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June 12, 2006

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Chairman Kevin J. Martin
Federal Communications Commission
445 Twelfth Street, S.W.
Washington, DC 20554

Re: Report and Recommendations of the Independent Panel Reviewing the Impact of Hurricane Katrina on Communications Networks

Dear Mr. Chairman:

In January of this year, under your leadership, the Commission established the Independent Panel Reviewing the Impact of Hurricane Katrina on Communications Networks ("Katrina Panel" or "Panel"). The Panel was charged with (1) studying the impact of Hurricane Katrina on the telecommunications and media infrastructure, including public safety communications; (2) reviewing the sufficiency of the recovery effort with respect to this infrastructure; and (3) making recommendations for improving disaster preparedness, network reliability and communication among first responders in the future. The Panel was directed to complete its report by June 15, 2006.

As the Chair of the Katrina Panel, I am pleased to submit the Panel's Report and Recommendations to the Commission ("Report"). The Panel members have brought to bear a broad background of public safety and industry experiences, including first-hand knowledge of the devastation wrought by Katrina. After five months of hard work, and the review of oral and written submissions by interested parties, the Panel unanimously approved the Report at our final meeting on June 9, 2006.

On behalf of the members of the Katrina Panel, I would like to thank the Commission for forming the Panel and giving all of us the opportunity to contribute to its important work. I have also been extremely honored to chair this Panel and to work with so many dedicated individuals, including several personally affected by Katrina's devastation. My colleagues on the Panel and I hope that the findings and recommendations set forth in the Report will provide a foundation for actions to

better prepare the communications industry and our nation's first responders for future emergencies.

Respectfully submitted,

Nancy J. Victory

Chair, Independent Panel Reviewing the Impact of Hurricane Katrina on Communications Networks

cc w/encl.: Commissioner Michael J. Copps
Commissioner Jonathan S. Adelstein
Commissioner Deborah Taylor Tate
Commissioner Robert M. McDowell

Independent Panel Reviewing the Impact of Hurricane Katrina on Communications Networks

Report and Recommendations to the Federal Communications Commission

June 12, 2006

TABLE OF CONTENTS

Page

EXECUTIVE SUMMARY i

INTRODUCTION 1

I. Panel Formation and Charge 1

II. Process and Activities of the Panel 2

PANEL OBSERVATIONS REGARDING THE IMPACT OF HURRICANE KATRINA ON THE COMMUNICATIONS SECTOR AND THE SUFFICIENCY AND EFFECTIVENESS OF THE RECOVERY EFFORT 5

I. Network Reliability and Resiliency 5

A. Effect of Hurricane Katrina on Various Types of Communications Networks 6

B. Major Problems Identified Following Katrina 13

II. Recovery Coordination and Procedures 15

A. Access to the Affected Area and Key Resources 15

B. Coordination Between Industry and Government 19

C. Emergency Communications Services and Programs 21

III. First Responder Communications 22

A. Lack of Advanced Planning for Massive System Failures 23

B. Lack of Interoperability 25

C. PSAP Rerouting 27

D. Emergency Medical Communications 27

IV. Emergency Communications to the Public 27

A. Lack of Activation 28

B. Limitations on Coverage 28

C. Reaching Persons with Disabilities and Non-English Speaking Americans 29

D. Inconsistent or Incorrect Emergency Information 30

RECOMMENDATIONS 31

CONCLUSION 43

APPENDIX A: Members of the Independent Panel

EXECUTIVE SUMMARY

The Independent Panel Reviewing the Impact of Hurricane Katrina on Communications Networks ("Katrina Panel" or "Panel") hereby submits its report to the Federal Communications Commission ("Commission" or "FCC"). The Panel is charged with studying the impact of Hurricane Katrina on the telecommunications and media infrastructure in the areas affected by the hurricane and making recommendations for improving disaster preparedness, network reliability and communications among first responders.

FINDINGS

Hurricane Katrina had a devastating impact on the Gulf Coast region, including its communications networks. The sheer force of this deadly hurricane and the extensive flooding from the breached levees in New Orleans severely tested the reliability and resiliency of the communications infrastructure in the area. Indeed, every sector of the communications industry was impacted by the storm. The Panel observed that most of the region's communications infrastructure fared fairly well through the storm's extreme wind and rain, with the coastal areas suffering the worst damage. However, the unique conditions in Katrina's aftermath – substantial flooding, widespread, extended power outages, and serious security issues – were responsible for damaging or disrupting communications service to a huge geographic area for a prolonged period of time. Indeed, in reviewing the impact on each communications sector, there appeared to be three main problems that caused the majority of communications network interruptions: (1) flooding; (2) lack of power and/or fuel; and (3) failure of redundant pathways for communications traffic. In addition, a fourth item – inadvertent line cuts during restoration – resulted in additional network damage, causing new outages or delaying service restoration.

The Panel also observed significant impediments to the recovery effort resulting from:

- Inconsistent and unclear requirements for communications infrastructure repair crews and their subcontractors to gain access to the affected area;
- Limited access to power and/or generator fuel;
- Limited security for communications infrastructure and personnel;
- Lack of pre-positioned back-up equipment;
- Lack of established coordination between the communications industry and state and local officials as well as among federal, state and local government officials with respect to communications matters; and
- Limited use of available priority communications services, such as GETS, WPS and TSP.

On a more positive note, in the wake of the storm, lines of communication between the communications industry and the federal government were established and seemed generally effective in facilitating coordination, promptly granting needed regulatory relief, and gathering outage information. The FCC was widely praised as playing a critical role in helping to restore communications connectivity. In addition, *ad hoc*, informal sharing of fuel and equipment among communications industry participants helped to maximize the assets available and bolster

the recovery effort. However, additional coordination of personnel and assets within industry and among government agencies could have substantially facilitated restoration of communications networks.

With respect to emergency communications, Hurricane Katrina significantly hampered the functionality of these typically resilient systems. The areas in and around New Orleans were seriously impacted, due to heavier storm impact and the levee flooding. As a result, more than 2,000 police, fire and emergency medical service personnel were forced to communicate in single channel mode, radio-to-radio, utilizing only three mutual aid frequencies. This level of destruction did not extend to inland areas, which generally did not lose their communications capabilities and were soon operating at pre-Katrina capabilities. In the hardest hit areas, however, the disruption of public safety communications operability, as well as a lack of interoperability, frustrated the response effort and caused tremendous confusion among official personnel and the general public.

The Panel observed that lack of effective first responder communications after the storm revealed inadequate planning, coordination and training on the use of technologies that can help to restore emergency communications. Very few public safety agencies had stockpiles of key equipment on hand to implement rapid repairs or alternative, redundant systems to turn to when their primary systems failed. To the extent alternative systems were available, lack of training and familiarity with the equipment limited functionality and impeded the recovery effort. Communications assets that could have been used to fill gaps were apparently not requested or deployed in sufficient quantities to have a significant impact. Hurricane Katrina also highlighted the long-standing problem of interoperability among public safety communications systems operating in different frequency bands and with different technical standards. Additionally, 911 emergency call handling suffered from a lack of preprogrammed routing of calls to PSAPs not incapacitated by the hurricane. Finally, the emergency medical community seemed lacking in contingency communications planning and information about technologies and services that might address their critical communications needs.

The use of communications networks to disseminate reliable emergency information to the public is critical – before, during and after such events. While the Panel understands that the National Weather Service used the Emergency Alert System ("EAS") to provide severe weather warnings to citizens in the Gulf States in advance of Katrina making landfall, the system was apparently not utilized by state and local officials to provide localized emergency evacuation and other important information. In the absence of EAS activation, inconsistent or erroneous information was sometimes provided within the affected area. Further, the Panel heard about notification technologies that may permit emergency messages to be sent to wireline and wireless telephones as well as personal digital assistants and other mobile devices, thus complementing the traditional broadcast-based EAS. Ensuring emergency communications reach Americans with hearing or visual disabilities or who do not speak English was a major challenge. Although the broadcast industry has taken significant steps to provide on-screen sign language interpreters, closed captioning, and critical information in a second language, these steps were reported to be insufficient in certain instances. Shelters also generally did not have communications capabilities for those with hearing or speech disabilities.

RECOMMENDATIONS

Based upon its observations regarding the impact of Hurricane Katrina on communications networks and the sufficiency and effectiveness of the recovery effort, the Panel has developed a number of recommendations to the FCC for improving disaster preparedness, network reliability and communications among first responders. These recommendations fall within four basic areas:

- ***Pre-positioning the communications industry and the government for disasters in order to achieve greater network reliability and resiliency.*** These recommendations include:
  - *Pre-positioning for the Communications Industry—A Readiness Checklist.* The FCC should work with and encourage each industry sector, through their organizations or associations, to develop and publicize sector-specific readiness recommendations.
  - *Pre-positioning for Public Safety – An Awareness Program for Non-Traditional Emergency Alternatives.* The FCC should take steps to educate the public safety community about the availability and capabilities of non-traditional technologies that might provide effective back-up solutions for existing public safety communications systems.
  - *Pre-positioning for FCC Regulatory Requirements – An A Priori Program for Disaster Areas.* The FCC should explore amending its rules to permit automatic grants of certain types of waivers or special temporary authority (STA) in a particular geographic area if the President declares that area to be a "disaster area".
  - *Pre-positioning for Government Outage Monitoring – A Single Repository and Contact with Consistent Data Collection.* The FCC should coordinate with other federal and state agencies to identify a single repository/point of contact for communications outage information in the wake of an emergency. The Panel suggests that the FCC is the federal agency best situated to perform this function.

- ***Improving recovery coordination to address existing shortcomings and to maximize the use of existing resources.*** These recommendations include:
  - *Remedying Existing Shortcomings – National Credentialing Guidelines for Communications Infrastructure Providers.* The FCC should work with other appropriate federal departments and agencies and the communications industry to promptly develop national credentialing requirements and process guidelines for enabling communications infrastructure providers and their contracted workers access to the affected area post-disaster.
  - *Remedying Existing Shortcomings – Emergency Responder Status for Communications Infrastructure Providers.* The Panel supports the National Security Telecommunications Advisory Committee's ("NSTAC's") recommendation that telecommunications infrastructure providers and their contracted workers be afforded emergency responder status under the Stafford Act, but recommends that it be broadened to include all communications infrastructure providers.

- *Remedying Existing Shortcomings – Utilization of State/Regional Coordination Bodies*. The FCC should work with state and local government and the communications industry (including wireline, wireless, WISP, satellite, cable and broadcasting) to better utilize the coordinating capabilities at regional, state and local Emergency Operations Centers, as well as the Joint Field Office.
- *Maximizing Existing Resources – Expanding and Publicizing Emergency Communications Programs (GETS, WPS, and TSP)*. The FCC should work with the National Communications System ("NCS") to actively and aggressively promote GETS, WPS and TSP to all eligible government, public safety, and critical industry groups.
- *Maximizing Existing Resources – Broadening NCC to Include All Communications Infrastructure Sectors*. The FCC should work with the NCS to broaden the membership of the National Coordination Center for Telecommunications ("NCC") to include adequate representation of all types of communications systems, including broadcast, cable, satellite and other new technologies, as appropriate.
- *Maximizing Existing Resources – FCC Website for Emergency Coordination Information.* The FCC should create a password-protected website, accessible by credentialed entities, listing the key state emergency management contacts, as well as post-disaster coordination areas for communications providers.
- *Maximizing Existing Resources – FCC Website for Emergency Response Team Information.* The FCC should create a website to publicize the agency's emergency response team's contact information and procedures for facilitating disaster response and outage recovery.

▶ ***Improving the operability and interoperability of public safety and 911 communications in times of crisis.*** These recommendations include:

- *Essential Steps in Pre-positioning Equipment, Supplies and Personnel – An Emergency Restoration Supply Cache and Alternatives Inventory*. The FCC should encourage state and local jurisdictions to retain and maintain, including through arrangements with the private sector, a cache of equipment components that would be needed to immediately restore existing public safety communications. The FCC should also work with the NCC to develop inventories of alternative communications assets.
- *Essential Steps in Enabling Emergency Communications Capabilities – Facilitating First Responder Interoperability*. The FCC should take several steps to facilitate interoperability among first responder communications, including maintaining the schedule for commercial spectrum auctions to fund the federal public safety grant programs; working with the National Telecommunications and Information Administration ("NTIA") and the Department of Homeland Security ("DHS") to establish appropriate criteria for these grants; encouraging the expeditious development and approval of 700 MHz regional plans; working with NTIA and DHS to develop spectrum sharing among federal, state and local agencies for emergency response purposes; and publicizing interoperability successes and best practices.

- *Essential Steps in Addressing E-911 Lessons Learned – A Plan for Resiliency and Restoration of E-911 Infrastructure and Public Safety Answering Points ("PSAPs").* The FCC should encourage implementation of certain Network Reliability and Interoperability Council ("NRIC") best practice recommendations to ensure more robust E-911 service. In addition, the FCC should recommend and take steps to permit the designation of a secondary back-up PSAP more than 200 miles away, as well as urge applicable federal programs to expand eligibility for 911 enhancement/interoperability grants.
- *Essential Steps in Addressing Lessons Learned Concerning Emergency Medical and Hospital Communications Needs – An Outreach Program to Educate and Include the Emergency Medical Community in Emergency Communications Preparedness.* The FCC should work to assist the emergency medical community to facilitate the resiliency and effectiveness of their emergency communications systems through education and clarification of Stafford Act classification and funding eligibility.

► ***Improving communication of emergency information to the public.*** These recommendations include:

- *Actions to Alert and Inform – Revitalize and Publicize the Underutilized Emergency Alert System.* The FCC should revitalize and publicize the underutilized EAS through education and the exploration of complementary notification technologies.
- *Actions to Alert and Inform – Commence Efforts to Ensure that Persons with Disabilities and Non-English-Speaking Americans Receive Meaningful Alerts.* The FCC should commence efforts to ensure that persons with disabilities and non-English-speaking Americans receive meaningful alerts, including resolving technical hurdles to these individual's utilization of EAS, publicizing best practices for serving these individuals, and encouraging state and local emergency agencies to make critical emergency information accessible to persons with disabilities and non-English-speaking Americans.
- *Actions to Alert and Inform – Ensure Consistent and Reliable Emergency Information Through a Consolidated and Coordinated Public Information Program.* The FCC should work with federal, state and local agencies to ensure consistent and reliable emergency information through a consolidated and coordinated public information program.

* * * * *

The Katrina Panel commends Chairman Martin and the Commission for their actions to assist industry and first responders before, during and after Hurricane Katrina and for forming this Panel to identify steps to be taken to enhance readiness and recovery in the future. The Panel hopes that its observations and recommendations prove useful to the Commission and assist our Nation in preparing for and responding to future hurricanes and any other disasters that might lay ahead for us.

INTRODUCTION

The Independent Panel Reviewing the Impact of Hurricane Katrina on Communications Networks ("Katrina Panel" or "Panel") hereby submits its report to the Federal Communications Commission ("Commission" or "FCC"). The Panel is charged with studying the impact of Hurricane Katrina on the telecommunications and media infrastructure[1] in the areas affected by the hurricane. As directed by the Commission, this report presents the Panel's findings as well as recommendations for improving disaster preparedness, network reliability and communications among first responders.

I. Panel Formation and Charge

On September 15, 2005, FCC Chairman Kevin J. Martin announced that he would establish an independent expert panel to review the impact of Hurricane Katrina on the communications infrastructure.[2] Chairman Martin made the announcement at the FCC's Open Meeting focusing on the effects of Hurricane Katrina, which was held in Atlanta, Georgia. He stated that the Panel would be composed of public safety and communications industry representatives.[3] The twenty-seven members of the Panel, reflecting that diverse composition, are identified in Appendix A. Chairman Martin appointed Nancy J. Victory of Wiley Rein & Fielding LLP, the former Assistant Secretary of Commerce for Communications and Information and Administrator of the National Telecommunications and Information Administration, to chair the Panel.[4]

In accordance with the requirements of the Federal Advisory Committee Act, the FCC published a notice announcing the establishment of the Katrina Panel in the Federal Register on January 6, 2006.[5] The Panel's charter details the Katrina Panel's objectives and the scope of its activity.[6] Specifically, the Charter directs the Panel:

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[1] Throughout this report, the terms "communications infrastructure" and "communications networks" are intended to refer to both telecommunications (*e.g.*, telephony, wireless, satellite, WISP) and media (*e.g.*, radio, television, cable) infrastructure. "Communications providers" is intended to refer to the operators of these networks.

[2] Statement of Kevin J. Martin, Chairman, Federal Communications Commission, Open Meeting on the Effects of Hurricane Katrina, Atlanta, GA, at 3 (Sept. 15, 2005), *available at* http://hraunfoss.fcc.gov/edocs_public/attachmatch/DOC-261095A1.pdf [hereinafter "Martin Sept. 15 Statement"]; *see also* FCC Takes Steps to Assist in Hurricane Katrina Disaster Relief, 2005 FCC LEXIS 5109 (rel. Sept. 15, 2005) (Commission news release).

[3] Martin Sept. 15 Statement at 3.

[4] Chairman Kevin J. Martin Names Nancy J. Victory as Chair of the Federal Communication Commission's Independent Panel Reviewing the Impact of Hurricane Katrina on Communications Networks, 2005 FCC LEXIS 6514 (rel. Nov. 28, 2005) (Commission news release).

[5] *See* Federal Communications Commission, Federal Advisory Committee Act, Notice, 71 Fed. Reg. 933 (Jan. 6, 2006), *available at* http://www.fcc.gov/eb/hkip/hkipnoe.pdf. Access to the public comments filed with and notices generated by the Katrina Panel (unless otherwise noted with a URL designation in the citations which follow) is through the Panel's website, *available at* http://www.fcc.gov/eb/hkip/.

- to study the impact of Hurricane Katrina on all sectors of the telecommunications and media industries, including public safety communications;
- to review the sufficiency and effectiveness of the recovery effort with respect to this infrastructure; and
- to make recommendations to the Commission by June 15, 2006 regarding ways to improve disaster preparedness, network reliability, and communication among first responders such as police, fire fighters, and emergency medical personnel.[7]

Pursuant to the Charter, the Panel became operational on January 9, 2006. The Charter also provides that the Panel will terminate on June 15, 2006 and must carry out its duties before that date.

II. Process and Activities of the Panel

In order to gather information to fulfill the directives of its Charter, the Panel called upon the experiences of its members, many of whom were directly involved in the recovery efforts following Hurricane Katrina. The Panel also solicited broad public input by providing processes by which interested parties could submit written comments[8] and provide oral presentations.[9] The Panel additionally invited certain experts to present to the Panel or demonstrate new technologies and applications. The written comments received by the Panel, as well as transcripts of the Panel's meetings, are publicly available at the FCC's Public Reference Room and on the Panel's website. Finally, the Panel also reviewed publicly available information regarding matters under the Panel's consideration.

The Panel met five times to hear oral presentations, to discuss draft findings and recommendations, and to finalize and approve this report. Those meetings occurred on January 30, March 6-7, April 18, May 12, and June 9, 2006. The March 6-7 meeting was held in Jackson, Mississippi, where the Panel was able to hear oral presentations by interested parties. All other meetings of the Panel occurred in Washington, DC. All of these meetings were public, with prior notice of their date, time and location provided to the public.[10]

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[6] *See* FCC Independent Panel Reviewing the Impact of Hurricane Katrina on Communications Networks, Charter (filed Jan. 9, 2006), *available at* http://www.fcc.gov/eb/hkip/HKIPCharter.pdf.

[7] *Id.* at 1- 2.

[8] *See, e.g.,* Federal Communications Commission, Federal Advisory Committee Act; Independent Panel Reviewing the Impact of Hurricane Katrina on Communications Networks, Notice of opportunity to provide oral presentations, 71 Fed. Reg. 5846 (Feb. 3, 2006), *available at* http://a257.g.akamaitech.net/7/257/2422/01jan20061800/edocket.access.gpo.gov/2006/pdf/06-1057.pdf.

[9] *Id.*

[10] *See, e.g., Notice of Appointment Of Members To Serve On Federal Communications Commission's Independent Panel Reviewing The Impact Of Hurricane Katrina On Communications Networks; And Independent Panel's First Meeting Scheduled For January 30, 2006*, Public Notice, 21 FCC Rcd 197 (2006). The Commission

The Panel formed informal working groups ("IWGs"), made up of small numbers of Panel members, to help it effectively review and process the necessary information within the time required. The working groups met numerous times in person and telephonically during the Panel's existence. These working groups were not decision-making bodies. Rather, they compiled and sorted information in particular issue areas for presentation to the full Panel. The Panel had three informal working groups:

- *IWG-1: Infrastructure Resiliency.* This working group focused its discussions and efforts on four main areas: (1) reviewing how and why certain portions of the communications networks failed; (2) identifying which portions of the communications networks continued to work and withstood the hurricane and why; (3) examining how communications technology can be made less vulnerable to failing; and (4) studying what steps can be taken, pre-event, to strengthen the communications infrastructure. Marion Scott, Vice President - Operations, CenturyTel, served as the Chair of this working group and Steve Dean, Fire Chief of Mobile, Alabama, served as Vice-Chair.

- *IWG-2: Recovery Coordination and Procedures.* This working group focused on seven main issues: (1) examining ways to increase the speed with which communications networks can be restored post-event; (2) reviewing whether communications technology could have been used more effectively during the recovery period, including issues relating to consumer education and post-event deployment of communications technology; (3) reviewing the intra-industry procedures that communications providers use to coordinate recovery efforts; (4) reviewing the industry-government procedures that private communications firms and federal, state and local governments use to coordinate recovery efforts; (5) studying ways that private industry can obtain faster and more efficient access to impacted areas; (6) reviewing the security and protection procedures utilized by private communications industry members when they send their first responders to impacted areas; and (7) reviewing how well emergency communications services, including Telecommunications Service Priority, Government Emergency Telecommunications Service, and Wireless Priority Service, performed during Katrina and the extent to which emergency responders used these services. Steve Davis, Senior Vice President - Engineering, Clear Channel Radio, served as the Chair of this working group and Lt. Colonel Joseph Booth, Deputy Superintendent, Louisiana State Police, served as Vice-Chair.

- *IWG-3: Emergency Communications.* This working group focused on six main issues: (1) identifying means for ensuring or enabling rapid deployment of interoperable communications in the wake of an event like Hurricane Katrina that can be implemented in the short term; (2) identifying any coordination that needs to occur among public safety entities to facilitate implementation of such a system in the wake of a disaster; (3) reviewing Hurricane Katrina's impact on the Gulf Coast Region's 911 and E-911

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also published notices in the Federal Register announcing Panel meetings. *See, e.g.,* Federal Communications Commission, Federal Advisory Committee Act; Independent Panel Reviewing the Impact of Hurricane Katrina on Communications Networks, Notice of public meeting, 71 Fed. Reg. 2233 (Jan. 13, 2006). The Panel's website at http://www.fcc.gov/eb/hkip/Meetings.html contains more information about meeting notices.

systems; (4) reviewing the impact of the hurricane on PSAPs and the procedures used to re-route emergency calls; (5) examining whether and how the communications networks could have provided greater 911 connectivity for private citizens; and (6) reviewing the adequacy of emergency communications to the public before, during and after the hurricane, and the best ways to alert and inform the public about emergencies in the future. Steve Delahousey, Vice President - Operations, American Medical Response, served as the Chair of this working group and Jim Jacot, Vice President, Cingular Network Group, served as Vice-Chair.

Typically, discussion about various findings and recommendations occurred first within the working groups. The working groups then presented draft findings and recommendations to the full Panel for further discussion. Certain issues were referred back to the working groups for additional discussion and revision.

The Panel held its final meeting on June 9, 2006. During this meeting, the Panel discussed the final draft report, including recommendations to the Commission. The Panel then unanimously approved this report for submission to the Commission.[11]

[11] The Panel would like to recognize and express appreciation to Lisa Fowlkes and Jean Ann Collins, the Designated and Alternate Designated FACA Officers for the Panel, for their important contributions in enabling the Panel to carry out its mission under the Charter. In addition, the Panel would like to thank Michael A. Lewis, Thomas Dombrowsky, and Brendan T. Carr of Wiley Rein & Fielding LLP for their considerable assistance in preparing this report.

PANEL OBSERVATIONS REGARDING THE IMPACT OF HURRICANE KATRINA ON THE COMMUNICATIONS SECTOR AND THE SUFFICIENCY AND EFFECTIVENESS OF THE RECOVERY EFFORT

The Katrina Panel has been charged with studying the impact of Hurricane Katrina on all sectors of the telecommunications and media industries, including public safety communications. The Panel has also been directed to review the effectiveness of the recovery effort with respect to this infrastructure. To inform its views on these issues, the Panel heard oral presentations and reviewed written comments from numerous government and industry representatives, as well as other interested members of the public. The Panel members also brought to bear their own experiences with Hurricane Katrina and its aftermath. As a result of digesting and discussing all of this information, the Panel members identified a number of areas where problems were observed or communications recovery and restoration efforts could have been more effective. The Panel also identified areas where successes were achieved – successes that should be repeated. These observed problems and successes, which are detailed below, generally formed the basis for the Panel's recommendations to the Commission.

The Panel's observations below are divided into four sections. Section I, Network Reliability and Resiliency, discusses the successes and failures in the resiliency and reliability of various types of communications networks from an operational perspective. This section looks at the effects of both the hurricane itself and the subsequent levee breaches on communications infrastructure. Section II, Recovery Coordination and Procedures, reviews the challenges communications infrastructure providers encountered in restoring and maintaining communications service, particularly with regard to access and credentialing issues, restoration of power, and security. Section III, First Responder Communications, examines the challenges posed to public safety and emergency first responders in the days following Hurricane Katrina. And finally Section IV, Emergency Communication to the Public, focuses on the adequacy and effectiveness of emergency communications to the public before, during and after Hurricane Katrina.

I. Network Reliability and Resiliency

The sheer force of Hurricane Katrina and the extensive flooding resulting from the breached levees severely tested the reliability and resiliency of communications networks in the Gulf Coast region. Katrina also affected areas of the Gulf Coast in varied fashions. In the high impact zones near Gulfport, MS and New Orleans, LA, the hurricane created much heavier damage to the infrastructure due to strong winds and, in New Orleans, extensive flooding in the days after the storm. In less impacted areas, damage was less severe and recovery efforts were more easily accomplished. Katrina taxed each type of communications infrastructure in a variety of ways: (1) strong winds and rain made it difficult for technical staff to support and maintain the networks and blew antennas out of alignment; (2) heavy flooding following Katrina overwhelmed a large portion of the communications infrastructure, damaging equipment and impeding recovery; (3) single points of failure in vital communications links led to widespread communications outages across a variety of networks; and (4) the duration of power outages far

outlasted most generator fuel reserves, leading to the failure of otherwise functional infrastructure. However, there were resiliency successes in the aftermath: (1) a large portion of the communications infrastructure withstood the storm's wind and rain with only minor damage (as distinguished from post-storm flooding from levee breaches and power outages, which had a more devastating impact); (2) satellite networks, although taxed by extensive numbers of additional users, remained available and usable throughout the affected region; and (3) the communications networks operated by utilities appeared to have a very high rate of survivability. By examining the failures in network resiliency and reliability, along with the successes, we can better prepare communications infrastructure to withstand or quickly recover from future catastrophic events.

A. Effect of Hurricane Katrina on Various Types of Communications Networks.

Hurricane Katrina and its aftermath had a devastating impact on communications networks in the Gulf Coast region. In the affected areas of Louisiana, Mississippi and Alabama, more than three million customer telephone lines were knocked out of service. Both switching centers and customer lines sustained damage. Thirty-eight 911 call centers went down. Approximately 100 broadcast stations were unable to transmit and hundreds of thousands of cable customers lost service.[12] Even generally resilient public safety networks experienced massive outages. In short, Katrina had a catastrophic impact over a huge geographic area. Further, due to the unique circumstances associated with this disaster, repair and activation of the communications infrastructure in the region was not a matter of days, but rather a long and slow process.

To understand the precise impact that Hurricane Katrina had on communications networks, it is useful to distinguish between the impact of the storm itself (*i.e.,* hurricane force winds and rain) and the effect of what came later – extensive flooding from breached levees and widespread, long term power outages. As detailed below, it appears that most communications infrastructure in the areas impacted by Katrina fared fairly well through the storm's wind and rain, in most cases sustaining only minor damage or damage that should have been promptly repairable. Indeed, the tower industry reported that of all the towers in the path of the 2005 hurricanes in the Southeastern and Gulf Coast areas of the United States, less than 1 percent suffered any structural damage.[13] The coastal areas that bore the brunt of the storm suffered the worst infrastructure damage from the hurricane. Not to diminish the significant impact of the hurricane itself, what made Katrina unique and particularly catastrophic were the unique conditions after the winds subsided – substantial flooding and widespread, extended power outages. These developments impacted communications networks greatly, causing irreparable damage to submerged electronics and prolonged outages in many cases. The Panel's observations on how each type of communications infrastructure withstood Katrina and its challenging aftermath is presented below.

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[12] *See* Written Statement of Kevin J. Martin, Chairman, Federal Communications Commission, Hearing on Public Safety Communications from 9/11 to Katrina: Critical Public Policy Lessons, Before the Subcommittee on Telecommunications and the Internet, Committee on Energy and Commerce, United States House of Representatives, at 2 (Sept. 29, 2005), *available at* http://hraunfoss.fcc.gov/edocs_public/attachmatch/DOC-261417A1.pdf [hereinafter "Martin Sept. 29 Written Statement"].

[13] *See* Comments of PCIA – The Wireless Infrastructure Association, at 1 (May 15, 2006).

1. ***Public Safety Communications Networks.*** Public safety communications networks are generally built to be reliable in extreme conditions.[14] To ensure this, the systems are planned to accommodate everyday peak service times as well as large incidents. They are also designed to account for radio system disruptions, such as power outages, transmission failures, system interconnect failures, and personal radio equipment failures. However, these systems are generally not designed for widespread catastrophes of long duration – the situation resulting from Katrina.[15] As a result of the storm and its aftermath, public safety networks in the Gulf states experienced a large number of transmission outages that impacted the functionality of both primary and back-up systems. The loss of power and the failure of switches in the wireline telephone network also had a huge impact on the ability of public safety systems to function.[16] Public safety personnel's apparent lack of familiarity with the operation of back-up or alternate systems (such as satellite systems) also limited functionality.

a. *Tower Failures.* In general, public safety's antenna towers remained standing after the storm. The winds did blow antennas out of alignment, requiring readjustment. However, the main cause of transmission failures was loss of power (as discussed below). Most public safety radio systems by design are able to handle and manage a single or isolated subsystem failure or loss.[17] However, Katrina affected parts of four states, causing transmission losses at a much greater number and over a larger area than public safety planning had envisioned.

b. *Power Failures.* Power for radio base stations and battery/chargers for portable radio devices are carefully planned for public safety systems. However, generators are typically designed to keep base stations operating for 24 to 48 hours. The long duration of power outages in the wake of Katrina substantially exceeded the capabilities of most of public safety's back-up generators and fuel reserves.[18] Similarly, portable radios and back-up batteries generally have an 8 to 10 hour duty cycle.[19] Without access to power to recharge the devices and backup batteries, portable devices quickly ran out of power.

c. *Wireline and Network Infrastructure Failures.* Katrina and the subsequent levee breaches caused significant failures of the Public Switched Telephone Network ("PSTN"), particularly in the New Orleans area.[20] Public safety radio networks rely on interconnection with the PSTN or by fixed microwave links to get communications through to

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[14] *See, e.g.*, Written Statement of Chief Harlin R. McEwen, Chairman, Communications and Technology Committee, International Association of Chiefs of Police, at 2 (Mar. 6, 2006) [hereinafter "McEwen Mar. 6 Written Statement"].

[15] *Id.* at 4.

[16] *See id.* at 6.

[17] *See id.* at 5.

[18] *See id.*

[19] *Id.* at 6.

[20] *Id.*

public safety responders. Given PSTN failures, as well as damage to fixed microwave links, public safety communications were significantly affected.

d. *Training Issues.* Because of failures of the primary public safety networks, public safety personnel had to utilize back-up or alternative communications technologies with which they may not have had substantial experience. Confusion or unfamiliarity with the capabilities or operational requirements of the alternative technology seemed to result in limitations in functionality.[21] For example, some public safety personnel handed satellite phones were not familiar with their special dialing requirements and, as a result, thought the phones did not work.[22] Public safety personnel did not seem to have adequate training on alternative communications technologies, such as paging, satellite, license-exempt WISP systems, and thus were not able to transition seamlessly to these alternatives when existing public safety communications networks failed. Additionally, because alternative technologies were used so infrequently, there were reported problems with upkeep and maintenance of the equipment.[23]

2. *Public Safety Answering Points (PSAPs).* Handling of 911 calls was identified as a problem during Katrina. As a result of the storm and subsequent flooding, thirty-eight 911 call centers ceased to function.[24] Limited training and advanced planning on how to handle rerouting of emergency calls under this situation created serious problems.[25] As an example, the City of Biloxi was able to relocate their 911 call center prior to landfall; however, representatives relocated to the facility did not have full 911 capabilities. This severely hampered their ability to effectively route 911 calls to the appropriate agencies. The Katrina experience identified that there appeared to be a lack of 911 PSAP failovers and some deficits in training on routing and handling of calls when a crisis and rerouting occurs. Nevertheless, the vast majority of 911 call centers, especially in the less impacted portions of the region, were up and running by September 9.[26]

3. *Wireline.* According to FCC data, more than 3 million customer phone lines were knocked out in the Louisiana, Mississippi and Alabama area following Hurricane Katrina.[27] The wireline telephone network sustained significant damage both to the switching

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[21] *See, e.g.,* Oral Testimony of Dr. Sandy Bogucki, U.S. Department of Health and Human Services, Tr. at 54-55 (Mar. 6, 2006) [hereinafter "Bogucki Mar. 6 Oral Testimony"].

[22] Written Testimony of David Cavossa, Executive Director, Satellite Industry Association, Before the FCC's Independent Panel Reviewing the Impact of Hurricane Katrina, at 4-5 (Mar. 3, 2006) [hereinafter "Cavossa-SIA Written Testimony"]; Bogucki Mar. 6 Oral Testimony, Tr. at 55.

[23] *See* Bogucki Mar. 6 Oral Testimony, Tr. at 55.

[24] *See* Martin Sept. 29 Written Statement at 2.

[25] *See, e.g.*, Comments of Comcare at 2 (May 11, 2006) (there was no plan to bring in additional telecommunicators to the region to keep up with the influx of 911calls from victims and rescue response teams).

[26] *See* Martin Sept. 29 Written Statement at 27.

[27] *See* Written Statement of Kenneth P. Moran, Director, Office of Homeland Security, Enforcement Bureau, FCC, on Hurricane Katrina, Before the Committee on Energy and Commerce, United States House of

centers that route calls and to the lines used to connect buildings and customers to the network.[28] Katrina highlighted the dependence on tandems and tandem access to SS7 switches.[29] The high volume routes from tandem switches, especially in and around New Orleans were especially critical and vulnerable. Katrina highlighted the need for diversity of call routing and avoiding strict reliance upon a single routing solution. One tandem switch, which was critical for 911 call routing, was lost from September 4 to September 21. This switch went down due to flooding that did not allow for fuel to be replenished. Due to the high winds and severe flooding, there were multiple breaks in the fiber network supporting the PSTN. Katrina demonstrated that in many areas there may be a lack of multiple fiber routes throughout the wireline network and that aerial fiber was more at risk than underground fiber. As with other private sector communications providers, lack of access to facilities (due to both flooding and inadequate credentialing), lack of commercial power, and lack of security greatly hampered recovery efforts. Nevertheless, ten days after Katrina, nearly 90 percent of wireline customers in the Gulf region who had lost service had their service restored.[30] However, the vast majority of these customers were in the less impacted regions of the Gulf; regions that were harder hit sustained more infrastructure damage and continued to have difficulty in restoring service.

4. ***Cellular/PCS.*** Local cellular and personal communications service ("PCS") networks received considerable damage with more than 1000 base station sites impacted.[31] In general, cellular/PCS base stations were not destroyed by Katrina, although some antennas required adjustment after the storm. Rather, the majority of the adverse effects and outages encountered by wireless providers were due to a lack of commercial power or a lack of transport connectivity to the wireless switch (wireline T1 line lost or fixed microwave backhaul offline). The transport connectivity is generally provided by the local exchange carrier. With either failure, wireless providers would be required to make a site visit to return the base station to operational status. Wireless providers cited security for their personnel, access and fuel as the most pressing needs and problems affecting restoration of wireless service. However, within one week after Katrina, approximately 80 percent of wireless cell sites were up and running.[32] Consistent with other systems, the 20 percent of base stations still affected were in the areas most impacted by Katrina. Cellular base stations on wheels ("COWs") were successfully used as needed to restore service throughout the affected region. Over 100 COWs were delivered to the Gulf Coast region.[33] In addition to voice services, text messaging was used successfully during

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Representatives, at 2 (Sept. 7, 2005), *available at* http://hraunfoss.fcc.gov/edocs_public/attachmatch/DOC-260895A1.pdf [hereinafter "Moran Sept. 7 Written Statement"].

[28] *Id.* at 2-3.

[29] *See, e.g.*, Oral Testimony of Woody Glover, Director, St. Tammany Parish Communications District, Tr. at 64-67 (Mar. 6, 2006) [hereinafter "Woody Glover Mar. 6 Oral Testimony"].

[30] Martin Sept. 29 Written Statement at 43.

[31] Moran Sept. 7 Written Statement at 3.

[32] Martin Sept. 29 Written Statement at 44.

[33] S. Comm. on Homeland Security and Gov't Affairs, 109th Cong., Hurricane Katrina: A Nation Still Unprepared at 18-4, May 2006, *available at* http://hsgac.senate.gov/_files/Katrina/FullReport.pdf [hereinafter "Senate Report on Katrina"].

the crisis and appeared to offer communications when the voice networks became overloaded with traffic. Additionally, wireless providers' push-to-talk services appeared to be more resilient than interconnected voice service inasmuch as they do not necessarily rely upon connectivity to the PSTN.[34]

5. ***Paging.*** Paging systems seemed more reliable in some instances than voice/cellular systems because paging systems utilize satellite networks, rather than terrestrial systems, for backbone infrastructure.[35] Paging technology is also inherently redundant, which means that messages may still be relayed if a single transmitter or group of transmitters in a network fails.[36] Paging signals penetrate buildings very well, thus providing an added level of reliability.[37] Additionally, pagers benefited from having a long battery life and thus remained operating longer during the power outages.[38] Other positive observations concerning paging systems included that they were effective at text messaging and were equipped to provide broadcast messaging.[39] Finally, although it is unclear whether this function was utilized, group pages can be sent out during times of emergencies to alert thousands of pager units all at the same time.[40]

6. ***Satellite.*** Satellite networks appeared to be the communications service least disrupted by Hurricane Katrina.[41] As these networks do not heavily depend upon terrestrial-based infrastructure, they are typically not affected by wind, rain, flooding or power outages.[42] As a result, both fixed and mobile satellite systems provided a functional, alternative

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[34] *See* Written Testimony of Dave Flessas, VP, Network Operations, Sprint Nextel Corp, Before the FCC's Independent Panel Reviewing the Impact of Hurricane Katrina, at 3 (Jan. 30, 2006) [hereinafter "Sprint Nextel Jan. 30 Written Testimony"].

[35] *See, e.g.*, Written Testimony of Vincent D. Kelly, President and Chief Executive Officer, USA Mobility, Before the FCC's Independent Panel Reviewing the Impact of Hurricane Katrina at 7 (Mar. 6, 2006) [hereinafter "Vincent Kelly-USA Mobility Mar. 6 Written Testimony"]; Oral Testimony of Bruce Deer, President, American Association of Paging Carriers, Tr. at 122-123 (Mar. 6, 2006) [hereinafter "Deer Mar. 6 Oral Testimony"].

[36] *See, e.g.*, Vincent Kelly-USA Mobility Mar. 6 Written Testimony at 7-8.

[37] Deer Mar. 6 Oral Testimony, Tr. at 123.

[38] *Id.*

[39] *See, e.g.*, Vincent Kelly-USA Mobility Mar. 6 Written Testimony at 3.

[40] *See, e.g.*, Comments of Interstate Wireless, Inc., at 1 (May 10, 2006).

[41] *See, e.g.*, Comments of Globalstar LLC, at 1 (Jan. 27, 2006) [hereinafter "Globalstar Comments"].

[42] *See, e.g.*, Senate Report on Katrina at 18-9 ("satellite phones do not rely on terrestrial . . . infrastructure that is necessary for land mobile radio, land-line, and cellular communications"); Written Statement of Tony Trujillo, Chairman, Satellite Industry Association, Hearing on Public Safety Communications From 9/11 to Katrina: Critical Public Policy Lessons, Before the Subcommittee on Telecommunications and the Internet, Committee on Energy and Commerce, United States House of Representatives, at 3 (Sept. 29, 2005), *available at* http://energycommerce.house.gov/108/09292005Hearing1648/Trujillo.pdf [hereinafter "Trujillo Sept. 29 Written Statement"].

communications path for those in the storm-ravaged region.[43] Mobile satellite operators reported large increases in satellite traffic without any particular network/infrastructure issues.[44] More than 20,000 satellite phones were deployed to the Gulf Coast region in the days following Katrina.[45] Broadband capacity was provided by fixed satellite operators for voice, video and data network applications. Nevertheless, there were functionality issues with satellite communications – largely due to lack of user training and equipment preparation.[46] Some satellite phones require specialized dialing in order to place a call. They also require line of sight with the satellite and thus do not generally work indoors.[47] Users who had not been trained or used a satellite phone prior to Katrina reported frustration and difficulty in rapid and effective use of these devices.[48] Satellite phones also require charged batteries. Handsets that were not charged and ready to go were of no use as there was often no power to recharge handsets. Additionally, most of Louisiana's parishes (all but three) did not have satellite phones on hand because they had previously chosen to discontinue their service as a cost-saving measure.[49] Finally, users expressed the observation that satellite data networks (replacing wireline T1 service) were more robust and had fewer difficulties in obtaining and maintaining communications with the satellite network than voice services.

7. ***Broadcasting.*** The television and radio broadcasting industry was also hard hit by Katrina. Approximately 28 percent of television stations experienced downtime in the storm zone; approximately 35 percent of radio stations failed in one fashion or another.[50] In

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[43] *See, e.g.*, Written Statement of Colonel Jeff Smith, Deputy Director, Louisiana Office of Homeland Security and Emergency Preparedness, Hurricane Katrina: Preparedness and Response by the State of Louisiana, Before the Select Bipartisan Committee to Investigate the Preparation for and Response to Hurricane Katrina, United States House of Representatives, at 12 (Dec. 14, 2005), *available at* http://katrina.house.gov/hearing/12-14-05/smith_121405.doc [hereinafter "Jeff Smith Written Statement"]; Written Statement of Bruce Baughman, Director, Alabama State Emergency Management Agency, Hurricane Katrina: Preparedness and Response by the State of Alabama, Before the Select Bipartisan Committee to Investigate the Preparation for and Response to Hurricane Katrina, United States House of Representatives, at 4 (Nov. 9, 2005), *available at* http://katrina.house.gov/hearings/11_09_05/baughman_110905.doc; Written Statement of Robert Latham, Director, Mississippi Emergency Management Agency, Hurricane Katrina: Preparedness and Response by the State of Mississippi, Before the Select Bipartisan Committee to Investigate the Preparation for and Response to Hurricane Katrina, United States House of Representatives, at 4 (Dec. 7, 2005), *available at* http://katrina.house.gov/hearings/12_07_05/latham_120705.pdf.

[44] Globalstar Comments at 2.

[45] Trujillo Sept. 29 Written Statement at 4.

[46] *See, e.g.*, Senate Report on Katrina at 18-9 (problems with satellite phones do not appear to have been caused by the phones themselves or the satellite networks; a combination of user error and obstruction of satellite signals were most likely the problems); Cavossa-SIA Testimony at 4-5; Bogucki Mar. 6 Public Testimony, Tr. at 55.

[47] Cavossa-SIA Written Testimony at 5.

[48] *Id.* at 4.

[49] *See* Final Report of the Select Bipartisan Committee to Investigate the Preparation for and Response to Hurricane Katrina, H.R. Rep. No. 109-377, at 172-73 (2006), *available at* http://www.gpo.access.gov/serialset/creports/Katrina.html, [hereinafter "House Report"].

[50] *See, e.g.*, Martin Sept. 29 Written Statement at 45; Written Statement of Kevin J. Martin, Chairman, Federal Communications Commission, Hearing on Communications in a Disaster, Before the Senate Comm. on

addition, in New Orleans and the surrounding area, only 4 of the 41 broadcast radio stations remained on the air in the wake of the hurricane.[51] Some broadcasters continued broadcasting only by partnering with other broadcasters whose signals were not interrupted.[52] Broadcasters reported very few tower losses as a result of Katrina. Instead, the wind displacing and causing misaligning antennas was the biggest cause of broadcast outages. Although this type of damage could be readily repaired, the lengthy power outages – which substantially exceeded back-up generator capabilities – prevented many broadcast stations from coming back on the air. Power outages at the viewer/listener end were also an issue as they prevented broadcast transmissions from being successfully received. Additionally, the lack of security for broadcast facilities and repair personnel impeded recovery efforts. Nevertheless, within three weeks after Katrina, more than 90 percent of broadcasters were up and running in the affected region.[53] However, in the areas most impacted by the storm, the vast majority of stations remained down much longer.

8. ***Cable.*** As with the broadcasting industry, cable companies in the region reported limited infrastructure damage to their head ends following Katrina. In the areas hardest hit by the storm itself, aerial cable infrastructure was heavily damaged. Some cable facilities are underground; the storm's wind and rain had only minimal effects on them. However, the opposite was true in areas where the levees' breach caused heavy flooding. There, underground facilities were heavily damaged and the electronics in those facilities were generally completely lost. The cable industry indicated that new cable plants generally allowed for multiple points of failure and system workarounds that permitted the network to operate in spite of some widespread faults in the infrastructure. However, lack of power to cable facilities and security proved to be key problems. The cable operator serving New Orleans indicated that, even where its network was intact, lack of power/fuel prevented it from restoring operations in those areas.[54] Also, similar to broadcasting, power outages at the viewer end prevented cable programming from being successfully received.

9. ***Utilities.*** Electric utility networks (including utility-owned commercial wireless networks) appeared to have a high rate of survivability following Katrina.[55] These communications systems did not have a significant rate of failure because: (1) the systems were designed to remain intact to aid restoration of electric service following a significant storm event; (2) they were built with significant onsite back-up power supplies (batteries and generators); (3) last mile connections to tower sites and the backbone transport are typically owned by the utility

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Commerce, Science, and Transportation at 2 (Sept. 22, 2005) (an estimated 100 broadcast stations were knocked off the air).

[51] Moran Sept. 7 Written Statement at 3.

[52] Oral Testimony of Dave Vincent, Station Manager, WLOX-TV, Before the FCC's Independent Panel Reviewing the Impact of Hurricane Katrina on Communications Networks, Tr. at 309 (Mar. 6, 2006) [hereinafter "Vincent-WLOX-TV Mar. 6 Oral Testimony"] (WLOX in Biloxi partnered with WXXV in Gulfport, Mississippi, which carried WLOX's signal until they could get back on the air).

[53] Martin Sept. 29 Written Statement at 45.

[54] *See, e.g.,* Comments of Greg Bicket, Cox Communications, at 1 (Jan. 27, 2006).

[55] *See, e.g.*, UTC Comments, Hurricanes of 2005: Performance of Gulf Coast Critical Infrastructure Communications Networks, at 2 (Jan. 27, 2006).

and have redundant paths (both T1 and fixed microwave); and (4) the staff responsible for the communications network have a focus on continuing maintenance of network elements (for example, exercising standby generators on a routine basis).

10. ***License Exempt Wireless (WISPs).*** The License Exempt Wireless or wireless internet service provider ("WISP") infrastructure, in general, was not heavily damaged by Katrina or the subsequent flooding, although some antennas required adjustment because of high winds. Rather, the majority of the adverse effects and outages encountered by WISP providers were due to a lack of commercial power and difficulty with fuel resupply. WISP providers cited access difficulties as their most pressing problem in restoring their networks.

11. ***Amateur Radio Service.*** As with other communications services, amateur radio stations were also adversely affected by Katrina. Equipment was damaged or lost due to the storm and trained amateurs were difficult to find in the immediate aftermath. However, once called into help, amateur radio operators volunteered to support many agencies, such as FEMA, the National Weather Service, Hurricane Watch and the American Red Cross.[56] Amateurs provided wireless communications in many locations where there was no other means of communicating and also provided other technical aid to the communities affected by Katrina.[57]

B. Major Problems Identified Following Katrina.

In reviewing the detailed reports from each communications sector, there were three main problems that caused the majority of communications network interruptions: (1) flooding; (2) lack of power and/or fuel; and (3) failure of redundant pathways for communications traffic. In addition, a fourth item – inadvertent line cuts during restoration – resulted in additional network damage, causing new outages or delaying service restoration. Each of these areas of concern is detailed below.

1. ***Flooding.*** Hurricanes typically have flooding associated with them due to the torrential rainfall and storm surge associated with the storms. However, in addition to these sources of flooding, the levee breaks in New Orleans caused catastrophic flooding that was extremely detrimental to the communications networks.[58] While communications infrastructure had been hardened to prepare against strong winds from a hurricane, the widespread flooding of long duration associated with Katrina destroyed or disabled substantial portions of the communications networks and impeded trained personnel from reaching and operating the facilities.[59] In addition, as detailed below, the massive flooding caused widespread power outages that were not readily remedied (electric substations could not be reached nor were there

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[56] *See* Hurricane Katrina Amateur Radio Emergency Communications Relief Effort Operations Review Summary, Written Statement submitted by Gregory Sarratt, W4OZK, at 2 (Mar. 7, 2006).

[57] *Id.* at 4.

[58] *See, e.g.,* House Report at 164 (reporting that flooding knocked out two telephone company switches and hindered the communications abilities of six out of eight police districts in New Orleans, as well as the police department headquarters).

[59] *See, e.g.,* Oral Testimony of Dr. Juliette M. Saussy, Director, Emergency Medical Services of the City of New Orleans, Louisiana, Tr. at 43-44 (Mar. 6, 2006) [hereinafter "Saussy Mar. 6 Oral Testimony"].

personnel available to remedy the outages). The flooding also wiped out transportation options, preventing fuel for generators from getting where it needed to be.

2. ***Power and Fuel.*** Katrina caused extensive damage to the power grid. Significant portions of electrical facilities in Mississippi, Alabama and Louisiana – including both power lines and electric plants – were severely impaired due to wind and flooding. As a result, power to support the communications networks was generally unavailable throughout the region.[60] This meant that, for communications systems to continue to operate, backup batteries and generators were required. While the communications industry has generally been diligent in deploying backup batteries and generators and ensuring that these systems have one to two days of fuel or charge, not all locations had them installed. Furthermore, not all locations were able to exercise and test the backup equipment in any systemic fashion. Thus, some generators and batteries did not function during the crisis. Where generators were installed and operational, the fuel was generally exhausted prior to restoration of power. Finally, flooding, shortages of fuel and restrictions on access to the affected area made refueling extraordinarily difficult.[61] In some instances, fuel was confiscated by federal or local authorities when it was brought into the Katrina region.[62]

3. ***Redundant pathways.*** The switches that failed, especially tandems, had widespread effects on a broad variety of communications in and out of the Katrina region. In addition, T1 and other leased lines were heavily used by the communications networks throughout the region, with those failures leading to loss of service. As an example, a major tandem switch in New Orleans was isolated, which meant that no communications from parts of New Orleans to outside the region could occur. This switch, an access tandem that carried long distance traffic through New Orleans and out to other offices, had two major routes out of the city (one to the east and one to the west). The eastern route was severed by a barge that came ashore during the hurricane and cut the aerial fiber associated with the route. If only this route had been lost, the access tandem traffic could have continued. However, the western route was also severed – initially by large trees falling across aerial cables, then subsequently by construction crews removing debris from highway rights-of-way. While there were provisions for rerouting traffic out of the city, the simultaneous loss of both of these major paths significantly limited communications service in parts of New Orleans.

4. ***Line cuts.*** During the restoration process following Katrina, there were numerous instances of fiber lines cut accidentally by parties seeking to restore power, phone, and cable, remove trees and other debris, and engage in similar restoration activities.[63] BellSouth indicated in its comments to the Katrina Panel that several of its major routes were cut multiple

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[60] House Report. at 166.

[61] *Id.* at 164.

[62] *See, e.g.*, Senate Report on Katrina at 18-4 (citing Committee staff interview of William Smith, Chief Technology Officer, BellSouth, conducted on Jan. 25, 2006) (FEMA commandeered communications fuel reserves in order to refuel helicopters).

[63] *See, e.g.*, Woody Glover Mar. 6 Oral Testimony, Tr. at 66 (Mar. 6, 2006).

times.[64] For example, on Monday, September 12th, a major fiber route from Hammond, Louisiana to Covington, Louisiana was cut by a tree trimming company.[65] Cox Communications reported that, by the eleventh day after the storm, more outages of its network in the region were caused by human damage than storm damage. Public safety entities also noted similar cuts in service during the restoration process.[66]

In addition to these major causes of network interruptions, security and access to facilities were consistently mentioned as significant issues affecting restoration of communications services. These problems are discussed in detail in the following section.

II. Recovery Coordination and Procedures

After Katrina's wind and rain subsided, challenges to communications service maintenance and restoration continued. Flooding, which submerged and damaged equipment and blocked access for restoration, was a major problem. The Panel also observed significant challenges to the recovery effort resulting from (1) inconsistent and unclear requirements for communications infrastructure repair crews and their subcontractors to gain access to the affected area; (2) limited access to power and/or generator fuel; (3) limited security for communications infrastructure and personnel and lack of pre-positioned back-up equipment; (4) lack of established coordination between the communications industry and state and local officials as well as among federal, state and local government officials with respect to communications matters; and (5) limited use of available priority communications services. On the other hand, lines of communication between the communications industry and the federal government were established and seemed generally effective in facilitating coordination, promptly granting needed regulatory relief, and gathering outage information. In addition, *ad hoc*, informal sharing of fuel and equipment among communications industry participants helped to maximize the assets available and bolster the recovery effort. However, additional industry coordination of personnel and assets internally and among governments could have substantially facilitated restoration of communications networks.

A. Access to the Affected Area and Key Resources.

1. ***Perimeter Access and Credentialing.*** Communications restoration efforts were hampered significantly by the inability of communications infrastructure repair crews and their contracted workers to access the impacted area post-disaster.[67] For important safety and

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[64] *See* Comments by William L. Smith, BellSouth, Before the FCC's Independent Panel Reviewing the Impact of Hurricane Katrina on Communications Networks, at 7 (Jan. 30, 2006) [hereinafter "Smith-BellSouth Jan. 30 Written Statement").

[65] *Id.*

[66] *See, e.g.,* Comments of Robert G. Bailey, National Emergency Number Association, Harris County Emergency Communications, at 1 (Jan. 30, 2006) [hereinafter "Bailey Jan. 30 Written Testimony"].

[67] *See, e.g.*, Oral Testimony of William L. Smith, Chief Technology Officer, BellSouth Corp., Before the FCC's Independent Panel Reviewing the Impact of Hurricane Katrina, Tr. at 188 (Jan. 30, 2006) [hereinafter "Smith-BellSouth Jan. 30 Oral Testimony"]; *see also* Statement of Jim Jacot, Vice President, Cingular Network Group, Before the FCC's Independent Panel Reviewing the Impact of Hurricane Katrina, Tr. at 125 (Jan. 30, 2006)

security reasons, law enforcement personnel set up a perimeter around much of the impacted region and imposed restrictions on who could access the area. Communications infrastructure repair crews from all sectors of the industry had great difficulty crossing the perimeter to access their facilities in need of repair.[68] This seemed to be a particular problem for smaller or non-traditional communications companies,[69] who tended to have lower levels of name recognition with law enforcement personnel guarding the perimeter.

Although some jurisdictions provided credentials to communications infrastructure repair crews to permit them to access the affected area, the process appeared to be unique for each local jurisdiction. Communications providers reported that credentials that permitted access through one checkpoint would not be honored at another.[70] In many cases, different checkpoints required different documentation and credentialing before permitting access.[71] As a result, repair crews needed to carry multiple credentials and letters from various federal, state and local officials.[72] There was no uniform credentialing method in place whereby one type of credential would permit access at any checkpoint.[73] Communications providers were also not clear about which agency had authority to issue the necessary credentials.[74] And there did not appear to be any mechanism in place for issuing credentials to those who needed them prior to Katrina making landfall.

Once communications infrastructure repair crews gained access to the impacted area, they had no guarantee they would be allowed to remain there. The enforcement of curfews and other security procedures at times interrupted repair work and required communications restoration crews to exit the area. In at least one instance, law enforcement personnel insisted that communications

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[hereinafter "Jacot-Cingular Jan. 30 Oral Testimony"]; Trujillo Sept. 29 Written Statement at 9; Comments of M/A-Com at 7 (Jan. 30, 2006).

[68] *See, e.g.*, Senate Report on Katrina at 18-4 (repair workers sometimes had difficulty gaining access to their equipment and facilities because the police and National Guard refused to let crews enter the affected area); Federal Support to Telecommunications Infrastructure Providers in National Emergencies: Designation as "Emergency Responders (Private Sector)", The President's National Security Telecommunications Advisory Committee, Legislative and Regulatory Task Force, at 7 (Jan. 31, 2006) [hereinafter "Jan. 31 NSTAC Report"].

[69] *See, e.g.*, Comments of the Satellite Industry Association at 6 (January 27, 2006) (describing how satellite system repair crews had difficulty obtaining access to the impacted area); Comments of Xspedius Communications, LLC, at 2, 6 (Mar. 6, 2006) [hereinafter "Comments of Xspedius"].

[70] *See, e.g.*, Senate Report on Katrina at 18-4 (citing Committee staff interview of Christopher Guttman-McCabe, Vice President, Regulatory Affairs, CTIA, conducted on Jan. 24, 2006) (industry representatives said that their technicians would benefit from having uniform credentialing that is recognized by the multiple law enforcement agencies operating in a disaster area).

[71] *See, e.g.*, Vincent-WLOX-TV Mar. 6 Written Testimony at 5 (stating that a credential that permitted access in one county was sometimes not honored in a different county).

[72] *See, e.g.*, Comments of Xspedius at 2-3.

[73] *See, e.g.*, Senate Report on Katrina at Findings at 8 (efforts by private sector to restore communications efforts were hampered by the fact that the government did not provide uniform credentials to gain access to affected areas).

[74] *See, e.g.*, Comments of Xspedius at 3.

technicians cease their work splicing a key telecommunications cable and exit the area in order to enforce a curfew.[75] Although such practices may have been necessary from a security standpoint, they did interrupt and hamper the recovery process.

The problems with access were not all one-sided. Law enforcement personnel also expressed frustration with the access situation, particularly with respect to the different credentials issued and not knowing what to ask for or what to honor. It was also reported that credentialed communications infrastructure repair personnel sometimes allowed non-credentialed individuals to ride in their vehicles through checkpoints, which compromised the security of the area. It also caused law enforcement personnel at the perimeter to be wary of persons seeking to access the affected area and the credentials they presented, potentially further slowing the access process.

2. ***Fuel.*** Problems with maintaining and restoring power for communications infrastructure significantly affected the recovery process. As described in Section I.B.2 above, many facilities could have been up and operating much more quickly if communications providers had access to sufficient fuel. The commercial power upon which the vast majority of communications networks depended for day-to-day operations was knocked out over a huge geographic area. Back-up generators and batteries were not present at all facilities. Where they were deployed, most provided only enough power to operate particular communications facilities for 24-48 hours – generally a sufficient period of time to permit the restoration of commercial power in most situations, but not enough for a catastrophe like Hurricane Katrina.

Access to fuel reserves or priority power restoration appeared extremely limited for the communications industry.[76] Only a few communications providers had stockpiles of fuel or special supplier arrangements. However, if the fuel was not located fairly near to the perimeter, it was difficult and expensive to get it where it was needed in a timely fashion. Perimeter access issues also impeded the ability to bring reserve fuel into the region. Moreover, many roads and traditional means of accessing certain facilities could not be used due to the extensive flooding that followed Hurricane Katrina. And many communications providers did not anticipate the need for alternative means of reaching their facilities. In addition, some providers reported having their limited fuel reserves confiscated by law enforcement personnel for other pressing needs.[77] Although electric and other utilities maintain priority lists for commercial power restoration, it does not appear that commercial communications providers were on or eligible for such lists. Indeed, one wireless provider speaking at the Katrina Panel's January 2006 meeting – more than 4 months after Katrina's landfall – reported that it had 23 cell sites in the impacted

[75] Smith-BellSouth Jan. 30 Oral Testimony, Tr. at 191; *see also* Jacot-Cingular Jan. 30 Oral Testimony, Tr. at 125.

[76] *See, e.g.*, Comments of Mississippi Assn. of Broadcasters at 1–2 (Jan. 27, 2006).

[77] *See, e.g., id.*; House Report at 167 ("[O]ne of Nextel's fuel trucks was stopped at gunpoint and its fuel taken for other purposes while en route to refuel cell tower generators, and the Mississippi State Police redirected a fuel truck carrying fuel designated for a cell tower generator to fuel generators at Gulfport Memorial Hospital.").

area still running on backup generators.[78] Most communications providers also did not appear to be able to access any government fuel reserves.

On a positive note, several companies apparently shared their reserve fuel with other communications providers who needed it, even their competitors.[79] This sharing occurred on a purely *ad hoc* basis.[80] There did not appear to be any forum or coordination area for fostering industry sharing of fuel or other equipment.

3. ***Security.*** Limited security for key communications facilities and communications infrastructure repair crews also hampered the recovery effort.[81] Security concerns, both actual and perceived, led to delays in the restoration of communications networks.[82] Communications providers reported generators being stolen from key facilities, even if they were bolted down. Lack of security for communications infrastructure repair workers at times delayed their access to certain facilities to make repairs.[83] Some providers employed their own security crews.[84] However, obtaining credentials to allow these individuals to access the affected area was sometimes a problem. Further, communications infrastructure repair crews generally did not receive security details from law enforcement. Clearly, law enforcement had other very significant responsibilities in the wake of Katrina. In addition, communications providers are apparently not considered "emergency responders" under the Robert T. Stafford Disaster Relief and Emergency Assistance Act[85] and the National Response Plan and thus are not eligible to receive non-monetary Federal assistance, like security protection for critical facilities and repair personnel.[86] In one instance, however, a major communications provider successfully sought governmental security for its Poydras St. office in New Orleans, which serves as a regional hub for multiple telecommunications carriers. Both the Louisiana

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[78] *See* Jacot-Cingular Jan. 30 Oral Testimony, Tr. at 123.

[79] *See, e.g.*, Vincent-WLOX-TV Mar. 6 Oral Testimony, Tr. at 312 (describing how the radio station shared fuel with a nearby news organization).

[80] *See, e.g.*, Oral Testimony of Steve Davis, Senior Vice President of Engineering, Clear Channel Radio, Before the FCC's Independent Panel Reviewing the Impact of Hurricane Katrina, Tr. at 81-82 (Jan. 30, 2006) [hereinafter "Steve Davis-Clear Channel Jan. 30 Oral Testimony"].

[81] *See, e.g.*, Senate Report on Katrina at 18-4.

[82] The Federal Response To Hurricane Katrina Lessons Learned, February 2006, at 40, *available at* http://www.whitehouse.gov/reports/katrina-lessons-learned/.

[83] Jan. 31 NSTAC Report at 5.

[84] *See, e.g.*, Senate Report on Katrina at 18-4 (when government security proved unavailable, many telecommunications providers hired private security to protect their workers and supplies); Written Statement of Dave Flessas, Vice President for Network Operations, Sprint Nextel Corp., Before the FCC's Independent Panel Reviewing the Impact of Hurricane Katrina, at 2 (Jan. 30, 2006) (security issues forced Sprint to hire armored guards to protect its employees and contractors); Jan. 31 NSTAC Report at 5.

[85] Pub. L. No. 93-288, as amended [hereinafter "Stafford Act"].

[86] *See, e.g.*, Smith-BellSouth Jan. 30 Written Statement at 9; Jacot-Cingular Jan. 30 Oral Testimony, Tr. at 125; *see also* Oral Testimony of Captain Thomas Wetherald, Deputy Operations Director, National Communications System, Before the FCC's Independent Panel Reviewing the Impact of Hurricane Katrina, Tr. at 24 (Apr. 18, 2006) [hereinafter "Capt. Wetherald Apr. 18 Oral Testimony"].

State Police and the FBI provided security so that BellSouth workers could return to the office and keep it in service.[87]

Apparently, several companies that had their own security forces shared them with other communications providers by forming a convoy to go to a particular area.[88] Such arrangements seemed to occur on a purely informal basis. There did not appear to be any forum or staging area for fostering industry sharing of security forces or other resources.

4. ***Pre-positioning of Equipment.*** Limited pre-positioning of communications equipment may have slowed the recovery process. While some individual companies and organizations had some backup communications technologies on-hand for use after a disaster, most did not appear to locate strategic stockpiles of communications equipment that could be rapidly deployed and immediately used by persons in the impacted area.

B. Coordination Between Industry and Government.

1. ***Industry – Federal Government Coordination.*** Despite problems related above at the scene of the disaster, at the federal level, industry and government recovery coordination for the communications sector appeared to function as intended. Under the National Response Plan, the lead federal agency for emergency support functions regarding communications is the National Communications System ("NCS"). NCS manages the National Coordination Center for Telecommunications ("NCC") in Washington, DC, which is a joint industry-federal government endeavor with 36 member companies.[89] The NCC meets on a regular basis during non-emergency situations; during and immediately after Katrina, it met daily and conducted analysis and situational monitoring of ongoing events and response capabilities.[90] The Katrina Panel heard that this group played an important and effective role in coordinating communications network recovery and allowing for information sharing among affected industry members.[91] Yet, NCC membership is limited to only certain providers and does not represent a broad cross-section of the communications industry (for example, no broadcasters, WISPs, or cable providers are members).[92] Accordingly, certain industry sectors or companies that might have been helpful were not a part of this coordination effort. State and local government are also not a part of this coordination effort.

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[87] Smith-BellSouth Jan. 30 Written Statement at 8-9.

[88] *See, e.g.,* Comments of Xspedius at 3.

[89] The NSTAC Report on the National Coordinating Center (4/27/06 Draft), The President's National Security Telecommunications Advisory Committee, May 10, 2006, at 9-10 [hereinafter "May 10 NSTAC Report"].

[90] *See* Written Statement of Dr. Peter M. Fonash, Director, National Communications System, U.S. Department of Homeland Security, Ensuring Operability During Catastrophic Events, Before the Subcommittee on Emergency Preparedness, Committee on Homeland Security, United States House of Representatives, at 2, 6 (Oct. 26, 2005), *available at* http://hsc.house.gov/files/TestimonyFonash.pdf.

[91] *See, e.g.*, Capt. Wetherald Apr. 18 Oral Testimony, Tr. at 17 -18.

[92] *See* May 10 NSTAC Report at 4.

The FCC was widely praised as playing a critical role in helping to restore communications connectivity in the wake of Hurricane Katrina.[93] During and immediately after Katrina, the Commission stayed open 24 hours a day, seven days a week to respond to the disaster.[94] Within hours of Katrina's landfall in the Gulf Coast region, the Commission established an internal Task Force to coordinate its response efforts,[95] focusing on providing regulatory relief where necessary, coordinating efforts with other federal agencies, and providing information and assistance to evacuees. To assist communications providers in their recovery, the Commission established emergency procedures to streamline various waiver and special temporary authority processes to speed needed relief,[96] reached out to various providers to determine their needs, and assisted communications providers in obtaining access to necessary resources.[97]

These actions by the Commission appeared substantially to assist the industry in the recovery effort. The emergency, 24/7 contacts the Commission made available and the new streamlined processes clearly accelerated the time frame for receiving necessary regulatory approvals. However, the extensive communications outages made accessing this new information about who to contact and how to comply with the new processes difficult. Similarly, repair crews often did not know what repairs they needed to make until they reached the site.

In addition, while it was generally clear to communications providers that the Commission was the right agency to contact for regulatory relief after the disaster, the roles of other federal agencies in the recovery effort were not as clear to a large portion of the industry.[98] Communications providers who needed federal assistance (such as obtaining fuel authorizations or access to the impacted area), often did not know whom to contact. Industry participants also appeared generally unclear about which federal agency was responsible for implementing important recovery programs or distributing resources to communications companies operating in the impacted area. Competing requests for outage information from government entities at the federal, state and local level added to the confusion about agency roles. And responding to duplicative, repeated inquiries in the aftermath of Hurricane Katrina was cited by some as a distraction to communications providers' restoration efforts.

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[93] *See, e.g.*, The Federal Response to Hurricane Katrina: Lessons Learned at 142-43 (February 2006).

[94] *See, e.g.*, Martin Sept. 29 Written Statement at 3.

[95] Moran Sept. 7 Written Statement at 4.

[96] *See, e.g.*, International Bureau Announces Procedures to Provide Emergency Communications in Areas Impacted by Hurricane Katrina, FCC Public Notice (rel. Sept. 1, 2005), *available at* http://hraunfoss.fcc.gov/edocs_public/attachmatch/DOC-260835A1.pdf.

[97] *See* Steve Davis-Clear Channel Jan. 30 Oral Testimony, Tr. at 83 (describing how the Audio Division of the FCC's Media Bureau helped radio licensees secure access to fuel).

[98] *See, e.g.*, Written Statement of C. Patrick Roberts, President of the Florida Association of Broadcasters, Before the FCC's Independent Panel Reviewing the Impact of Hurricane Katrina, at 3 (Mar. 7, 2006) (observing that American must have a more cohesive and comprehensive program among federal, state, and local governments to prepare for disasters); *see also* Sprint-Nextel Jan. 30 Written Testimony at 4-5 (recognizing that there is a need to clarify the roles and responsibilities of the government agencies that are involved telecommunications restoration).

2. ***Industry – State and Local Government Coordination.*** In general, coordination between communications providers and state and local government officials in the affected region for communications network recovery purposes did not appear to exist except on an *ad hoc* basis. For the most part, there did not appear to be in existence any organized mechanism for communications providers to share information with local officials or to seek their assistance with respect to specific recovery issues, like access and fuel. Following Katrina, the Panel heard that state and local government representatives were exchanging business cards with communications providers in their area for the first time. Local government officials noted that they sometimes did not know where to turn to figure out why communications to and from key government locations did not work and how to express their priorities for communications service restoration. In addition, coordinating credentialing, access, fuel sharing, security and other key recovery efforts was difficult because there were no identified staging areas or coordination points for the communications industry.

3. ***Federal Government – State and Local Government Coordination.*** The Panel is not aware of pre-established mechanisms through which the federal government coordinated with state and local governments concerning communications network restoration issues in the wake of Katrina. For example, the Panel heard that civilian public safety officials were often unable to communicate with military officials brought in to assist local law enforcement. In addition, state and local governments are not a part of the NCC[99] and, therefore, were not able to directly coordinate with that industry-federal government group. As noted above, and due in part to a lack of pre-arranged recovery procedures, state and local government officials did not seem to be part of communications network recovery efforts. This meant that their restoration priorities may not have been effectively conveyed to communications providers and that communications providers did not have an identified place to turn for assistance with access and other recovery issues.

C. Emergency Communications Services and Programs.

The federal government, through the NCS, has established several programs for priority communications services during and following an emergency.[100] These are the Government Emergency Telecommunications Service ("GETS"), which enables an eligible user to get priority call completion for wireline telephone calls; the Wireless Priority Service ("WPS"), which enables an eligible user to get access to the next free channel when making a wireless call; and Telecommunications Service Priority ("TSP"), which enables a qualifying user to get priority restoration and provisioning of telecommunications services.[101] During and after Katrina, these priority services seemed to work well for those who subscribed to them. However, only a small percentage of those eligible for the services appeared to do so. This is particularly true of public safety users – many eligible public safety entities have not signed up for these services. It also appears to be true for some communications providers, including

[99] *See* May 10 NSTAC Report at 3.

[100] *See, e.g.*, Capt. Wetherald Apr. 18 Oral Testimony, Tr. at 18.

[101] *See, e.g.*, Written Statement of Dr. Peter Fonash, Deputy Manager, National Communications System, S. Comm. on Homeland Security and Gov't Affairs, Hearing on Managing Law Enforcement and Communications in a Catastrophe at 3-4 (Feb. 6, 2006), *available at* http://hsgac.senate.gov/_files/020606Fonash.pdf.

broadcast, WISP, and cable companies. These priority services could be an extremely useful tool in network restoration efforts. Yet, they are tools that appear not fully utilized. Like other emergency tools, they require training and practice. In some cases, users who had access to these services did not fully understand how to use them (*e.g.*, that a WPS call requires inputting a GETS code so the call would get priority treatment when it reached the landline network).

III. First Responder Communications

In the days following Hurricane Katrina, the ability of public safety and emergency first responders to communicate varied greatly across the affected region. The areas in and around New Orleans were seriously impacted.[102] New Orleans EMS was forced to cease 911 operations in anticipation of Katrina's landfall and, after the levees were breached, a total loss of EMS and fire communications ensued.[103] The communications infrastructure in coastal areas was heavily damaged due to winds or flooding.[104] As a result, more than 2000 police, fire and EMS personnel were forced to communicate in single channel mode, radio-to-radio, utilizing only three mutual aid frequencies.[105] Some mutual-aid channels required each speaker to wait his or her turn before speaking, sometimes up to twenty minutes.[106] This level of destruction did not extend to inland areas affected by the hurricane so, in contrast to New Orleans, neither Baton Rouge nor Jackson County, Mississippi, completely lost their communications capabilities and were soon operating at pre-Katrina capabilities.[107] In the hardest hit areas, however, the disruption of public safety communications operability, as well as a lack of interoperability, frustrated the response effort and caused tremendous confusion among official personnel[108] and the general public.

State and local first responders are required to act and communicate within minutes after disasters have occurred and not hours or days later when Federal or other resources from outside the affected area become available. As further described below, the lack of effective emergency communications after the storm revealed inadequate planning, coordination and training on the use of technologies that can help to restore emergency communications. Hurricane Katrina also highlighted the long-standing problem of interoperability among public safety communications

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[102] *See, e.g.,* Saussy Mar. 6 Oral Testimony, Tr. at 43.

[103] *Id.*

[104] Jeff Smith Written Statement at 12.

[105] Presentation of Major Mike Sauter, Office of Technology and Communications, New Orleans Police Department, Before the FCC's Independent Panel Reviewing the Impact of Hurricane Katrina, at 1 (Feb.1, 2006) [hereinafter "Sauter Written Statement"].

[106] *See, e.g.*, Senate Report on Katrina at 21-6 (NOFD and NOPD were forced to use a mutual aid channel, rather than the 800 MHz trunk system they were supposed to operate on; transmission over the mutual aid channel was limited and could not reach certain parts of the city).

[107] *See* Oral Testimony of George W. Sholl, Director, Jackson County Emergency Communications District, Before the FCC's Independent Panel Reviewing the Impact of Hurricane Katrina, at Tr. at 58-59 (Mar. 6, 2006) [hereinafter "Scholl Mar. 6 Oral Testimony']].

[108] Saussy Mar. 6 Oral Testimony, Tr. at 43-44.

systems operating in different frequency bands and with different technical standards.[109] One advantage that New Orleans had was the fact that no broadcasters were using the 700 MHz spectrum set aside for public safety, thus freeing it up immediately for first responder use.[110] As a result of this availability, communications providers were able to provide emergency trucks and hundreds of radios that operated on this spectrum as soon as first responders needed them.[111] Finally, 911 emergency call handling suffered from a lack of preprogrammed routing of calls to PSAPs not incapacitated by the hurricane.

A. Lack of Advanced Planning for Massive System Failures.

It was described to the Panel that public safety officials plan for disasters but that Hurricane Katrina was a catastrophe.[112] This left many state and local agencies – those who are required to respond first to such emergencies – ill-prepared to restore communications essential to their ability to do their jobs.[113] Very few public safety agencies had stockpiles of key equipment on hand to implement rapid repairs or patches to their systems. Had they been available, spare radios, batteries and chargers as well as portable repeaters or self-sufficient communications vehicles (also known as "communications on wheels") would have enabled greater local communications capabilities.[114] Further, when the primary communications system failed, many public safety entities did not have plans for an alternative, redundant system to take its place.[115] Similarly, public safety entities, including state and local government offices, did not appear to have plans in place for call forwarding or number portability to route their calls to alternative locations when they relocated. The apparent absence of contingency plans to address massive system failures, including widespread power outages, [116] was a major impediment to the rapid restoration of first responder communications.

Public safety agencies rely heavily on their equipment vendors to support them during such disasters by providing replacement parts and spare radios. Motorola stated that 72 hours prior to Katrina's landfall, it had mobilized more than 100,000 pieces of equipment and more than 300

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[109] *See, e.g.*, Written Statement of Colonel (ret.) Terry J. Ebbert, Director, Homeland Security for New Orleans, Hurricane Katrina: Preparedness and Response by the State of Louisiana, Before the Select Bipartisan Committee to Investigate the Preparation for and Response to Hurricane Katrina, United States House of Representatives, at 3-4 (Dec. 14, 2005), *available a* http://katrina.house.gov/hearings/12_14_05/ebbert_121405.doc.

[110] *See* Written Statement of Kelly Kirwin, Vice President, Motorola Comm. & Electronics, Before the FCC's Independent Panel Reviewing the Impact of Hurricane Katrina, at 5 (Jan. 30, 2006) [hereinafter "Kirwin Jan. 30 Written Statement"] (in some major cities (*e.g.*, New York, Los Angeles, San Francisco), the 700 MHz spectrum would not be available to first responders).

[111] *See id.*

[112] Written Statement of Sheriff Kevin Beary, Major County Sheriffs Assn. at 1 (Jan. 30, 2006) [hereinafter "Beary Jan. 30 Written Statement"].

[113] Saussy Mar. 6 Oral Testimony, Tr. at 43-44.

[114] Beary Jan. 30 Written Statement at 1.

[115] Presentation of Sheriff Ted Sexton, Sr. National Sheriffs Assn at 5 (Jan. 30, 2006); McEwen Mar. 6 Oral Testimony, Tr. at 35-36.

[116] McEwen Mar. 6 Written Statement at 5-6.

employees to support their customers.[117] Similarly, M/A-Com supported the restoration and maintenance of the New Orleans 800 MHz system as well as the systems for Mobile, Biloxi, Gulfport, and St. Tammany Parish.[118] Reports indicate that these efforts with established vendors were generally well-executed, except for problems with access into New Orleans.

However, the Panel was made aware of a variety of non-traditional, alternative technologies that could have served as effective, back-up communications for public safety until their primary systems were repaired. As noted in Section I, satellite infrastructure was generally unaffected by the storm and could have provided a viable back-up system. Two-way paging operations remained generally operational during the storm and did provide communications capabilities for some police, fire emergency medical personnel, but could have been more widely utilized.[119] Other types of non-traditional technology that can be deployed quickly, such as WiFi and WiMax, or self-contained communications vehicles, could also have been effectively utilized. These all appear deserving of exploration as back-up communications options to primary public safety systems.

First responders' lack of training on alternative, back-up communications equipment was also an impediment in the recovery effort.[120] This lack of training may have accounted for a sizeable number of communications failures during the first 48 hours after Katrina.[121] Public safety officials noted that that there was little time after Katrina to investigate the capabilities of new technologies for which none of their personnel had been adequately trained. This highlights the need for public safety entities to have contingency communications plans with training as a key component. The lack of training issue evidenced itself in particular with the distribution of satellite phones. These phones proved to be a beneficial resource to some, while others described the service as spotty and capacity strained. In many cases, it appears that complaints about spotty coverage really resulted from the user's lack of understanding about how to use the phone (*e.g.*, some satellite phones have a unique dialing pattern and they generally do not work indoors).[122] However, the uncontrolled distribution of satellite phones could also have triggered capacity issues in certain areas.[123] Additionally, public safety officials reminded the Panel that users must be properly trained before they can be expected to competently use technologies during high stress events.[124]

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[117] Kirwin Jan. 30 Written Statement at 2.

[118] Comments of M/A-Com at 7 (Jan. 30, 2006).

[119] Vincent Kelly-USA Mobility Mar. 6 Written Testimony at 7-9; Deer Mar. 6 Oral Testimony, Tr. at 122-23.

[120] *See, e.g.*, Written Statement of James Monroe III, Chief Executive Officer, Globalstar LLC, Before the FCC's Independent Panel Reviewing the Impact of Hurricane Katrina at 4 (Mar. 6, 2006) [hereinafter "Monroe-Globalstar Written Statement"] (some first responders failed to keep handset batteries charged, others did not realize that satellite phones require a clear line of sight between the handset and the satellite).

[121] *Id.*

[122] Cavossa-SIA Written Testimony at 4-5.

[123] *See* Report of Ed Smith, Chief, Baton Rouge Fire Department, Hurricane Katrina Independent Panel Meeting, at 1 (Jan. 30, 2006) [hereinafter "Written Report of Ed Smith"].

[124] *See, e.g.*, Scholl Oral Testimony, Tr. at 57-58, 61-62.

Finally, it seems that communications assets that were available and could have been used by first responders were not requested or deployed. There have been reports that federal government communications assets operated and maintained by FEMA and USDA were available, but not utilized, for state and local public safety operations.[125] This underutilization may have been due to the fact that FEMA's pre-staged communications vehicles apparently were located 250-350 miles away from the devastated areas,[126] and that FEMA did not request deployment of these vehicles until twenty-four hours after landfall.[127] Further, first responders were not made aware of these assets and/or did not know how to request them.[128] As noted above, many public safety officials failed to subscribe to the GETS, TSP and WPS priority programs, despite their eligibility.[129] Communications assets made available by the private sector also appear to have been underutilized by first responders. The Panel heard that manufacturers of alternative public safety communications systems were unable to gain the attention of key public safety officials to effectuate their proposed donation of equipment and services. Some offered equipment or access to their network in Katrina's aftermath but "found no takers".[130] These and other outlets could have provided some measure of communications capabilities, while repairs to primary systems were completed.

B. Lack of Interoperability.

Because of its scope and severity, Hurricane Katrina demanded a coordinated response from federal and affected state and local agencies, as well as volunteers from states both neighboring and distant. The Panel heard evidence that, in many cases, responders in different agencies were unable to communicate due to incompatible frequency assignments.[131] When the existing infrastructure for the New Orleans system was incapacitated by flooding, communications were almost completely thwarted as too many users attempted to use the three mutual aid channels in the 800 MHz band.[132] In addition, communications between the military and first responders

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[125] The Federal Response To Hurricane Katrina Lessons Learned, February 2006, at 55.

[126] Senate Report on Katrina at 12-19 (citing Committee staff interview of James Attaway, Telecommunications Specialist, Region VI, FEMA, conducted on Jan. 13, 2006).

[127] Senate Report on Katrina at 12-19 (citing Committee staff interview of William Milani, Chief Mobile Operations Section, FEMA, conducted on Jan. 13, 2006).

[128] *See, e.g.*, Monroe-Globalstar Written Statement at 5 (first responders generally did not have pre-emergency deployment plans that they could invoke in advance of the actual emergency).

[129] During and after Katrina, the NCS issued 1,000 new GETS access code numbers to first responders, and the GETS system was used to make more than 35,000 calls between August 28 and September 9. House Report at 176. During Katrina, the NCS enabled and distributed more than 4,000 new WPS phones. *Id.* The NCS also completed more than 1,500 TSP assignments following Hurricane Katrina. *Id.* at 177. It would have been helpful if these assets had been in place before the disaster and first responders were fully trained in how to use them.

[130] Statement of Jerry Knoblach, Chairman & CEO, Space Data Corporation, Before the Federal Communications Commission's Independent Panel Reviewing the Impact of Hurricane Katrina on Communications Networks, at 6 (Mar. 7, 2006).

[131] A Failure to Communicate: A Stocktake of Government Inaction to Address Communications Interoperability Failures Following Hurricane Katrina, First Response Coalition, December 2005.

[132] Sauter Written Statement at 1; Written Report of Ed Smith at 1.

also appeared to suffer from lack of interoperability.[133] In some cases, the military was reduced to using human runners to physically carry messages between deployed units and first responders.[134] In another case, a military helicopter had to drop a message in a bottle to warn first responders about a dangerous gas leak.[135]

While most observers characterized "operability" as the primary communications failure following Katrina,[136] increased ability to interoperate with other agencies would have provided greater redundant communications paths and a more coordinated response. While technological solutions, such as IP gateways to integrate frequencies across multiple bands,[137] are a critical tool for improving interoperability, the Panel was reminded that technology is not the sole driver of an optimal solution.[138] Training, agreement on standard operating procedures, governance or leadership and proper usage are all critical elements of the interoperability continuum.[139] However, the Panel heard testimony that Project SAFECOM, which is intended to provide a solution for interoperability among Federal, state and local officials, will take years to achieve its objectives.[140] However, the Panel is also aware of more expedient proposals, such as the M/A-COM, Inc. proposal to mandate construction of all Federal and non-Federal mutual aid channels to provide baseline interoperability to all emergency responders that operate across multiple frequency bands using disparate technologies.[141]

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[133] *See* Written Statement of Dr. William W. Pinsky on behalf of the American Hospital Association, The State of Interoperable Communications: Perspectives from the Field, Before the Subcommittee on Emergency Preparedness, Science, and Technology, Committee on Homeland Security, United States House of Representatives, at 5 (Feb. 15, 2006), *available at* http://hsc.house.gov/files/TestimonyPinsky.pdf.

[134] *See, e.g.,* Written Statement of The Honorable Timothy J. Roemer, Director, Center for National Policy, Public Safety Communications From 9/11 to Katrina: Critical Public Policy Lessons, Before the Subcommittee on Telecommunications and the Internet, Committee on Energy and Commerce, United States House of Representatives, at 5 (Sept. 29, 2005), *available at* http://energycommerce.house.gov/108/hearings/09292005Hearing1648/Roemer.pdf (describing the use of human couriers by the National Guard).

[135] Heather Greenfield, *Katrina Revealed Gaps In Emergency Response System*, THE WASH. TIMES, Dec. 28, 2005, at B1, *available at* http://washingtontimes.com/metro/20051227-095134-3753r.htm.

[136] The Federal Response To Hurricane Katrina Lessons Learned, February 2006, at 55; Saussy Mar. 6 Oral Testimony, Tr. at 44.

[137] *See,* e.g., Presentation to the Meeting of the Independent Panel Reviewing the Impact of Hurricane Katrina on Communications Networks, Dr. John Vaughan, Vice President TYCO Electronics: M/A-COM, March 6, 2006; *see also* Presentation to the FCC's Independent Panel Reviewing the Impact of Hurricane Katrina on Communications Networks, Wesley D. Smith, Technical Director, ARINC (Mar. 7, 2006).

[138] *See* Interoperability Continuum Brochure, Project Safecom, Dept. of Homeland Security (April 5, 2005), *available at* http://www.safecomprogram.gov/NR/rdonlyres/5C103F66-A36E-4DD1-A00A-54C477B47AFC/0/ContinuumBrochure40505.pdf.

[139] *Id.* at 4.

[140] Oral Testimony of Dr. David G. Boyd, Director of SAFECOM, Dept. of Homeland Security, Tr. at 29-30 (Apr. 18, 2006); *see also* Stephen Losey, *Defense re-examines homeland role, tactics,* Federal Times.com (Oct. 18, 2005), *available at http://*www.federaltimes.com/index.php?S=1174164.

[141] *See* Further Comments of M/A-Com, Inc. (May 30, 2006).

C. PSAP Rerouting.

When a PSAP becomes disabled, 911 emergency calls from the public are typically diverted to a secondary neighboring PSAP using preconfigured traffic routes. In many cases, Katrina disabled both the primary and secondary PSAPs, which resulted in many unanswered emergency calls. Additionally, many PSAPs in Louisiana did not have protocols in place to identify where 911 calls should go and had not arranged for any rerouting, resulting in dropped emergency calls.[142] The Panel heard testimony that Katrina has highlighted a need to identify additional back-up PSAPs at remote locations. However, FCC regulations may currently restrict the ability of local phone companies to establish pre-configured routes across LATA boundaries.[143] In addition, the routing of calls to more distant PSAPs would require specific planning to ensure appropriate and timely response to emergency calls.

D. Emergency Medical Communications.

There are indications that the emergency medical community was lacking in contingency communications planning and information about technologies and services that might address their critical communications needs.[144] In particular, this group of first responders did not seem to avail itself of existing priority communications services, such as GETS, WPS and TSP. It also appeared that emergency medical personnel were not always integrated into a locality's public safety communications planning.

IV. Emergency Communications to the Public.

The communications infrastructure, in all of its forms, is a key asset in delivering information to the American public. In emergencies and disaster situations, ensuring public safety is the first priority. The use of communications networks to disseminate reliable and relevant information to the public is critical – before, during and after such events. Moreover, to the extent a more well-informed citizenry is better able to prepare for and respond to disasters, there should be less strain on already taxed resources, thereby benefiting recovery efforts.

The Emergency Alert System ("EAS") and its predecessor systems have long made use of broadcast radio and television stations as the principal tools for communicating with the public about emergencies and disaster situations. The Panel heard stories of heroic efforts by broadcasters and cable operators to provide members of the public impacted by Katrina with important storm-related information. However, there were also reports of missed opportunities to utilize the EAS and limitations in existing efforts to deliver emergency information to all members of the public. New technologies may address some of these limitations by facilitating the provision of both macro- and micro-level information about impending disasters and recovery efforts.

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[142] House Report at 173.

[143] Bailey Jan. 30 Written Testimony at 3.

[144] *See* House Report at 269.

A. Lack of Activation.

The EAS can be activated by the federal government as well as by state and local officials to disseminate official news and information to the public in the event of an emergency. The Panel understands that the National Weather Service used the EAS to provide severe weather warnings to citizens in the Gulf States in advance of Katrina making landfall.[145] However, the Panel also heard that the EAS was not utilized by state and local officials to provide localized emergency evacuation and other important information.[146] That means that an existing and effective means of distributing timely information to our citizens was not fully utilized.

B. Limitations in Coverage.

The primary source of emergency information about Katrina came through broadcast (including satellite broadcast) and cable infrastructure, whether through the EAS or local or national news programming. Citizens who were not watching TV or listening to the radio at the time of the broadcast missed this emergency information. Damage to communications infrastructure made it difficult for news and emergency information to reach the public, as did power outages.[147] As a result, a fairly large percentage of the public likely were uninformed. The Panel heard about notification technologies that may permit emergency messages to be sent to wireline and wireless telephones as well as personal digital assistants and other mobile devices.[148] For example, the Association of Public Television Stations has developed a means for utilizing the digital transmissions of public television stations to datacast emergency information to computers or wireless devices.[149] In addition, the St. Charles Parish Public School District used a telephone-based, time-sensitive notification technology to send out recorded evacuation messages to over 21,000 phone numbers in advance of Katrina's landfall.[150] The District continued to utilize this technology to provide members of the public with specific information regarding conditions in the community in the storm's aftermath. While the use of phone-based technologies for post-disaster communications is necessarily dependent on the state of the telephone network, such technologies – which are less subject to disruption from power outages – offer the potential for complementing the traditional broadcast-based EAS.

The Panel also understands that the FCC is considering extending the reach of the existing emergency alert system to other technologies, such as wireless and the Internet.[151] The Panel

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[145] The Federal Response To Hurricane Katrina Lessons Learned, February 2006, at 28.

[146] Comments of Hilary Styron of the National Organization on Disability Emergency Preparedness Initiative at 2 (Mar. 6, 2006) [hereinafter "Styron Mar. 6 Written Testimony"].

[147] Martin Sept. 29 Written Statement at 2.

[148] Comments of Notification Technologies, Inc., EB Docket No. 04-296 (Jan. 24, 2006).

[149] Written Testimony of John M. Lawson, President and CEO, Association of Public Television Stations, Before the FCC's Independent Panel Reviewing the Impact of Hurricane Katrina on Communications Networks (April 18, 2006).

[150] *Id.* at 12.

[151] *Review of the Emergency Alert System,* First Report and Order and Further Notice of Proposed Rulemaking, 20 FCC Rcd 18,625, 18,653 (¶ 69) (2005).

understands that there are ongoing collaborative industry-government efforts to overcome the hurdles to extending alerts to other technologies.

C. Reaching Persons with Disabilities and Non-English-Speaking Americans.

Ensuring emergency communications reach all Americans, even those with hearing and visual disabilities or who do not speak English, remains a major challenge. Unfortunately, accessibility to suitable communications devices for the deaf and hard of hearing was difficult during and after Hurricane Katrina.[152] This problem was intensified by the fact that Katrina brought humidity, rain, flooding, and high temperatures (which translate into perspiration), all of which reduce the effectiveness of hearing aids and cochlear implants.[153] For persons with visual impairments, telephone and broadcast outages made information very hard to obtain, and many people with vision loss were unable to evacuate.[154]

The broadcast industry has taken significant steps to provide on-screen sign language interpreters and close captioning. Broadcasters also sometimes broadcast critical information in a second language where there are a significant number of non-English speaking residents in the community. For example, a Spanish-language radio station in the New Orleans area provided warnings, and information about family members and disaster relief assistance.[155]

However, the Panel also heard that written or captioned information was at times inadequate and that station logos or captions sometimes covered up the sign-language interpreter or close-captioning.[156] Additionally, personnel who provided these critical services often evacuated, leaving the station with no ability to deliver these services. Further, specialized radios relied upon by the hearing-impaired, because they can display text messages, are not currently designed to be battery-operated and thus became useless when power goes out.[157] The distribution of emergency weather information in languages other than English appeared limited, based primarily on the willingness and ability of local weather forecasting offices and the availability

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[152] *See, e.g.*, Styron Mar. 6 Written Testimony at 2 (over 80% of shelters did not have access to communications devices for the deaf; over 60% of shelters did not have captioning capabilities utilized on the televisions screens and several broadcasters did not caption their emergency information, even though it is required by the FCC); Oral Testimony of Cheryl Heppner, Vice Chair, Deaf and Hard of Hearing Consumer Advocacy Network, FCC Independent Panel Reviewing the Impact of Hurricane Katrina on Communications Networks, Tr. at 283 (Mar. 6, 2006) [hereinafter "Heppner Mar. 6 Oral Testimony"] (many television stations did not provide visual information).

[153] Heppner Mar. 6 Oral Testimony, Tr. at 282.

[154] Comment of the American Council of the Blind and American Foundation for the Blind, at 2 (May 3, 2006).

[155] *See, e.g.*, Comments by the National Council of La Raza, In the Eye of the Storm: How the Gov't and Private Response to Hurricane Katrina Failed Latinos at 5 (Apr. 24, 2006) [hereinafter "La Raza Comments"].

[156] Heppner Mar. 6 Oral Testimony, Tr. at 283-84; Remarks by Cheryl Heppner, Deaf and Hard of Hearing Consumer Advocacy Network, at 2 (Mar. 6, 2006).

[157] Heppner Mar. 6. Oral Testimony at 283-85.

of ethnic media outlets.[158] Innovative notification technologies, such as those described above, may provide a partial answer to the emergency communications needs of persons with disabilities and non-English-speaking members of the public as such technologies can be used to deliver targeted messages in a specified format.

Relatedly, individuals with disabilities often had a difficult time using communications capabilities at shelters or other recovery areas.[159] Phone and computer banks provided at these locations generally did not have capabilities to assist the hearing or speech-impaired.[160]

D. Inconsistent or Incorrect Emergency Information.

One of the benefits of the EAS is that it facilitates the communication of a uniform message to the public by an authoritative or credible spokesperson, thereby minimizing confusion and contributing to an orderly public response. However, as noted above, the EAS was not activated in several jurisdictions. Moreover, while broadcasters, cable operators and satellite providers went to considerable lengths to provide the public with information regarding Katrina and its impact, the Panel understands that inconsistent or erroneous information about critical emergency issues was sometimes provided within the affected region. For example, information regarding conditions in one portion of New Orleans did not necessarily accurately depict conditions in other areas of the city. The dissemination of targeted information from an authoritative source through the EAS or other notification technologies might have assisted with this problem.

[158] *See, e.g.*, La Raza Comments at 5 (citing Interview with official at the National Weather Service, Jan. 6, 2006).

[159] *Id.*; Styron Mar. 6 Written Testimony at 2.

[160] *See, e.g., id.*; Comments of the Consortium for Citizens With Disabilities at 1-2 (April 13, 2006); Styron Mar. 6 Oral Testimony, Tr. at 291.

RECOMMENDATIONS

Based upon its observations regarding the impact of Hurricane Katrina on communications networks and the sufficiency and effectiveness of the recovery effort, the Panel has developed a number of recommendations to the FCC for improving disaster preparedness, network reliability and communications among first responders. As with its observations, these recommendations are grouped into four sections. The first contains recommendations for steps to better pre-position the communications industry and the government for disasters in order to achieve greater network reliability and resiliency. The second section presents suggestions for improving recovery coordination to address existing shortcomings and to maximize the use of existing resources. The third section focuses on first responder communications issues, recommending essential steps for improving the operability and interoperability of public safety and 911 communications in times of crisis. And finally, the last group of recommendations presents the Panel's suggestions for improving emergency communications to the public. All of our citizens deserve to be sufficiently informed should a major disaster strike in the future.

Pre-positioning for Disasters – A Proactive, Rather than Reactive Program for Network Reliability and Resiliency

1. ***Pre-positioning for the Communications Industry – A Readiness Checklist*** – The FCC should work with and encourage each industry sector, through their organizations or associations, to develop and publicize sector-specific readiness recommendations. Such a checklist should be based upon relevant industry best practices as set forth by groups such as the Media Security and Reliability Council ("MSRC") and the Network Reliability and Interoperability Council ("NRIC"). Any such checklist should include the following elements:

    a. Developing and implementing business continuity plans, which would at a minimum address:

        i. power reserves,
        ii. cache of essential replacement equipment,
        iii. adequate sparing levels,
        iv. credentialing,
        v. Emergency Operations Center ("EOC") coordination,
        vi. training/disaster drills, and
        vii. appropriate disaster preparedness checklists;

    b. conducting exercises to evaluate these plans and train personnel;

    c. developing and practicing a communications plan to identify "key players" and multiple means of contacting them (including alternate communications channels, such as alpha pagers, Internet, satellite phones, VOIP, private lines, BlackBerry-type devices, etc.);

    d. routinely archiving critical system backups and providing for their storage in a "secure off-site" facilities.

2. ***Pre-positioning for Public Safety – An Awareness Program for Non-Traditional Emergency Alternatives*** – The FCC should take steps to educate the public safety community about the availability and capabilities of non-traditional technologies that might provide effective back-up solutions for existing public safety communications systems. Examples of these technologies would be pagers, satellite technology and phones, portable towers and repeaters, point-to-point microwave links, license-exempt WISP systems, other systems less reliant on the PSTN, and bridging technologies/gateways that would facilitate interoperability. One means for the FCC to do this would be to organize an exhibit area or demonstration of these technologies in conjunction with one or more large public safety conferences, such as:

   a. APCO International Annual Conference and Exposition
   August 6-10, 2006; Orlando, FL

   b. IAFC Fire Rescue International
   September 14-16, 2006; Dallas, TX

   c. International Association of Chiefs of Police Conference
   October 14-18, 2006; Boston, MA

   d. NENA Annual Conference and Trade Show
   June 9-14, 2007; Fort Worth, TX

   e. National Sheriff's Association Annual Conference
   June 23-27, 2007; Salt Lake City, UT

   f. National Fraternal Order of Police
   August 13-16, 2007; Louisville, KY

   The FCC should also consider organizing a similar exhibit/demonstration for other industry sectors that might benefit from this information

3. ***Pre-positioning for FCC Regulatory Requirements – An A Priori Program for Disaster Areas*** – The FCC should explore amending its rules to permit automatic grants of certain types of waivers or special temporary authority (STA) in a particular geographic area if the President declares that area to be a "disaster area". As a condition of the waiver or STA, the FCC could require verbal or written notification to the Commission staff contemporaneously with activation or promptly after the fact. Further, the FCC should examine expanding the on-line filing opportunities for STA requests, including STA requests for AM broadcast stations. Examples of possible rule waivers and STAs to study for this treatment include:

   a. *Wireline.*

      i. Waiver of certain carrier change requirements to allow customers whose long distance service was disrupted to be connected to an operational long distance provider.

      ii. Waiver of aging residential numbers rules for customers in the affected area. This allows carriers to disconnect temporarily customers' telephone service, upon request, and reinstate the same number when the service is reconnected.

iii. Waiver of number portability requirements to allow rerouting of traffic to switches unaffected by the crisis.
iv. Waiver of reporting filings, such as Form 477 on local competition and broadband data, during the crisis.

b. *Wireless.*

i. Waiver of amateur radio and license exempt rules permitting transmissions necessary to meet essential communications needs.
ii. Waiver of application filing deadlines (*e.g.,* renewals, construction notifications, discontinuance notices, *etc.*), construction requirements, and discontinuance of service requirements.
iii. Streamlined STA process, such that parties in the affected area may simply notify the FCC in writing or verbally of a need to operate in order to restore service.

c. *Broadcast and Cable.*

i. Waiver of non-commercial educational ("NCE") rules to permit NCE television and radio stations in the affected area to simulcast and rebroadcast commercial station programming during a crisis.
ii. Waiver of requirements for notifying the FCC of use of emergency antennas within 24 hours.
iii. Waiver of limits on AM nighttime operations, so long as operation is conducted on a noncommercial basis.
iv. Waiver of rules on limited and discontinued operations.
v. Tolling of broadcast station construction deadlines.
vi. Automatic STAs, or STAs granted through written or oral notification, for broadcast stations to go silent.
vii. Waiver of restrictions on simulcast programming of commonly owned stations within the same band.
viii. Waiver of location and staffing requirements of a main studio within the community.
ix. Waiver of activation and post-event Section 73.1250 reporting requirements related to transmission of point-to-point communications during a declared emergency.

d. *Satellite.*

i. Waiver of requirements for notifying the FCC of use of emergency antenna equipment within 24 hours.
ii. Streamlined STA process for satellite operators responding to a declared emergency.

4. ***Pre-positioning for Government Outage Monitoring – A Single Repository and Contact with Consistent Data Collection*** – The FCC should coordinate with other federal and state agencies to identify a single repository/point of contact for communications outage information in the wake of an emergency. The Panel suggests that the FCC is the federal agency best situated to perform this function. The FCC should work with affected

industry members and their trade associations to establish a consolidated data set and geographic area for data collection. Once broad agreement is reached on the appropriate outage information to be collected, it should be consistently applied and not subject to routine changes. To the extent practical, the frequency of voluntary reporting and duration of reporting requirements should be specified as part of any emergency outage reporting plan. The Panel suggests that reporting no more than once a day would strike the right balance between supplying important outage information and not distracting resources from critical recovery efforts. Additionally, any proprietary information that is gathered through voluntary outage reporting must be kept confidential, with only aggregated information provided to appropriate government entities, such as the local EOC, during a crisis situation. Any carrier-specific data should be disclosed to other agencies only with appropriate confidentiality safeguards (such as non-disclosure agreements) in place.

Recovery Coordination – Critical Steps for Addressing Existing Shortcomings and Maximizing Use of Existing Resources

1. ***Remedying Existing Shortcomings – National Credentialing Guidelines for Communications Infrastructure Providers*** – The Panel generally supports the National Security Telecommunications Advisory Committee's ("NSTAC's") recommendation for a national standard for credentialing telecommunications repair workers, but believes this should be broadened to include repair workers of all communications infrastructure providers (including wireline, wireless, WISP, satellite, cable and broadcasting infrastructure providers). Specifically, the Panel recommends that the FCC work with other appropriate federal departments and agencies and the communications industry to promptly develop national credentialing requirements and process guidelines for enabling communications infrastructure providers and their contracted workers access to the affected area post-disaster. The FCC should encourage states to develop and implement a credentialing program consistent with these guidelines as promptly as possible and encourage appropriate communications industry members to secure any necessary credentialing. Under this program, credentials should be available to be issued to communications infrastructure providers at any time during the year, including before, during and after a disaster situation. The credentials should be issued directly to communications infrastructure providers, which will then be responsible for distributing these credentials to their employees and contracted workers. These credentials, together with company-issued employee or contractor identification should be sufficient to permit access. As a condition of credentialing, the program should require that communications infrastructure providers receiving credentials ensure that their employees and contracted workers receiving credentials complete basic National Incident Management System ("NIMS") training *(i.e.,* "Introduction to NIMS"). The FCC should work with the communications industry to develop an appropriate basic NIMS training course (no more than one hour) for communications repair workers that can be completed online. Once developed, this communications-specific training course should replace "Introduction to NIMS" as the requirement for credentialing. The FCC should also encourage states to recognize and accept credentials issued by other states.

2. ***Remedying Existing Shortcomings – Emergency Responder Status for Communications Infrastructure Providers*** – The Panel supports the NSTAC's recommendation that telecommunications infrastructure providers and their contracted workers be afforded emergency responder status under the Stafford Act and that this designation be incorporated into the National Response Plan, as well as state and local emergency response plans. However, the Panel suggests that this recommendation be broadened to include all communications infrastructure providers (including wireline, wireless, WISP, satellite, cable and broadcasting infrastructure providers) and their contracted workers. The FCC should work with Congress and the other appropriate federal departments and agencies to implement this broadened recommendation.

3. ***Remedying Existing Shortcomings – Utilization of State/Regional Coordination Bodies*** – The FCC should work with state and local government and the communications industry (including wireline, wireless, WISP, satellite, cable and broadcasting) to better utilize the coordinating capabilities at regional, state and local EOCs, as well as the Joint Field Office ("JFO"). The FCC should encourage, but not require, each regional, state and local EOC and the JFO to engage in the following activities:

   a. Facilitate coordination between communications infrastructure providers (including wireline, wireless, WISP, satellite, cable and broadcasting providers, where appropriate) and state and local emergency preparedness officials (such as the state emergency operations center) in the state or region at the EOC or JFO. The parties should meet on a periodic basis to develop channels of communications (both pre-and post-disaster), to construct joint preparedness and response plans, and to conduct joint exercises.

   b. Develop credentialing requirements and procedures for purposes of allowing communications infrastructure providers, their contracted workers and private security teams, if any, access to the affected area post-disaster. These requirements and procedures should be consistent with any nationally-developed credentialing guidelines. Where possible, web-based applications should be created to pre-clear or expedite movement of communications infrastructure providers into a disaster area.

   c. Develop and facilitate inclusion in the state's Emergency Preparedness Plan, where appropriate, one or more clearly identified post-disaster coordination areas for communications infrastructure providers, their contracted workers, and private security teams, if any, to gather post-disaster where credentialing, security, escorts and further coordination can be achieved. The state's Emergency Preparedness Plan should describe the process for informing communications infrastructure providers where these coordination area(s) will be located.

   d. Post-disaster, share information and coordinate resources to facilitate repair of key communications infrastructure. Specifically, this would include identifying key damaged infrastructure; if necessary, assigning priorities for access and scarce resources (fuel, security, etc.) to repair this infrastructure. Additionally, the coordination body and staging area can provide a means for industry to share

and maximize scarce resources (share surplus equipment, double and triple up on security escorts to a particular area, *etc.*).

e. Facilitate electric and other utilities' maintenance of priority lists for commercial power restoration. Include commercial communications providers on this priority list and coordinate power restoration activities with communications restoration.

The Panel would also support communications infrastructure providers in a state or region forming an industry-only group for disaster planning, coordinating recovery efforts and other purposes. Nevertheless, the Panel believes that coordinating capabilities and staffing of regional, state and local EOCs, as well as the JFO, need to be better utilized for the purposes described above.

4. ***Maximizing Existing Resources – Expanding and Publicizing Emergency Communications Programs (GETS, WPS and TSP)*** – To facilitate the use of existing emergency communications services and programs, the FCC should:

a. Work with the National Communications System ("NCS") to actively and aggressively promote GETS, WPS and TSP to all eligible government, public safety, and critical industry groups. As part of this outreach effort, the Commission should target groups that have relatively low levels of participation. For example, the Panel recommends that the Commission reach out to the emergency medical community and major trauma centers to make them aware of the availability of these services.

b. Work with the NCS to clarify whether broadcast, WISP, satellite, and cable company repair crews are eligible for GETS and WPS under the Commission's existing rules. If so, the Commission should promote the availability of these programs to those entities and urge their subscribership. If the Commission determines that these entities are not eligible, the Panel recommends that the Commission revise its rules so that these entities can subscribe to WPS and GETS.

c. Work with the NCS to explore whether it is technically and financially feasible for WPS calls to automatically receive GETS treatment when they reach landline facilities (thus avoiding the need for a WPS caller to also enter GETS information). The Commission may desire to set up an industry task force to explore this issue.

d. Work with the NCS and the communications sector to establish and promote best practices to ensure that all WPS, GETS, and TSP subscribers are properly trained in how to use these services.

5. ***Maximizing Existing Resources – Broadening NCC to Include All Communications Infrastructure Sectors*** – The FCC should work with the NCS to broaden the membership of the National Coordination Center for Telecommunications ("NCC") to include adequate representation of all types of communications systems, including broadcast, cable, satellite and other new technologies, as appropriate.

6. ***Maximizing Existing Resources – FCC Website for Emergency Coordination Information*** – The FCC should create a password-protected website, accessible by credentialed entities (under recovery coordination recommendation #1), listing the key state emergency management contacts (especially the contacts for communications coordinating bodies), as well as post-disaster coordination areas for communications providers. During an emergency, this website should be updated on a 24/7 basis.

7. ***Maximizing Existing Resources – FCC Website for Emergency Response Team Information*** – The FCC should create a website to publicize the agency's emergency response team's contact information and procedures for facilitating disaster response and outage recovery.

First Responder Communications – Essential Steps for Addressing Lessons Learned from Hurricane Katrina

1. ***Essential Steps in Pre-positioning Equipment, Supplies and Personnel – An Emergency Restoration Supply Cache and Alternatives Inventory*** – To facilitate the restoration of public safety communications capabilities, the FCC should:

   a. Encourage state and local jurisdictions to retain and maintain, including through arrangements with the private sector, a cache of equipment components that would be needed to immediately restore existing public safety communications within hours of a disaster. At a minimum, the cache should include the necessary equipment to quickly restore communications capabilities on all relevant mutual aid channels. Such a cache would consist of:

      i. RF gear, such as 800 MHz, UHF, VHF, Mutual Aid, IP Gateway, and dispatch consoles;
      ii. trailer and equipment housing;
      iii. tower system components (antenna system, hydraulic mast);
      iv. power system components (generator, UPS, batteries, distribution panel); and
      v. fuel.

      The cache should be maintained as a regional or state-wide resource and located in areas protected from disaster impacts. The cache should be included as an element of the National Response Plan.

   b. Encourage state and local jurisdictions to utilize the cache through training exercises on a regular basis.

   c. Support the ongoing efforts of the NCC to develop and maintain a database of state and local public safety system information, including frequency usage, to allow for more efficient spectrum sharing, rapid on-site frequency coordination, and emergency provision of supplemental equipment in the event of system failures.

d. Urge public safety licensees to familiarize themselves with alternative communications technologies to provide communications when normal public safety networks are down. Such technologies include satellite telephones, two-way paging devices, and other technologies less reliant on the PSTN. Most importantly, public safety agencies should be reminded/encouraged to train and use such devices prior to emergencies.

e. Support the efforts of the NCC to develop an inventory of available communications assets (including local, state, federal civilian and military) that can be rapidly deployed in the event of a catastrophic event. The list should include land mobile radios, portable infrastructure equipment, bridging technologies/gateways, and backup power system components. This information should include the steps necessary for requesting the deployment of these assets. The FCC should work with the NCC and the appropriate agencies to educate key state and local emergency response personnel on the availability of these assets and how to request them.

f. Coordinate with the NCS/NCC to assure that, immediately following any large disaster, there is an efficient means by which federal, state and local officials can identify and locate private sector communications assets that can be made rapidly available to first responders and relief organizations. One such means to be considered would be a website maintained by either the FCC or NCC through which the private sector could register available assets along with product information. The website should be designed with a special area for registering available equipment to assist persons with disabilities in their communications needs.

2. ***Essential Steps in Enabling Emergency Communications Capabilities – Facilitating First Responder Interoperability*** – To facilitate interoperability among first responder communications, the FCC should:

a. Consistent with recent legislation, maintain the schedule for commencing commercial spectrum auctions before January 28, 2008 to fully fund the $1 billion public safety interoperability program.

b. Work with National Telecommunications and Information Administration ("NTIA") and the Department of Homeland Security ("DHS") to establish appropriate criteria for the distribution of the $1 billion in a manner that best promotes interoperability with the 700 MHz band. Among other things, such criteria should mandate that any radios purchased with grant monies must be capable of operating on 700 MHz and 800 MHz channels established for mutual aid and interoperability voice communications.

c. Encourage the expeditious development of regional plans for the use of 700 MHz systems and move promptly to review and approve such plans.

d. Expeditiously approve any requests by broadcasters to terminate analog service in the 700 MHz band before the end of the digital television transition in 2009 in order to allow public safety users immediate access to this spectrum.

e. Work with the NTIA and DHS to develop strategies and policies to expedite allowing Federal (including the military), state and local agencies to share spectrum for emergency response purposes, particularly the Federal incident response channels and channels established for mutual aid and interoperability.

f. Publicize interoperability successes and/or best practices by public safety entities to serve as models to further interoperability.

3. ***Essential Steps in Addressing E-911 Lessons Learned – A Plan for Resiliency and Restoration of E-911 Infrastructure and PSAPs*** – In order to ensure a more robust E-911 service, the FCC should encourage the implementation of these best practice recommendations issued by Focus Group 1C of the FCC-chartered NRIC VII:

a. Service providers and network operators should consider placing and maintaining 911 circuits over diverse interoffice transport facilities (*e.g.,* geographically diverse facility routes, automatically invoked standby routing, diverse digital cross-connect system services, self-healing fiber ring topologies, or any combination thereof). *See NRIC VII Recommendation 7-7-0566.*

b. Service providers, network operators and property managers should ensure availability of emergency/backup power (*e.g.,* batteries, generators, fuel cells) to maintain critical communications services during times of commercial power failures, including natural and manmade occurrences (*e.g.,* earthquakes, floods, fires, power brown/blackouts, terrorism). The emergency/backup power generators should be located onsite, when appropriate. *See NRIC VII Recommendation 7-7-5204.*

c. Network operators should consider deploying dual active 911 selective router architectures to enable circuits from the caller's serving end office to be split between two selective routers in order to eliminate single points of failure. Diversity should also be considered on interoffice transport facilities connecting each 911 selective router to the PSAP serving end office. *See NRIC VII Recommendations 7-7-0571.*

d. Network operators, service providers, equipment suppliers and public safety authorities should establish alternative methods of communication for critical personnel. *See NRIC VII Recommendation 7-7-1011.*

In addition, the FCC should:

a. Recommend the designation of a secondary back-up PSAP that is more than 200 miles away to answer calls when the primary and secondary PSAPs are disabled. This requires the FCC to eliminate any regulatory prohibition against the transport of 911 across LATA boundaries. The Panel recommends that the FCC expeditiously initiate such a rulemaking. This rulemaking should also consider permitting a backup E-911 tandem across a LATA boundary.

b. Recommend that the FCC urge the DHS, Fire Grant Act, and other applicable federal programs to permit state or local 911 commissions or emergency communications districts, which provide 911 or public safety communications

services, to be eligible to apply for 911 enhancement and communications enhancement/interoperability grants.

4. ***Essential Steps in Addressing Lessons Learned Concerning Emergency Medical and Hospital Communications Needs – An Outreach Program to Educate and Include the Emergency Medical Community in Emergency Communications Preparedness*** – The FCC should work to assist the emergency medical community to facilitate the resiliency and effectiveness of their emergency communications systems. Among other things, the FCC should:

   a. Educate the emergency medical community about emergency communications and help to coordinate this sector's emergency communications efforts;

   b. Educate the emergency medical community about the various priority communications services (*i.e.,* GETS, WPS and TSP) and urge them to subscribe;

   c. Work with Congress and the other appropriate federal departments and agencies to ensure emergency medical personnel are treated as public safety personnel under the Stafford Act; and

   d. Support DHS efforts to make emergency medical providers eligible for funding for emergency communications equipment under the State Homeland Security Grant Program.

Emergency Communications to the Public – Actions to Alert and Inform

1. ***Actions to Alert and Inform – Revitalize and Publicize the Underutilized Emergency Alert System*** – To facilitate and complement the use of the existing Emergency Alert System ("EAS"), the FCC should:

   a. Educate state and local officials about the existing EAS, its benefits, and how it can be best utilized.

   b. Develop a program for educating the public about the EAS and promote community awareness of potential mechanisms for accessing those alerts sent during power outages or broadcast transmission failures.

   c. Move expeditiously to complete its proceeding to explore the technical and financial viability of expanding the EAS to other technologies, such as wireless services and the Internet, recognizing that changes to communications networks and equipment take time to implement.

   d. Consistent with proposed legislation, work with Congress and other appropriate federal departments and agencies to explore the technical and financial viability of establishing a comprehensive national warning system that complements existing systems and allows local officials to increase the penetration of warnings to the public as well as target, when necessary, alerts to a particular area.

e. Work with the DHS and other appropriate federal agencies on pilot programs that would allow more immediate evaluation and testing of new notification technologies.

f. Work with the Department of Commerce to expand the distribution of certain critical non-weather emergency warnings over NOAA weather radios to supplement the EAS.

2. ***Actions to Alert and Inform – Commence Efforts to Ensure that Persons with Disabilities and Non-English-Speaking Americans Receive Meaningful Alerts*** – To help to ensure that all Americans, including those with hearing or visual disabilities or who do not speak English, can receive emergency communications, the FCC should:

a. Promptly find a mechanism to resolve any technical and financial hurdles in the current EAS to ensure that non-English speaking people or persons with disabilities have access to public warnings, if readily achievable.

b. Work with the various industry trade associations and the disabled community to create and publicize best practices for serving persons with disabilities and non-English-speaking Americans.

c. Encourage state and local government agencies who provide emergency information (through video or audio broadcasts or websites) to take steps to make critical emergency information accessible to persons with disabilities and non-English-speaking Americans.

3. ***Actions to Alert and Inform – Ensure Consistent and Reliable Emergency Information Through a Consolidated and Coordinated Public Information Program*** – Public information functions should be coordinated and integrated across jurisdictions and across functional agencies, among federal, state, local and tribal partners, and with private sector and non-governmental organizations. The FCC should work with all involved parties to help facilitate the following:

a. Integration of media representatives into the development of disaster communications plans (ESF #2). These plans should establish systems and protocols for communicating timely and accurate information to the public during crisis or emergency situations.

b. Designation of a public information officer at each EOC. This individual should be accessible to the media to handle media and public inquiries, emergency public information and warnings, rumor monitoring and response, and other functions required to coordinate, clear with appropriate authorities, and disseminate accurate and timely information related to the incident, particularly regarding information on public health, safety and protection.

c. During large scale disasters, the formation of a Joint Information Center ("JIC") for the collocation of representatives from federal, regional, state, local and/or tribal EOCs tasked with primary incident coordination responsibilities. The JIC would provide the mechanism for integrating public information activities across

jurisdictions and with private sector and non-governmental organizations. Media operations should be an integral part of the JIC.

CONCLUSION

The Katrina Panel commends Chairman Martin and the Commission for their actions to assist industry and first responders before, during and after Hurricane Katrina and for forming this Panel to identify steps to be taken to enhance readiness and recovery in the future. The Panel thanks the Commission for the opportunity to address the important issues associated with this devastating hurricane's effect on our nation's communications networks. In this effort, the Panel members have brought to bear a broad background of public safety and industry experiences, including (for many) first-hand knowledge of the devastation wrought by Katrina. The Panel has also benefited from information provided in the many comments and expert presentations. The Panel hopes that its resulting observations and recommendations prove useful to the Commission in helping to ensure that the communications industry, first responders, and government at all levels are better prepared for future hurricanes and any other disasters that might lie ahead for us.

APPENDIX A

Members of the Independent Panel Reviewing the Impact of Hurricane Katrina on Communications Networks

Chair: *Nancy J. Victory,* Partner, Wiley Rein & Fielding LLP

Carson Agnew, Executive Vice President, Mobile Satellite Ventures, LP
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Robert G. Dawson, President & CEO, SouthernLINC Wireless
Stephen A. Dean, Fire Chief, City of Mobile, AL
Steve Delahousey, Vice President - Operations, American Medical Response
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Billy Pitts, President of Government Affairs, The NTI Group
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Marion Scott, Vice President - Operations, CenturyTel
Kay Sears, Senior Vice President of Sales and Marketing, G2 Satellite Solutions, PanAmSat Corporation
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Edwin D. Smith, Chief, Baton Rouge Fire Department
William L. Smith, Chief Technology Officer, BellSouth Corporation
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