the telemetry network to include more diverse connections and failover (alternative) locations. • Diversity guidelines for telemetry network published 8/15/12; implementation plan approved.

911/PSAPs

Verizon's analysis of the network impacts following the Derecho has identified areas for improvement with specific PSAP configurations, especially involving ALI and trunk diversity. Verizon will work directly with the specific PSAP partners to make those improvements.

Issue	Action Plan	Status
Opportunities for improved diversity on PSAP trunking and ALI links. Conduct network design review for all Maryland and Virginia PSAPs.	• Review PSAP trunking and ALI links for diversity • Work with local Engineering and Operations team to remediate issues identified.	Review completed for affected PSAPs in Northern Virginia 7/31/12 Virginia redesign recommendations ready for review; to be scheduled with PSAPs Maryland reviews to be complete by 9/30/12
A centrally inventoried 911 Infrastructure will facilitate trouble-shooting and improve restoration times.	• Develop a means to implement and maintain an inventory for E911 Infrastructure .	Technical service managers to retain all currently developed network routing maps. Network routing maps will be integrated into new ticketing systems to allow for faster response and facilitate trouble-shooting and restoration.

Communications

- The 911 Directors of the City of Alexandria, and the Counties of Arlington, Fairfax, Loudoun, Prince William and Stafford have recommended that Verizon adopt five steps to improve communications and crisis response. Verizon has adopted those concepts.

Recommendation	Action Plan
Verizon adopt, embrace, instruct, train and utilize the National Incident Management System (NIMS) model, to address and mitigate any and all significant events/incidents impacting providing 911 service to the aforementioned jurisdictions. Complete	• Verizon employs an "all hazards approach" to its Business Continuity, Disaster Recovery, Facility Preparedness and Emergency Management programs. These are essential to the protection of its employees, critical business processes and structural facilities located around the globe. • Verizon's National Emergency Coordination Center (NECC) process utilizes the National Incident Management System (NIMS) principles as published by the U.S. Department of Homeland Security. Verizon offers internal training and orientation courses on its NECC processes, and an Introduction to the National Incident Management System.

Communications (cont'd)

Recommendation	Action Plan
Verizon obtain and utilize a Reverse 911® type system to notify, via voice and text, those persons identified by the above jurisdictions, as soon it is known or suspected by Verizon that there is or may be an interruption of 9-1-1 service to any or all of the above jurisdictions. The immediately transmitted voice and text message should contain, in plain language, the nature of the problem, current or potential impact of the problem, what Verizon is doing to address the problem, recommend actions the impacted 9-1-1 center(s) should take and other appropriate information and include the name of the sender and the telephone number (business and mobile) at which the sender can be reached, and their email address.	• Since March 2011, Verizon has employed a broadcast email process to provide specific ticket information to individual PSAPs, and also to provide general information and updates on issues that affect multiple PSAPs. Verizon has selected a tool for broadcast voice, text and email, and is working with 911 Directors to establish the correct contact lists and process details. Expected completion 9/30/2012. • Based on experience with the email process, it is evident that there is no one common standard vehicle that is universally desired by all PSAPs. Verizon will work with the 911 Directors to accommodate specific needs within a standard process. • Verizon will make every effort to share actionable information with PSAPs as soon as we are aware of service interruptions. For events that may impact multiple PSAPs, we will recommend that voice conference bridges be established to enable Verizon to brief PSAPs on the situation and allow for questions and discussion. Recommended actions would be specific to each PSAP (based on their back-up configuration and event impact) and need to be developed jointly between Verizon and the PSAP.

Communications (cont'd)

Recommendation	Action Plan
Verizon work with the jurisdictions to develop, by no later than December 31, 2012, a method to semi-annually conduct a drill/exercise with each jurisdiction on actions to be taken by Verizon and the impacted jurisdiction(s) in the event of a potential or actual 9-1-1 outage.	• Verizon will engage the assistance of its Business Continuity Emergency Management (BCEM) team to work with Verizon's 911 Customer Care Center organization to develop and exercise procedures for drills that model potential or actual 911 outages with any of the jurisdictions that request such a joint exercise.
Verizon provide the above jurisdictions, during the first week of each month, a current contact list; beginning with the name and contact information (email, business telephone number, business mobile telephone number and any other appropriate information) for the Verizon account manager assigned to the jurisdiction and four immediately escalating Verizon personnel up to a Vice President level.	Complete

Communications (cont'd)

Recommendation	Action Plan
Verizon, if/when requested by any of the above jurisdictions, have a Verizon representative with authority to act/react; respond to and to be present at the jurisdictions' Emergency Operations Center (EOC), to provide current accurate information concerning 9-1-1 service and outages, other telephone service, etc. and liaison with other parties staffing the EOC, when the EOC is activated. Complete	• Verizon has committed to partnering with the Virginia Department of Emergency Management and staffing the state EOC in Richmond with a Verizon representative upon request in the event of an emergency. • Verizon has discussed options for virtual participation in any EOC via an "instant messaging - like" application with Virginia emergency management leaders. • Verizon has discussed joint training with Fairfax Emergency Management personnel and would welcome the opportunity to participate in that activity. • If PSAP discussions regarding a joint regional 911 EOC become the strategy, that would present an excellent vehicle for Verizon to be on site in one location serving multiple jurisdictions in an emergency situation.

NEWS RELEASE

FOR IMMEDIATE RELEASE
October 26, 2012

Media contacts:
See end of release

Verizon Networks Ready to Serve Consumers, Businesses as Hurricane Sandy Threatens East Coast

BASKING RIDGE, N.J. – Verizon's networks are ready to serve customers as Hurricane Sandy is forecast to make landfall somewhere along the Eastern Seaboard over the next several days.

Verizon prepares year-round for natural disasters and other emergencies to provide customers with reliable wireless and wireline coverage so they can keep the doors of their businesses open; stay in touch with family and friends; and check the latest weather conditions on their TVs, PCs, tablets or smartphones using their Verizon services.

*(**NOTE**: Verizon has produced a short video on customer-readiness tips; to view it, click here. A more complete list of tips is available here.)*

Employees are on standby to respond to any crisis in the event network equipment is endangered or when emergency first-responder or customer support is required. Verizon also can deploy employees from unaffected parts of the country to help restore services in hard-hit areas.

The Verizon communications networks require power to operate. If commercial power fails, backup batteries and generators in the company's switching centers, cell sites and other facilities keep

power flowing so the company's networks can continue to deliver services to customers. Portable generators also are available for deployment to storm-stricken facilities when needed.

Verizon crisis management teams along the East Coast continue to closely monitor the storm's path and complete required preparations, such as confirming staff schedules; testing and confirming fuel supplies for backup generators; adding critical inventory such as spare smartphone batteries and car chargers to meet customer demand; moving vehicles and other portable equipment from low-lying areas; and stocking critical supplies in centralized locations for rapid deployment to hard-hit areas.

In addition, Verizon's disaster recovery fleet of emergency vehicles stands ready for deployment to the affected region, if needed. The fleet includes a 51-foot mobile command center; two 53-foot mobile emergency calling centers; and satellite trailers. (Click here to view Verizon's disaster recovery fleet.)

Verizon also has the industry's first environmental hazmat response team, the Major Emergency Response Incident Team (MERIT), which will remain on standby to deploy immediately, if needed. This team is specially trained for rapid deployment to manage hazardous materials emergencies involving or threatening Verizon's critical communications facilities or infrastructure, or other company assets.

Residential customers should contact Verizon online at *www.verizon.com/outage* or call 1-800-VERIZON (1-800-837-4966) to report any service-related issue. Business customers should contact their regular customer service centers or account teams as needed.

Verizon Communications Inc. (NYSE, Nasdaq: VZ), headquartered in New York, is a global leader in delivering broadband and other wireless and wireline communications services to consumer, business, government and wholesale customers. Verizon Wireless operates America's most reliable wireless network, with nearly 96 million retail customers nationwide. Verizon also provides converged communications, information and entertainment services over America's most advanced fiber-optic network, and delivers integrated business solutions to customers in more than 150 countries, including all of the Fortune 500. A Dow 30 company with $111 billion in 2011 revenues, Verizon employs a diverse workforce of 184,500. For more information, visit *www.verizon.com*.

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Center on the World Wide Web at *www.verizon.com/news*. To receive news releases by email, visit the News Center and register for customized automatic delivery of Verizon news releases.

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Tips To Help Prepare for Hurricanes, Snowstorms and Other Severe Weather

With Hurricane Sandy approaching the Eastern Seaboard, Verizon suggests customers prepare for potential emergencies by taking the following steps: (To view a short video on customer-readiness tips, click here.)

- Check your local emergency-readiness authorities for their recommendations and advisories about the situation in your area. Be sure to check back with them if the situation gets worse.

- Develop a systematic evacuation and communications plan with family and friends that includes what to do, who to call, where to go, and what supplies and items you will take with you.

- Ensure that all battery-powered devices are fully charged before the storm hits. This includes wireless phones and smartphones, MiFi cards, laptops, tablets, DVD players, flashlights and radios.

- To help preserve battery life, use devices only when necessary. Turn off background data applications or Wi-Fi search services if you have a wireless device that is capable of these communications. (Note that your device will not receive alerts while data is turned off.) Consider obtaining a supply of additional batteries.

- Consider getting a corded phone that can be plugged into a working telephone jack. A cordless phone probably will not work during a power outage, even though Verizon may still be providing service to the home.

- Verizon has provided an emergency backup battery to its FiOS customers in the event they lose commercial power. This battery backup unit (BBU) provides up to eight hours of standby voice service, depending on usage. For example, receiving calls uses power to ring the phones and would reduce the available backup power time. The BBU also has a "battery emergency use" button, which provides up to one additional hour of battery life in the event a customer needs to make an emergency call.

- Maintain a list of emergency phone numbers and email addresses, including police, fire and rescue agencies; power companies; insurance providers; and family, friends and coworkers. Program them into your phone, smartphone, tablet or laptop and also have a hard copy handy, someplace easily accessible.

- Make contact lists and create communications plans for loved ones before the storm hits. If you are evacuated or are otherwise unreachable, make plans to communicate via wireless calling, text messaging, the Internet or other alternatives available at relocation sites.

- In your wireless device contact list, store the number of a person to contact under the contact name ICE (in case of emergency). In an emergency, if you are seriously injured or disabled, authorities will quickly know whom to call in an emergency should you be unable to.

- Forward your home phone calls to your wireless number if you will be away or need to evacuate.

- Set up all social media and email accounts for you, your family and friends on all wireless phones, tablets and other devices as a method of communication and means to alert contacts of your status and location.

- Download Back-up Assistant, Verizon Wireless' free application that stores your phone's address book and contact information, on a secure server in case the phone is lost or damaged.

- Download weather applications and alerts that provide users with a variety of information such as radar images, forecasts and severe storm warnings.

- Download apps and subscribe to alerts from aid and relief organizations such as the American Red Cross' apps for first aid, hurricane and shelter, and the Commercial Mobile Alert System from the Federal Emergency Management Agency.

- Location-based services provide peace of mind so that you know where your family members are located.

- Set up your work email and server login (when allowed) to your wireless device to stay updated with co-workers in the event of emergency office closures.

- If you live in a flood-prone area, protect sensitive equipment like computers and TVs by getting them as high above ground as you can, so when service comes back up you'll be back in business quickly.

Many of the tips for consumers apply to small businesses, but business owners or managers may want to take some additional steps:

- Back up your archives and documents, including critical business data, stored on your computers. Verizon's Online Backup & Sharing will allow any small-business owner to back up these important files to secure remote servers that only the user can access from anywhere with an Internet connection, including via a smartphone.

- Consider adding a Jetpack to your disaster survival toolkit. A fully charged mobile hot spot can give you 4G LTE access instantaneously. Plus, Mobile Hotspot users can share their signal with several devices, enabling fellow disaster victims to gain access.

- Update the “Contact Us” page on your website to include an email address. This is an additional method of communication for your customers to keep in touch with you.

- Add sign-up forms to your website and other social media platforms to capture contact information for your customers. This will allow you to communicate with them in case you have to temporarily close your business.

Verizon offers many free resources to help small businesses stay operational in an emergency; click here for more tips and insights on disaster planning. For more about disaster recovery, read this post.

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