Before The
Federal Communications Commission
Washington, D.C. 20554

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

COMMENTS OF THE SAMUELSON-GLUSHKO TECHNOLOGY & POLICY CLINIC
UNIVERSITY OF COLORADO LAW SCHOOL

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"It kind of felt like the end of the world," said Tracy Zent, an American consumer, offering her perspective about living without power or phone service in the aftermath of Hurricane Sandy.[1] Along with many residents of New Jersey and New York, Zent had no access to communication services for more than a week.[2] In the following days and weeks, the nation was inundated with shocking video and other descriptions of the damage and effects of Hurricane Sandy. Like the massive disasters, Hurricane Katrina and the 2012 Derecho, Superstorm Sandy was a reminder of the vulnerabilities of the communications infrastructure and consumers' lack of awareness of the risks inherent to wireless communication.

[1] Tracy Zent is a twenty-seven year old schoolteacher living in Jersey City, New Jersey. She, like most residents of New Jersey, chose not to evacuate and weather Hurricane Sandy.
[2] U.S. Dept. of Energy; *see* DiSavino, "Sandy Power Outages Hit More Than 8.1 Million Homes and Businesses," Huff Post, Oct. 30, 2012. http://www.huffingtonpost.com/2012/10/30/hurricane-sandy-power-outages_n_2044016.html. New Jersey was the hardest hit state with about 2.5 million customers out, about 62% of the state total; New York with 21% or 2 million customers out of power.

Recent trends in subscriptions of telephone service indicate that consumers assume and expect the resiliency of wired communication to be a feature of wireless communication.[3] Wireless phones offer mobility and data-transferring capability that appeals to consumers who wish to connect with others away from home. However consumers assume the reliability of wired communication, the 99.999% resiliency, to be a feature of wireless phones as well. Consumers are not only purchasing wireless phones, but they are also terminating their wired phone service. Consumers might not replace their wired landlines with wireless if they knew that wireless phones' resiliency is 98%.[4] That may not seem like a big difference but when calculated, it means 6.05 seconds in downtime per week for wired phones compared to 3.36 hours of downtime per week for wireless phones.[5] And during an emergency, three and a half hours of downtime may be deadly.

Wired telephones did not always operate 99.999% of the time. The first telephone system was constructed before there was a comprehensive power grid that covered the country so the telephone company developed their own power

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[3] From 1995 to 2008, wireless cell phone subscriptions increased by 699%.[3] During this same time, 26.6% of Americans terminated their wired telephone subscriptions.

[4] Hammack, William S., Plain Old Telephone Service (Public Radio Commentary by Bill Hammack), EngineerGuy.com, http://www.kaptest.com/Bar-Exam/Home/index.html (Apr. 10, 2013).

[5] Bill, "In Search of Five 9s- Calculating Availability of Complex Systems," EdgeBlog: Notes from the Edge, http://www.edgeblog.net/2007/in-search-of-five-9s/ (Apr, 10, 2013). Reliability calculations are cumulative. Every system has components that have a failure rate associated with it, and as a result, the reliability of the whole system can never be higher than the lowest reliability of any individual components. However, the reliability of the components can be boosted to increase the reliability of the system. For example, a wired landline phone system's power supply component can be boosted with battery backup power. Thus, the calculations here are based on general reliability rates of phone equipment, not an average of actual service downtimes.

sources to connect phones from central switching stations.[6] In contrast, the wireless phone system was built in dependence of the power grid, so when the grid power goes out, wireless networks go out as well. This means that the resiliency of the communications infrastructure is and always has been about the power source.

The Commission recognizes that wireless service disruption is a power issue and that the resiliency of the communications infrastructure can be improved by creating the right standards of backup power at cell sites and switching centers. [7] In order to better address needs revealed during wireless communication disruptions, the Commission established the Disaster Information Reporting System ("DIRS").[8] DIRS collects information concerning switching facilities and cell sites.[9] In addition to broadcast and cable providers, wireless communication providers voluntarily report outages in DIRS to streamline requests for help in restoring service.[10]

The National Association of Regulatory Utility Commissioners ("NARUC") has determined that outage reports contain especially useful information and that the

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[6] Hammack, William S., Plain Old Telephone Service (Public Radio Commentary by Bill Hammack), EngineerGuy.com, http://www.kaptest.com/Bar-Exam/Home/index.html (Apr. 10, 2013).

[7] Federal Communications Commission, A Report of the Public Safety and Homeland Security Bureau, Impact of the June 2012 Derecho on Communications Networks and Services: *Report and Recommendations*, at 12, Jan 2013. http://www.fcc.gov/document/derecho-report-and-recommendations. Two main reasons reported for cell site outages were loss of power and the disabling of transport facilities that connect cell sites to mobile switching centers.

[8] *See* Disaster Information Reporting System (DIRS), http://transition.fcc.gov/pshs/services/cip/dirs/dirs.html. DIRS is a voluntary, web-based system that communications companies, including wireless, broadcast, and cable providers, can use to report communications infrastructure status and situational awareness information during a crisis.

[9] *Id*.

[10] *Id*.

protocols and processes for the flow of this information can be improved.[11] NARUC resolves that the sharing of information concerning the location and extent of service disruptions can enhance coordination between service providers and state commissions and other appropriate governmental bodies.[12] It could help service providers dispatch workers efficiently and effectively.[13] And it ensures communications service providers that share infrastructure with electric utilities can better rely on those electric utilities to conduct restoration activities.[14]

The state public utility commissions ("state commissions") should have access to DIRS. The state commissions create standards of power and backup power for the electric grid and it could create similar standards at cell sites. The states already have useful information on utility operations and weather patterns in their respective jurisdictions. They should be involved in the efforts to improve the resiliency of the communications infrastructure because they can offer the needed collaboration with power utility companies and provide localized insight on storms and natural disasters likely to cause service disruptions. If the states also acquired information about service disruptions and outages from DIRS, the states would be

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[11] NARUC, Resolution Urging Governmental Agencies to Take Action to Coordinate Emergency Planning to Ensure the Outage and Other Critical Information in Emergency Situations, adopted by the NARUC Board of Directors, February 6, 2013 (Apr. 19, 2013), available at http://www.naruc.org/Resolutions/Resolution%20Urging%20Governmental%20Agencies%20to%20Take%20Action%20to%20Coordinate%20Emergency%20Planning%20to%20Ensure%20the%20Sharing%20of%20Outage%20and%20Other%20Critical%20Information%20in%20Emerg1.pdf.

[12] *Id*.

[13] *Id*.

[14] *Id*.

able to create standards of backup power that comply with federal requirements but reflect state-specific needs.

I. BACKGROUND

As of November 2012, thirty-six states required power utility companies to publicly report how often and for how long power outages occur.[15] However, in light of backup power sources, a grid power outage does not necessarily translate into a loss of communication services. So while the state commissions require and receive outage reporting from power companies, many states do not receive outage reports for telecommunication services.[16] It follows that state commissions do not receive any direct information about power provided or not provided at cell sites.

If states had access to DIRS, they would have important information about power supplied to cell sites and switching centers and, thus, have the information necessary to help restore power and thereby improve wireless communication resiliency.

The Commission has long recognized that such outage reporting is useful for its purposes in regulating communications service providers. "Obtaining information on communications service disruptions is essential to the FCC's goal of ensuring the reliability and security of the nation's communications

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[15] Henderson, Bruce, "Duke Energy May Report Data on Outages to Public," &NewsObserver.com, Nov. 28, 2012, http://www.newsobserver.com/2012/11/28/2512497/duke-energy-may-report-data-on.html.

[16] 47 U.S.C. §332(c). Congress gave the exclusive jurisdiction over "entry" and "rate" regulation of wireless service providers, but gave the FCC and the state concurrent jurisdiction over "terms and conditions" of wireless service. Between 2010 and April of 2012, 21 state legislatures enacted laws that eliminated state PUC oversight of VoIP and other IP-enabled services, and deregulation legislation is pending in 14 additional states.

infrastructure."[17] In 2005, it created the Network Outage Reporting System ("NORS"), a web-based filing system through which communication providers covered by Part 4 of the FCC's rules submit reports of significant disruptions and outages.[18] Prior to 2005, communications providers were required to submit their reports via facsimile.[19] The FCC acknowledged that loss of communication services was most crucial during emergency situations. "The availability and resilience of our communications infrastructure, specifically 9-1-1, directly impacts public safety and the ability of our first responders to fulfill their critical mission."[20] This awareness led to the FCC creating DIRS in 2007.[21]

DIRS activates during disasters; and it was activated to collect information on both the 2012 Derecho and Hurricane Sandy. The information obtained from the outage reports prompted the Commission to do more analysis on the extent of the service lost during these disasters. Specifically, after the 2012 Derecho, the Public Safety and Homeland Security Bureau ("the Bureau") met with cable, wireline, and wireless providers that experienced the most severe outages.[22] The Bureau asked

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[17] Public Safety and Homeland Security Bureau, "Network Outage Reporting System (NORS), http://transition.fcc.gov/pshs/services/cip/nors/nors.html (Apr. 13, 2013).
[18] FCC, Network Outage Reporting System (NORS) available at http://www.archives.gov/records-mgmt/rcs/schedules/independent-agencies/rg-0173/n1-173-10-001_sf115.pdf.
[19] *Id*.
[20] FCC, FCC Adopts Outage Reporting Rule for Interconnected VoIP Services, Report and Order, Commission Documents, FCC 12-22, p. 3, Feb. 2012, http://www.fcc.gov/document/fcc-adopts-outage-reporting-rule-interconnected-voip-services.
[21] Public Safety and Homeland Security Bureau, "Disaster Information Reporting System (DIRS)," http://transition.fcc.gov/pshs/services/cip/dirs/dirs.html (Apr. 13, 2013).
[22] Federal Communications Commission, A Report of the Public Safety and Homeland Security Bureau, Impact of the June 2012 Derecho on Communications Networks and Services: *Report and Recommendations*, at 9, Jan 2013.

pointed questions about the cause of each outage and the function of backup power at cell sites.[23] It was through initial reporting and subsequent investigation that the Bureau was able to find that inadequate backup power was one of the main reasons for loss of communication.[24] As opposed to being knocked out by downed trees or flooding, cell sites went down during the Derecho because several communications providers ignored industry Best Practices standards and failed to test and monitor their backup equipment.[25]

As a way to ensure that backup equipment is sufficiently monitored and tested in order to comply with power supply standards, the state commissions should have access to DIRS. The data collected from the reports of the 2012 Derecho provided important information to the Bureau about issues with backup power equipment. The problem was not directly related to weather but a subtler operational problem. If states are to make any improvements to the communications infrastructure through power operations, the state commissions need to be properly informed about power needs.

II. STATES NEED ACCESS TO DIRS IN ORDER TO CREATE EFFECTIVE STANDARDS THAT IMPROVE BEST PRACTICES

The Bureau reported that Hurricane Katrina, the 2012 Derecho, and Superstorm Sandy revealed weaknesses in the reliability and resiliency of

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[23] *Id*.
[24] *Id*. at 13.
[25] Federal Communications Commission, A Report of the Public Safety and Homeland Security Bureau, Impact of the June 2012 Derecho on Communications Networks and Services: *Report and Recommendations*, at 17, Jan 2013. Verizon allowed a key central office with critical network equipment to operate with effectively *no* backup generator power because one generator had failed to start during routine testing before the Derecho and a single generator could not power the entire office.

communications and raised concerns about commercial power and telecommunications providers' implementation of adequate backup power.[26]

The Bureau stated that the 2012 Derecho affected communications in eleven states and the District of Columbia.[27] The communications failures resulted, in large part, from loss of commercial power and failures of backup power equipment.[28] Additionally, twenty-five percent of cell towers were disabled as a result of power outages in affected areas in the aftermath of Hurricane Sandy.[29] Both of these storms raised new concerns about the resiliency of the communications infrastructure but the discussion spanned back to Hurricane Katrina and backup power at cell sites.

After Hurricane Katrina knocked out communications in areas along the Gulf Coast, regulators considered requiring wireless companies to have backup power at all their cell towers.[30] The FCC proposed a rule mandating a minimum of 24 hours of emergency backup power for central offices and 8 hours for other facilities such as cell sites and remote switches.[31] Mobile phone and tower companies fired back contending that the requirement was unreasonably burdensome and costly.[32] With

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[26] *Id*.
[27] *Id*. at 11.
[28] *Id*. at 12.
[29] Sasso, Brendan, "FCC says Hurricane Sandy Knocked Out 25 Percent of Cell Towers in Its Path," The Hill, Oct. 30, 2012, http://thehill.com/blogs/hillicon-valley/technology/264915-fcc-hurricane-sandy-knocked-out-25-percent-of-cell-towers.
[30] FCC 07-177, Order on Reconsideration, Recommendations of the Independent Panel-EB Docket No. 06-119, Reviewing the Impact of Hurricane Katrina on Communications Networks-WC Docket No. 06-63, available at http://www.njslom.org/FCC-07-177A1.pdf.
[31] *Id*.
[32] Silva, Jeffrey, "Appeals Court Questions FCC's Authority On Backup Power Rule," RCRWireless, May 9 , 2008,

about 200,000 cell sites in the United States, the wireless companies argued that these rules would have cost them hundreds of millions of dollars.[33]

The FCC relied on its ancillary authority in Title I of the Communications Act to justify the rule, arguing that requiring backup power was "reasonably ancillary" to its authority to ensure emergency communications.[34] The wireless companies challenged the rule in the D.C. Circuit. In oral arguments, the U.S Court of Appeals for the D.C. Circuit questioned the FCC's authority. Before the D.C. Circuit could issue a ruling, the Office of Management and Budget ("OMB") disallowed the rules based on the cost. The FCC withdrew the rule and dismissed the case.[35]

Without any comprehensive regulation, the onus was on the providers to ensure communications for their customers. The FCC chartered a council consisting of many industry leaders and communication service providers known as the Communications Security, Reliability, and Interoperability Council ("CSRIC").[36] CSRIC provides recommendations to the FCC to ensure "optimal security, interoperability of communications systems, including public safety, telecommunications, and media communications."[37] CSRIC created a list of practices

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http://www.rcrwireless.com/article/20080509/tower/appeals-court-questions-fccs-authority-on-backup-power-rule/.

[33] *Id*.

[34] Harold, "If your cell tower loses power, be sure to thank CTIA and the D.C. Circuit," Wetmachine, Oct. 29, 2012, http://tales-of-the-sausage-factory.wetmachine.com/if-your-cell-tower-loses-power-be-sure-to-thank-ctia-and-the-d-c-circuit/.

[35] *Id*.

[36] Charter of the FCC's Communications Security, Reliability, and Interoperability Council, Mar. 19, 2009, *available at* http://transition.fcc.gov/pshs/docs/advisory/csric/CSRC_charter_03-19-2009.pdf.

[37] *Id*.

considered to be the best way to improve resiliency.[38] But it took catastrophic storms, the Derecho and Sandy, to expose the flaws in allowing the industry to regulate itself.[39] After scrambling for several days, restoring communication service in areas affected by Hurricane Sandy, AT&T got proactive. In the wake of the snowstorm that followed Hurricane Sandy, AT&T reported that it was distributing fuel to more than 3,000 generators positioned at cell sites and other key locations.[40]

AT&T's more proactive approach is a step in the right direction but if America is fortunate enough not to have another storm comparable to the scale of Sandy for several more years, consumers may find themselves in another extensive power outage with no communication services. CSRIC's best practices were announced in 2009 and by 2012, the reports of the Derecho indicated that many providers disregarded their own best practices.

According to the FCC's report from the 2012 Derecho, Verizon did not follow its own best practice of designing, installing, and maintaining each backup generator independent of other generators.[41] In the central offices, Verizon operated its

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[38] The Communications Security, Reliability, and Interoperability Council (CSRIC), http://transition.fcc.gov/pshs/advisory/csric/. CSRIC is a chartered federal advisory committee. Many CSRIC recommendations are voluntary. The PSHSB and stakeholders within the telecommunications industry encourage providers to implement at their discretion.

[39] Federal Communications Commission, A Report of the Public Safety and Homeland Security Bureau, Impact of the June 2012 Derecho on Communications Networks and Services: *Report and Recommendations*, at 11, Jan 2013. Communications failures during the 2012 Derecho revealed that many providers failed to implement the recommendations developed by CSRIC.

[40] Smith, J. Sharpe, "Sandy Slams Cell Towers in Northeast," Above Ground Level Magazine: for Antenna Site Decision-Makers, Dec. 16, 2012. http://agl-mag.com/northeast-struggles-to-bring-towers-back-on-line/.

[41] Federal Communications Commission, A Report of the Public Safety and Homeland Security Bureau, Impact of the June 2012 Derecho on Communications Networks and Services: *Report and Recommendations*, at 16, Jan 2013. Communications failures during the

generators in tandem. So when air entered the fuel system of one of the generators and failed to start, the second generator became overloaded and shut down. Additionally, Verizon provided that it was a standard operating procedure to conduct generator tests every month. However it failed to test a generator in another Arlington central office for several months because of a problem with the uninterruptible power supply.[42]

Frontier Communications Corp. also experienced problems with back up generators. It deployed several mobile generators in affected locations but as many as twenty generators were stolen from Frontier facilities in the aftermath of the Derecho, which caused additional backup power failures.[43]

These providers knew, before the Derecho, what backup needs were necessary to ensure communication at their facilities, but for whatever reasons, they did not adhere to best practices and the consumers suffered when communication was needed most. In order to avoid extended outages, the state commissions should require the power utility companies, which they regulate, to offer and develop backup power products and services. Then through the development of rules and standards, the commissions can create incentives for the wireless carriers to purchase these products and services and to set standards for use and maintenance. Access to DIRS would help states facilitate this authority.

III. STATES CAN CREATE EFFECTIVE POWER STANDARDS BASED ON THEIR AREA-SPECIFIC KNOWLEDGE

2012 Derecho revealed that many providers failed to implement the recommendations developed by CSRIC.

[42] *Id*.

[43] *Id*. at 20.

Cell sites and backup power equipment have to be built and tested to withstand unique weather conditions specific to their locations. States understand the types of natural disasters they face. Wildfires and blizzards are more likely to inflict Colorado than Florida. Tornadoes are more likely to inflict Oklahoma than New York.

Most utility companies, especially companies serving more than one state, recognize the climatic differences in weather events and build and maintain their infrastructures correspondingly. One power utility company reported that its reliability was tested with tornadoes in Minnesota, flooding in North Dakota, fires in Texas, and snowstorms in Colorado.[44] All of these storms disrupted service but the protocols necessary to restore service were very different.

State commissions are best situated to address the utility needs for the people and businesses in their jurisdictions. When resiliency of any utility infrastructure so greatly depends on the weather events in a specific area, it would be difficult for any federal regulatory body to create service standards that make sense for all providers to implement. With access to DIRS, states can provide standards that would reflect weather-related disruptions and area-specific service.[45]

IV. THE STATES CAN PROVIDE MORE RESOURCES FOR THE COST OF IMPROVING RESILIENCY

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[44] Xcel Energy, Overview of the Economic, Environmental & Social Impact of Xcel Energy, 2011, http://www.xcelenergy.com/staticfiles/xe/Corporate/Environment/12-01-304_CRR_finalP.pdf.

[45] *Id*. Each state has state-specific service disruptions.

The FCC's proposed rule to require emergency backup power for all central offices and cell sites was greatly criticized because of the potential costs to build and operate such equipment.[46]

State commissions can offer more resources to address the costs of building, monitoring, testing, and operating backup power equipment at cell sites by using rate of return regulation. Rate of return regulation adjusts overall price levels according to a company's accounting costs and cost of capital.[47] The adjustment is the amount of revenue the company is allowed to recover through prices charged for regulated services.[48] Prices under rate of return regulation are considered fair and reasonable if they give the company an opportunity to recover the costs it has appropriately incurred in providing services, and customers are protected from paying prices that would provide the company with monopoly profits.[49] The objective is to identify the amount of capital the company uses and needs to provide regulated services.[50]

States have used rate of return regulation to cover costs for power utilities for decades. The state commissions should use that authority to allow power companies to develop the types of back-up and redundant power sources needed to

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[46] Silva, Jeffrey, "Appeals Court Questions FCC's Authority On Backup Power Rule," RCRWireless, May 9 , 2008, http://www.rcrwireless.com/article/20080509/tower/appeals-court-questions-fccs-authority-on-backup-power-rule/.
[47] Jamison, Mark A., "Rate of Return: Regulation," 1, Public Utility Research Center, University of Florida, http://warrington.ufl.edu/centers/purc/purcdocs/papers/0528_jamison_rate_of_return.pdf (Apr. 16, 2013).
[48] *Id*. at 8.
[49] *Id*. at 3.
[50] *Id*. at 8.

provide network reliability. Only a state commission using rate of return regulation can spread the cost of the backup power across society as a whole. Rate of return regulation for this important social goal eliminates the financial uncertainty that non-economically regulated companies face. A wireless company will not divert the resources necessary to provide full backup power to its cell sites it if means not turning up service in other markets.

While increasing service charges is never a popular decision with paying customers, wireless companies may be able to spin the charges into a marketing opportunity. Wireless companies often advertise the coverage and reliability of their respective networks.[51] If they use the back-up services and products offered by the local utility companies and the state commissions offered them under a rate of return scheme, then wireless companies and the commission can improve communications reliability and coverage in relation to major disasters.

V. CONCLUSION

In order to improve communications resiliency, local disasters should have local responses from commissions with local knowledge. Access to DIRS provides state commissions with the information necessary to assess the infrastructure's power needs. Also, state commissions are designed to address issues of area-specific resiliency because they are most knowledgeable about the weather events most likely to adversely affect their jurisdictions. Furthermore, in times of crisis, when

[51] Verizon Wireless claims to be the nation's largest 4G LTE network and the most reliable 3G network, http://aboutus.verizonwireless.com/technology/network/ (Apr. 17, 2013). AT&T claims to be the nation's largest 4G network, http://www.att.com/network/, (Apr. 17, 2013).

time of is the essence, outage reporting should be streamlined for efficiency. Thus, the Bureau should permit states commissions to have access to DIRS.