NRSC Network Reliability Steering Committee

NETWORK RELIABILITY STEERING COMMITTEE
2006-2007 BIENNIAL REPORT

August 2008

atis

The Alliance for Telecommunication Industry Solutions (ATIS) is a technical planning and standards development organization that is committed to rapidly developing and promoting technical and operations standards for the communications and related information technologies industry worldwide using a pragmatic, flexible and open approach. Over 1,100 participants from over 300 communications companies are active in ATIS' 22 industry committees and its Incubator Solutions Program.

< http://www.atis.org/ >

ATIS-0100023, *NRSC 2006-2007 Biennial Report*

Is an ATIS Standard developed by the **Network Reliability Steering Committee (NRSC)**.

Published by
Alliance for Telecommunications Industry Solutions
1200 G Street, NW, Suite 500
Washington, DC 20005

DATE: **September 2008**

TO: **Stakeholders of the Nation's Public Communications Networks**

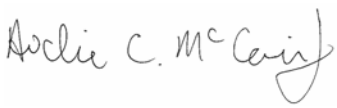
Public communications networks are vital to our nation's social well-being, public safety, economic stability, prosperity, and security. The objectives of the Network Reliability Steering Committee (NRSC) include reporting on the health of the nation's telecommunications networks and coordinating industry improvements in network reliability. This Biennial Report reviews observed network reliability trends and associated industry actions regarding the nation's communications networks for the years of 2006-2007.

Recent years have presented considerable challenges for the communications industry. Many of these challenges have been in the form of strong currents of change in fundamental areas – the technology basis of our networks, the subscriber expectations for mobile and high-bandwidth services, and the economic models underpinning investments, upgrades and operations. Despite these challenges, the industry remains committed to the collaboration that is essential to ensuring that the industry's expertise is available to monitor and address critical trends regarding the reliability of our nation's public networks.

Throughout its history, the NRSC has used two primary metrics to get its pulse on the health of the nation's public networks – one for outage frequency and one for outage impact. Most of the work to achieve current levels of reliability is performed by individual companies, as they proactively anticipate, and respond to, the needs of their subscribers. Network reliability improvements include both reducing the number of outages and reducing the impact of a given outage (e.g., the number of impacted subscribers and/or the duration of the outage). Within this report, several studies are presented in which representatives from multiple companies joined together to address an observed trend. The resulting analysis and guidance includes insights as to the major causes of the outages of concern and specific, actionable countermeasures the industry can take to effectively address the areas of concern. The NRSC encourages all service providers, network operators and equipment suppliers to review the industry's Best Practices and related documents. (< http://www.atis.org/nrsc/index.asp > and < http://www.bell-labs.com/USA/NRICbestpractices >).

Those familiar with past NRSC Annual Reports will notice a discontinued use of data from previous years. This is because changes in FCC outage reporting regulations have substantially affected key aspects of the data now being collected, in comparison to the previous data set. For example, reporting entities now include wireless and cable network operators.

The industry's recognition of its vital role in serving the nation's needs, its commitment to ensuring highly reliable networks, and its willingness to work together for the common good of network reliability despite a very competitive environment are as evident in the activities of the NRSC as they are anywhere. The NRSC is humble that its collaborative mission and activities are used as a model by others around the world and continues to seek opportunities to improve its approach.



ARCHIE MCCAIN
NRSC CHAIR
AT&T

KARL F. RAUSCHER
NRSC VICE CHAIR
Bell Labs, Alcatel-Lucent

TABLE OF CONTENTS

TABLE OF FIGURES

TABLE OF TABLES

EXECUTIVE SUMMARY

About the NRSC

The Network Reliability Steering Committee (NRSC) provides guidelines and tools to the communications industry, with the ultimate goals of maintaining and improving the high level of network reliability in the United States. Through its team of industry network reliability experts, the NRSC establishes industry guidelines and processes to be used in the collection of network reliability data, documents methods for the industry to use in analyzing outage data, works with the FCC to identify and analyze emerging outage trends, and makes recommendations aimed at improving the reliability of communications networks. The NRSC holds quarterly public meetings, and at a typical meeting there are more than thirty attendees from more than twenty companies, representing wireline, wireless and cable networks. This biennial report covers the period of 2006 and 2007. A brief summary of the history of the NRSC is provided in the *Introduction* of this report (pages 6-9).

Changing Environment and Changing Industry

Our nation's current daily work operations and way of life are vitally dependent on highly reliable communications networks. Critical sectors such as energy, finance, transportation and public safety – as well as others – increasingly rely on the immediate availability of public communications networks and services for their continued function. However, high reliability allows little room for any error, and attaining high levels of reliability for man-made systems is extremely difficult.

In fact, maintaining the reliability of public communications networks is increasingly challenging for several reasons. First, there are *changes in technology* on several fronts. These begin with the very foundational engineering principles for how end-to-end connectivity is achieved with packet-based switching fabric, and include wireless as a now often sole means of network access, methods of managing the global mobility of the user, and the offering of a plethora of new services – such as gaming and social networking.

There are also *changes in expectations* such that work and lifestyles are being built on advanced communications services being constantly available. Examples include financial transactions becoming entirely electronic immediately after the first document is scanned, businesses that are totally dependent on their web presence for revenue, the proliferation of employees telecommuting or maintaining a mobile virtual office, and children being educated at home through state-sponsored cyber charter schools. The members of the NRSC understand these financial, business, lifestyle and education dependencies and the diligence required to maintain the needed reliability in our nation's public networks.

©iStockphoto.com/Svetlana Tebenkova; Christine Balderas; Gene Chutka; and Greg Cooksey (left to right)

There are also *changes in the economic models* of the industry. Some advances brought about by our industry have ushered in new business paradigms such as complex outsourcing and off-shoring arrangements, new competitors with dramatically cheaper basic service offerings, and network devices with market life spans measured on the order of months. The result has been intense pressures placed on network operators and equipment suppliers, requiring continuous shifting to new technology platforms, highly complex business models with many external dependencies, and an ever-demanding focus on cost savings to remain competitive.

While any one of these factors – technology, expectation, economics – would be motivation for increased diligence and attention, their coexistence makes it even more so. Further discussions of the factors influencing network reliability are reviewed in the Introduction of this report.

Highlights

During the 2006 to 2007 period, the NRSC was involved in various stage of eight studies. These included six special studies, one opportunity evaluation and one standing study. Participation in these study teams is open to NRSC members, and they make regular reports at the NRSC's quarterly public meetings. The covered topics were:

- Special Studies:
  - DS3 Simplex Conditions
  - Wireless Outages
  - Hardware Sparing
  - E911 Outages
  - Digital Cross-Connect System Outages
  - Hurricane Special Study Follow Up
- Opportunity Evaluation:
  - Malicious Activities Outages
- Ongoing Studies:
  - Outage Reporting Advisory (NORS[1] and DIRS[2])

As a result of these studies, the following guidance was provided to the industry:

- A Hurricane Preparation Checklist.
- 2 NRSC Bulletins were posted.
- 5 new Best Practices were developed and posted.
- 20 existing Best Practices were highlighted for industry attention.
- 30 study team analysis reports were made in quarterly public meetings.

This report provides a statement on the health of the nation's public networks that represents the expert industry collaborative analysis, specific actionable guidance for improving network reliability and context for understanding issues that affect the NRSC's ability to continue to be an effective force in promoting high reliability.

[1] Network Outage Reporting System.

[2] Disaster Information Reporting System.

Network Reliability Steering Committee 2006-2007 Biennial Report

INTRODUCTION

History of the NRSC

Several Catastrophic Outage Events

During the period from 1988 through the early 1990s, the U.S. communications industry experienced several network outages that had a very high impact on subscribers. Beginning with the "Great Hinsdale Fire" of 1988 through several Signaling Transfer Point (STP) outages in 1991, the nation increased its focus on the reliability of its public networks.

The NRC is established

In November 1991, the Network Reliability Council (NRC) was established by the Federal Communications Commission (FCC) to bring together leaders of the telecommunications industry and telecommunications experts from academic and consumer organizations to explore and recommend measures that would enhance network reliability.[3]

The FCC mandates outage reporting

In April 1992, the FCC required the reporting of outages by exchange and interexchange service providers. The criteria for an event to be reportable were a duration of 30 minutes or more that potentially affected 50,000 or more customers.[4] The industry-led NRC afterward recommended that the reporting criteria be lowered to 30,000 customers affected. Another NRC recommendation was to report all outages affecting 911 emergency call centers, major airports, nuclear power plants, major military installations and key government facilities. Carriers began reporting outage events using the lowered threshold criteria in June 1992. Because of the sensitive nature of some of the outage events (e.g., military installations), in May 1993 the National Communications System (NCS) accepted the task of reporting such outages to the FCC. In August 1994, FCC outage reporting regulations were revised.[5] Most of the changes had already been accommodated for by the industry in their voluntary reporting of events that began in June 1992. Other major changes included the reporting of fire-related incidents potentially affecting 1,000 or more lines, and the requirement that final reports include root-cause analysis and a review of how "Best Practices" could have prevented or mitigated the impact of such events.

---

[3] Daugherty, H.T., Klein, W. J., *U.S. Network Reliability Issues and Major Outage Performance*, IEEE Computers and Communications, 1995. Proceedings., IEEE Symposium on Volume , Issue , 27-29 Jun 1995, Pages: 114 -119.

[4] *FCC Report and Order 92-58, CC Docket No. 91-273*, Federal Communications Commission, Washington, D.C., adopted February 13, 1992, released February 27, 1992.

[5] *FCC Second Report and Order 94-189, CC Docket No. 91-273*, Federal Communications Commission, Washington, D.C., adopted July 14, 1994, released August 1, 1994.

The NRC recommends the industry formation of the NRSC

In its 1993 *Report to the Nation*, the NRC[6] recommended formation of the Network Reliability Steering Committee (NRSC), under the auspices of the Alliance for Telecommunications Industry Solutions (ATIS) for the purpose of monitoring network reliability on an ongoing basis. The NRSC's mission was then defined as to "analyze the industry's reporting of network outages to identify trends, distribute the results of its findings to industry, and where applicable, refer matters to appropriate industry forums for further resolution, in order to help ensure a continued high level of network reliability."[7]

The FCC makes changes in outage reporting

In 2005, new FCC regulations were put in force. These new mandates can be summarized as having three major aspects: (a) expansion regarding who is required to report, (b) new reporting thresholds and concepts, and (c) limited access to the outage data. Regarding the reporting expansion, the requirements included wireless, satellite, paging, and cable telephony service providers. Changes in the thresholds and concepts include events that affect 900,000 user-minutes and events impacting DS3 facilities. Because of the new criteria, the overall number of reportable events has substantially increased. The change regarding access to reported outage data has substantially affected the work of the NRSC, as direct access to raw data is no longer available. Thus, unlike previous industry collaboration, the NRSC is hampered in that its expertise does not have direct access to the information collected by the FCC.

Mission of the NRSC

Fifteen years later, the Network Reliability Steering Committee (NRSC) continues to uphold this mission as an industry-led collaborative body. NRSC membership is available to all who are interested in improving network reliability. The current mission statement of the NRSC is as follows:

> **The NRSC strives to improve network reliability by providing timely consensus-based technical and operational expert guidance to all segments of the public communications industry.**[8]

[6] Since the subsequent re-charters under the name Network Reliability and Interoperability Council (NRIC), this first Council is sometimes referred to as "NRC-1".

[7] *Network Reliability: A Report to the Nation*, Network Reliability Council, June 1993. Section I, p. 6.

[8] Mission Statement of the NRSC, <www.atis.org/nrsc/index.asp>.

Figure 1: 2008 NRSC Meeting at ATIS Headquarters, Washington, DC

As a trusted expert, the NRSC addresses network reliability improvement opportunities in an open, noncompetitive environment. The NRSC advises the communications industry through developing and issuing standards, technical requirements, technical reports, bulletins, best practices, and annual reports.

The NRSC accomplishes this through:

- Identifying potential network reliability issues through an opportunity evaluation process;
- Establishing subcommittees that address network reliability issues;
- Conducting special studies that may lead to industry recommendations and/or the development of Best Practices;
- Developing industry feedback, both formal and informal, to the FCC on network reliability;
- Providing industry feedback to the FCC on Network Outage Reporting System (NORS) and Disaster Information Reporting System (DIRS); and
- Providing an opportunity for the public to be informed on network outages and ongoing efforts to resolve network reliability concerns.

Factors Affecting Network Reliability

The NRSC recognizes that identifying and understanding the underlying causes of outage trends are important for learning from past experiences and for preparing for future challenges as networks evolve. As reviewed in this report, in those cases where a possible trend of increasing frequency exists, the Committee works to identify direct and root causes of the events and assess whether existing industry consensus Best Practices, if implemented, would have prevented the outages. These analyses continue to confirm the value of existing Best Practices and occasionally yield other insights for new Best Practices. On the other hand, when a trend of decreasing outage frequency is observed, the Committee provides insights into the possible factors that can contribute to positive trends.

Figure 2 illustrates the basic building blocks of communications infrastructure. While each of these ingredients is essential for the operation of communications networks, each ingredient includes intrinsic vulnerabilities that must constantly be prepared for and addressed.

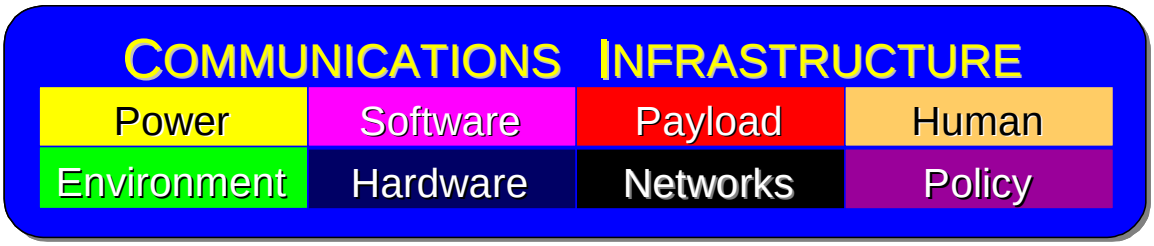


Figure 2: Ingredient Framework for Communications Infrastructure[9]

[9] ATIS-0100523.2007, *ATIS Telecom Glossary 2007*, < http://www.atis.org/glossary/definition.aspx?id=8347 >.

This framework is helpful in systematically reviewing the network elements and identifying possible influences (either negative or positive) on national network outage trends. Table 1, Systematic Review of Network Reliability Influencers – Examples, summarizes examples of these factors for each ingredient:

Table 1: Systematic Review of Network Reliability Influencers - Examples[10]

Ingredient	Possible Influencers (positive or negative)
Power	*increasing dependence on power capabilities for distributed remotes* *increased reliance on AC, which has more components* *decreasing number of subject matter experts* *increased back-up power need for cooling during commercial power failures*
Environment	*increased concentration of hardware packaging increases cooling challenges* *increased physical security affects access* *increased distributed mesh network topology potentially reduces significance of any single site*
Hardware	*increasing use of common hardware across equipment suppliers* *increased outsourcing by equipment suppliers* *increased capacity of single elements* *increased rate of technology turnover*
Software	*increased outsourcing by equipment suppliers and network operators* *increased use of artificial intelligence* *increased deployment of service-oriented architectures* *increased presence of worms and viruses*
Networks	*decreasing dependence on silicon for control (shift to software)* *decreasing prevalence of deterministic availability and path control* *increased complexity of interconnections with other entities* *increasing exposure to wireless interfaces*
Payload	*increasing diversity of services running on networks (video, gaming ,etc.)* *increasing variation in traffic levels due to service types* *decreased segregation of traffic with control messages* *increased use of "always on" sessions*
Policy	*increased number of connected network entities and elements* *increased number of relevant standards* *increased global divergence on the expected role of regulation* *decreasing preparation for turn up of new capabilities*
Human	*decreased time allotted for learning curve advances for new technologies* *increasingly competitive environment increases overall workloads* *increasing electronic authentication dependence to support virtual worksites* *decreased social cohesion with proliferation virtual work teams*

[10] *Systematic Assessment of NGN Vulnerabilities*, Appendix G, NSTAC NGN Task Force Report, March 2006.

HEALTH OF THE NATION'S PUBLIC NETWORKS

The members of the NRSC have a unique perspective on network reliability. Nowhere else in the world do subject matter experts from competing companies gather regularly for the purpose of analyzing network outage data, developing consensus determinations about the situations analyzed, and offering expert guidance on actionable countermeasures to improve network reliability. To accomplish this, common interests must be shared. The foremost common interest is the promotion of high reliability for the nation's public networks. The data collection and analysis described in these pages is performed for the purpose of attaining an accurate view of the health of networks at a national level and to make a difference through expert guidance on network reliability issues.

The NRSC believes that the reliability of the nation's public network is the best in the world. Further, the NRSC considers this world class performance remarkable given the enormous challenges the industry faces.

"Check-up" on Areas of Past Concern

One source for understanding how networks are performing is data charts presented by the FCC during NRSC quarterly public meetings. The NRSC makes use of these charts as one possible indicator of a trend.

Of interest regarding the health of the nation's public networks are three areas (Power, Signaling, and Procedural) that have been identified as areas of attention by the NRSC in previous years. The national network reliability picture as it relates to these three key areas is depicted in Figures 3-5.

Power Cause Category Outages

In previous years, the NRSC had identified *power-related outages* as a cause of concern. In fact, at two separate times, the NRSC organized special study teams to conduct analyses of this area. Figure 3 shows that the frequency of outages has been in control over the last two years:

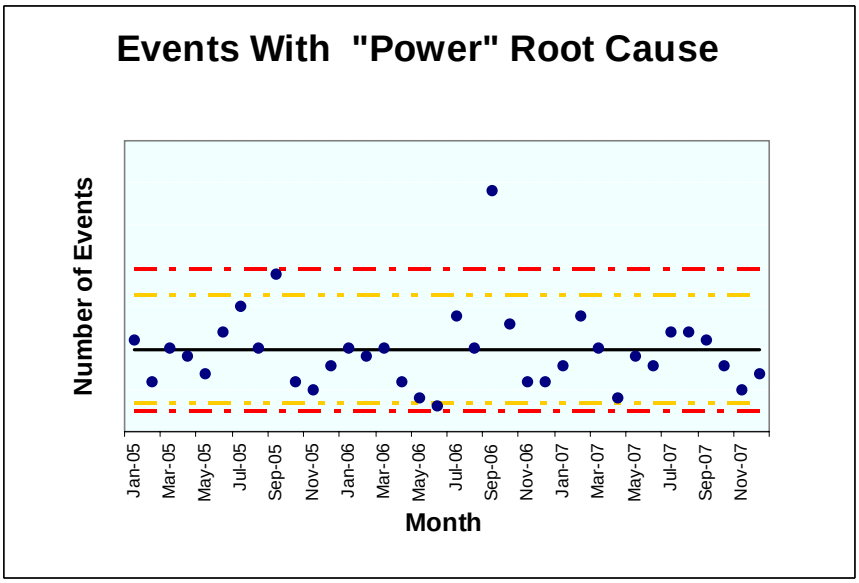


Figure 3: Frequency of Outages for "Power" Root Cause Category[11],[12]

[11] The outage frequency control charts presented in this report are taken from FCC materials presented to the NRSC in its quarterly public meetings.

[12] The outage frequency charts in this report are coded to indicate whether the nation's public networks are "under control" with respect to the outage types analyzed. The charts allow for comparison of outage frequency occurring in a particular month against normal variation experienced in the baseline period (March 2005 through February 2006). This variation is expressed as 95% (yellow dashed lines) and 99% (red dashed lines) tolerance limits on the frequency charts. Points between the yellow lines are in control with respect to the 95% tolerance limit, while points between the red lines are in control with respect to the 99% tolerance limit. Points above the upper red line are "out of control", while those below the lower red line indicate significant reduction in outage frequency.

Signaling Cause Category Outages

Another critical area historically has been signaling-related outages. As explained earlier, the national focus on network reliability and even the beginning of the NRSC are owed in part to concerns related to signaling outages. Figure 4 shows the frequency of outages attributed to signaling. Again, the NRSC is encouraged to see the frequency of these outages under control.

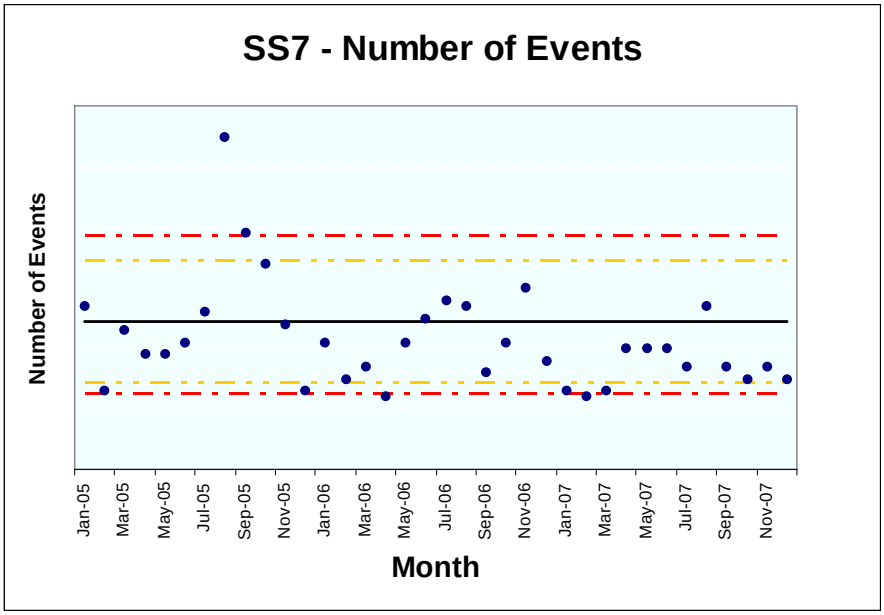


Figure 4: Frequency of Outages for Signaling Cause Category

Procedural Cause Category Outages

Another critical area of NRSC focus has been human performance, or "procedural" caused outages. During the period of 1998 through 2001, a rise in the number of procedural outages was observed by a number of industry fora. The heightened concern is evidenced not only by special NRSC studies, but also by Telcordia Technologies-facilitated studies and the IEEE Technical Committee on Communications Quality and Reliability[13] [14] [15]. Figure 5 shows the frequency of outages related to procedures. Again, the NRSC is encouraged to see that there is no increasing trend in the frequency of these outages.

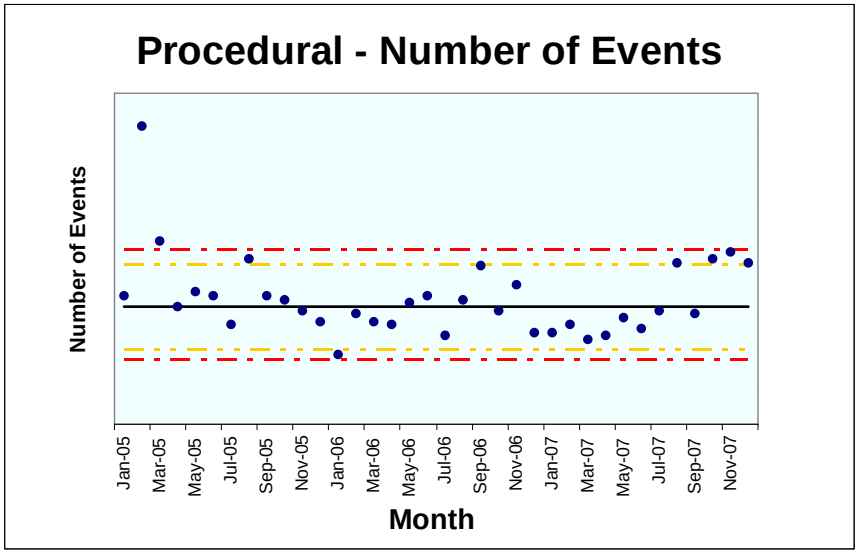


Figure 5: Frequency of Outages for Procedural Cause Category

In summary, the NRSC is encouraged by the observed trends that suggest these three specific areas of challenge appear to be in good health. These historical areas will continue to be monitored as routine practice.

[13] *Procedural Outage Reduction - Addressing the Human Part*, NRSC Special Study, May 31, 1999.

[14] GR-2914-CORE *Requirements for Equipment to Improve Network Reliability*, Telcordia, Issue 4, December 1998.

[15] Proceedings of the IEEE Technical Committee on Communications Quality & Reliability (CQR) 2001 International Workshop, May 2001.

Introduction to Special Studies

The NRSC had six special study teams in 2006-2007. The purpose of these special studies is to bring industry experts' attention to network reliability issues, determine the underlying causes behind national trends and determine the most effective best practices for preventing and ameliorating the impact of such events. For example, upon identification of a significant increase in the number of DS3 Simplex events (i.e. redundant DS3s in an unprotected state for five or more days), the NRSC launched a team to study the causes of these events. This study team issued a bulletin recommending several simple process changes that resulted in a sharp decrease in the number of long-duration DS3 simplex events. The keys to the success of these teams are open dialogue, meaningful information sharing and collaboration among the industry participants on potentially sensitive issues. Another key aspect is the willingness of industry companies to take action on NRSC recommendations. To protect the interests of participating companies, a Non-Disclosure Agreement (NDA) between the NRSC member companies is in place.

The special studies presented in the following pages address the areas of DS3 simplex conditions, wireless outages, hardware sparing, E911 outages, digital cross-connect system outages, and a checklist of guidelines for hurricane preparation. In addition to special studies, there is an ongoing Outage Reporting Advisory Team, as well as an opportunity evaluation conducted for malicious activity outages.

DS3 Simplex Conditions

Background

In communications networks, a Digital Signal 3 (DS3) transport system is typically configured in a duplex configuration using Synchronous Optical Network (SONET) rings. These ring configurations provide a robustness to the network such that if traffic on one side of the ring is disrupted (e.g., cable cut, line card failure), the traffic is rapidly switched to the protect side of the ring. While these 'simplex events' are *not* customer-service affecting, failure to restore the facility in a timely manner raises the risk for a DS3 duplex failure.

Purpose of the Special Study

While commenced in 2005, this study was primarily conducted during 2006-2007. The NRSC began this special study in response to an FCC presentation that suggested that a large number of DS3 simplex conditions were not being addressed within the 7200 minute (5 day) reporting threshold established for these events.[16] The purpose of the study was to determine if a systemic problem existed and, if so, how to address it with effective countermeasures.

Methodology of the Special Study

The study participants included seven companies representing both service and equipment providers. Data on simplex events was collected, the events were categorized, and comprehensive data analysis

[16] *In the Matter of New Part 4 of the Commission's Rules Concerning Disruptions to Communications*, ET Docket No. 04-35 (2004), requiring that DS3 simplex events be reported within 7200 minutes.

was completed. This analysis included direct and root causes of the events. Mitigation recommendations were identified in the form of Best Practices for the various points of concern.

Findings and Guidance of the Special Study

The study recommended several corrective actions that would prevent, or reduce the duration of, DS3 simplex events. These recommendations were communicated to the communications industry via an ATIS NRSC Bulletin [Appendix A].[17] This recommendation identified the following new Best Practice developed by the team to effectively address the DS3 simplex issue.

> Network Operators and Service Providers should detect DS3 simplex events and restore the duplex protective path in a timely manner by executing appropriate incident response and escalation processes. Restoration of simplex events should be coordinated with the restoration of customer affecting outages. Incident response and escalation processes should prioritize and assign higher priority to those events with the greatest risk of customer impact. [*Best Practice 7-P-0782*]

In addition, this NRSC Bulletin identified six areas for attention and encouraged additional attention to fourteen existing Best Practices [Appendix A].[18] The identified areas were:

- Tracking and Reporting Outages
- Human Procedures, Training, and Method of Procedures (MOPs)
- Cable Damage and Cable Cuts

[17] NRSC Bulletin No. 2006-1, <www.atis.org/NRSC/Bulletins/NRSC_BULLETIN_No%20_2006-1__revised_.pdf>.

[18] The industry consensus Best Practices can be found at: <www.bell-labs.com/USA/NRICbestpractices/>.

- Equipment Spares
- Maintaining Redundancy
- Disaster Recovery

An FCC analysis of NORS data presented to the NRSC in February 2007 underscored the success of this industry study. As shown in the following Figures 6 and 7, a 24% reduction in the number of DS3 simplex events occurred after the above guidance was established.

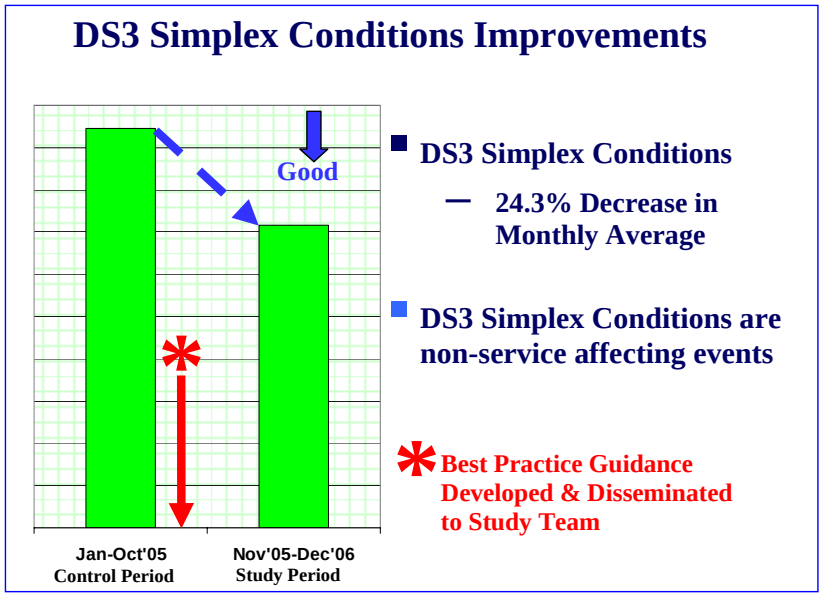


Figure 6: DS3 Simplex Events Improvements

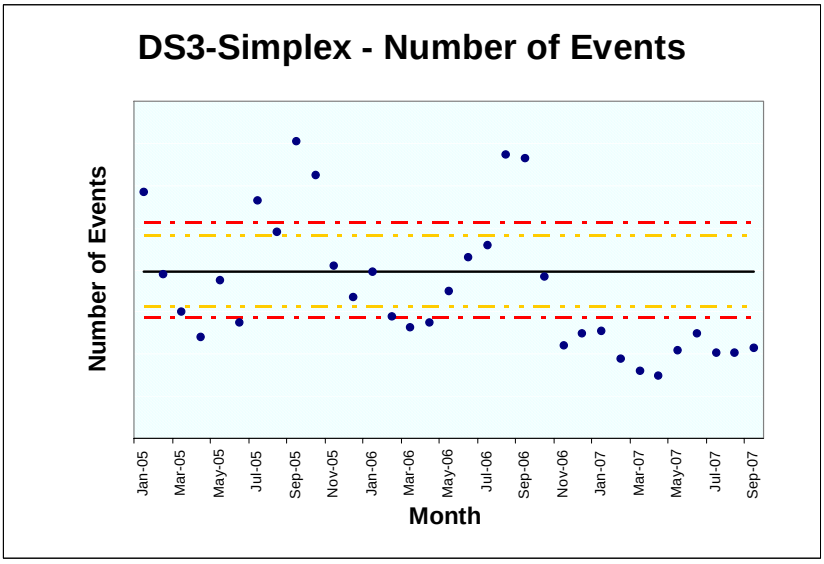


Figure 7: Frequency of Outage for DS3 Simplex Events Category

The NRSC continues to monitor the DS3 simplex events and continues to observe the lasting impact of the study's recommendation. For the entire 2007 calendar year, the number of DS3 simplex events has been below the lower 'red' control band.

Conclusion

In summary, the DS3 Simplex Condition study was effective in facilitating positive industry collaboration, conducting detailed technical analyses, understanding critical aspects related to the causes of these conditions, and providing meaningful guidance to the industry via an ATIS NRSC Bulletin. The industry responded by incorporating these recommendations and the resulting reduction in the number of events was observed.

Wireless Outages

Background

During the past decade, wireless communications have ascended to become an integral part of American business operations and personal lifestyles. It follows that expectation for the reliability of wireless-based services has likewise risen. Consumers in general are quite experienced with the phenomenon of coverage, understanding that they need to be in a place where their wireless device can be "seen" by a cell tower antenna. Some less obvious aspects of wireless networks are their dependence on backhaul connections to wireline core networks and the difficulty that some physical sites present for having long term emergency back-up power.

©iStockphoto.com/Marek Lambert

Purpose of the Special Study

The Wireless Outages study was initiated in February 2007 to address data presented to the NRSC that showed that the frequency of NORS outage reports for the wireless category were outside the control limits, and that the frequency trend line was increasing at approximately 4% month over month.

Methodology of the Special Study

Members of the study team included four national wireless carriers. The study included a series of analyses of the wireless outage data covering all final outage reports filed by the participating wireless carriers.

Initial efforts focused on normalizing outage statistics for growth in subscribers and growth in network coverage in order to recognize consumers' growing use of wireless and the concomitant coverage growth of wireless networks. This analysis was statistically inconclusive with respect to the increasing trend line.

By the end of 2007, the team's effort culminated in an analysis of thirty-three months of wireless final outage reports covering the period from the start of mandatory FCC NORS reporting for wireless carriers January 2005 through September 2007. Efforts focused on analyzing direct and root cause group distributions, by tracking root cause groups by month. The top six root causes were identified, with the effort directed toward the focused analysis of trends.

Findings and Guidance of the Special Study

Findings from the study that were presented at the December 2007 NRSC quarterly public meeting included (for data during the 2005-2007 period):

- The dominant cause groups with a significant *increasing* trend were:
  - Environment external
  - Cable damage
  - Design hardware
  - Design software
- The dominant cause groups with a significant *decreasing* trend were:
  - Hardware failure
  - Procedural service provider
- The dominant root cause was: environment (external) – storm – wind/trees
- "Outside building" outage reports are *increasing;* while "inside building" outage reports are *flat*

Conclusion

For 2008, the Wireless team's focus will be on these dominant ("top 6") cause groups including analysis of keywords used in NORS reports categorized by cause group. Further, the team will investigate the implementation of ATIS-0100012.2007 *Standard Outage Classification* (an enhanced list of causes) to more closely identify the causes of wireless outages across the industry.

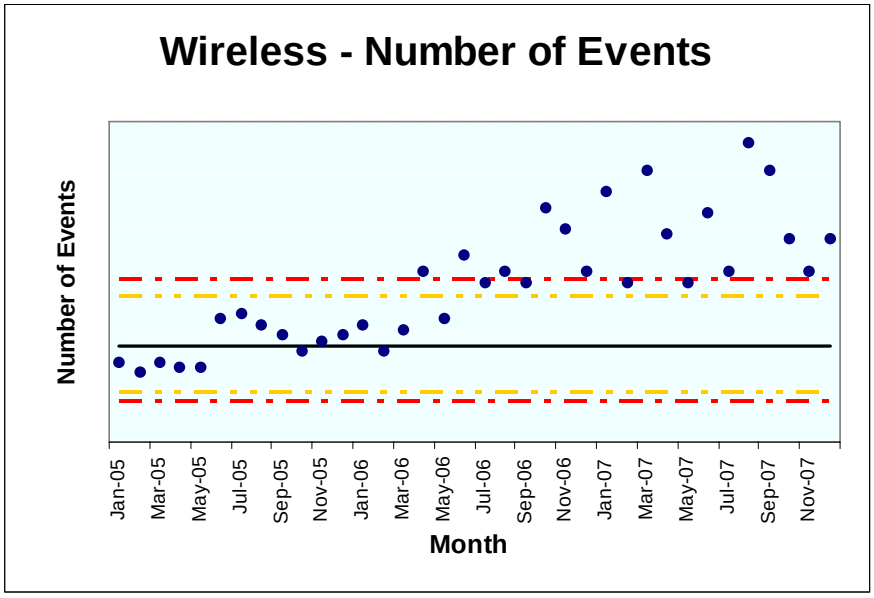


Figure 8: Frequency of Outage for Wireless Cause Category

Hardware Sparing Study

Background

When events meeting FCC-reportable criteria occur that interrupt network service, service providers are required to identify and report which industry consensus Best Practices could have prevented the event or mitigated its impact. To address the FCC's concern over the number of outage reports referencing sparing Best Practices, the NRSC created a special study team in 2006.

Purpose of the Special Study

The purpose of this special study was to investigate outages believed to be related to the management of spare hardware.

Methodology of the Special Study

Five service providers participated in this special study. The events that referenced sparing Best Practices were categorized and comprehensive data analysis was completed, including a study of the direct and root cause categories referenced in NORS.

Findings and Guidance of the Special Study

Based on the underlying problem descriptions available, the team was unable to correlate the FCC's suspected sparing problems to any pervasive sparing management practices. The team's findings included the following:

- There is a need to ensure service providers are referencing the most up-to-date NRIC Best Practices.
- Reportable outages categorized as hardware failure (45% direct cause; 80% root cause) are generally not attributable to sparing problems. This is primarily true given the time required to troubleshoot and replace failed hardware, in addition to the level of inherent redundancy in communications networks.
- Recommended addition of new sparing cause codes (e.g. spare not available, spare on hand – failed, spare on hand – out of date release) to identify when a lack of spares is the true cause of a reportable event.

Conclusion

As a result of the hardware sparing study's findings and recommendations, the FCC has since expanded specific sparing cause codes in NORS to assist in identifying trends when a lack of sparing is the true cause of an FCC reportable event.

E911 Outage Study

Background


©iStockphoto.com/Dr. Heinz Linke

E911 services are used to route customers to emergency services in the form of Public Safety Answering Points (PSAPs). The routing of a call to the appropriate PSAP and providing that PSAP with the caller's number and location is accomplished by means of specialized network components and services such as selective routers, tandem switches, databases, and position-determining equipment. These devices and services may belong to a communications service provider or a location service provider. These devices and services may serve a very large number of customers in a large number of PSAP jurisdictions. Delivery of a 911 call and the caller's information to a PSAP also utilizes finite facilities and equipment provided by the PSAP. Failures in any part of this concentrating architecture can affect very large numbers of customers.

Purpose of the Special Study

The NRSC commenced this special study in response to analysis by the FCC that was presented during the June 2006 NRSC public quarterly meeting. This analysis suggested that while the number of E911 outages remained within statistical control limits, the impact of individual outages was increasingly severe in terms of the number of PSAPs affected, the number of customers affected, and the duration of the outages. An analysis of outages affecting emergency calling (i.e. E911) was performed in order to determine if a negative trend was emerging in this area, and make recommendations, if necessary.

Methodology of the Special Study

The participating team members included five service providers. The E911 outage events were categorized and comprehensive data analysis was completed, including a study of the direct and root cause categories referenced in NORS. Mitigation recommendations were identified in the form of Best Practices for the areas of concern identified.

Findings and Guidance of the Special Study

Based on its analysis of the problem and the data available, the team was unable to correlate the FCC's analysis to any pervasive issues that resulted in major E911 outages. There were a number of contributing causes that, if addressed, might have prevented or mitigated the impact of these outages. These causes indicate a need for:

- Improvement in engineering, installation, and documentation of E911 assets.
- Improvement in monitoring and maintaining E911 assets.
- Improvement in growth and change control activities concerning E911 assets.

The study findings were presented at the October 2006 NRSC quarterly meeting as follows:

- There is a need to ensure communications providers are referencing the most up-to-date NRIC Best Practices.
- Several existing recommendations on corrective actions that would prevent or reduce the impact of E911 outages were identified. These recommendations were communicated to industry via an ATIS NRSC Bulletin (No. 2007-1 January 2007) [Appendix B].[19]

Conclusion

In summary, the E911 Outage Study found no pervasive issues that are resulting in major E911 outages, but did identify and provide meaningful guidance to the industry that could prevent, or mitigate the impact of, some outages. The NRSC resolved to continue to monitor E911 events.

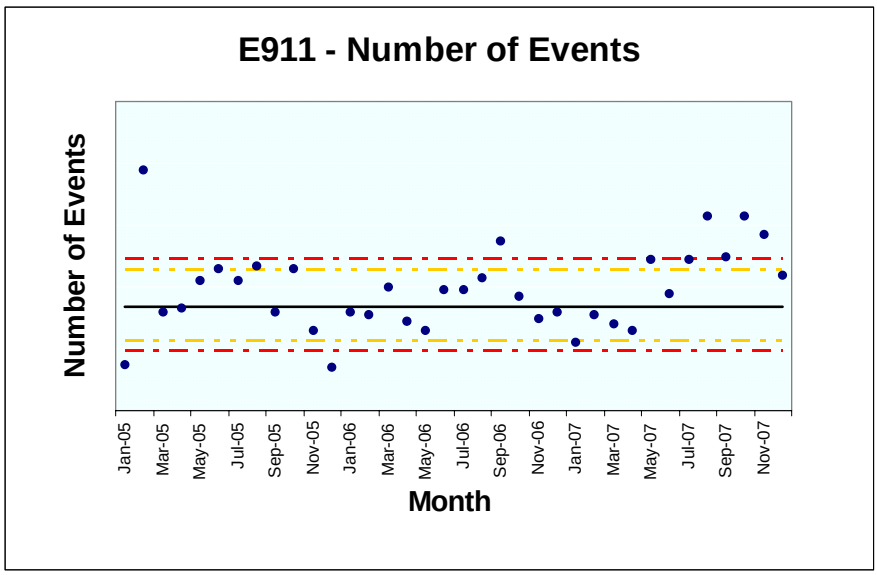


Figure 9: Frequency of Outage for E911 Cause Category

[19] NRSC BULLETIN No. 2007-1, January 2007, <www.atis.org/NRSC/Bulletins/NRSC_BULLETIN_No_2007-1.pdf>.

Digital Cross-Connect Study

Background

A digital cross-connect system (DCS) is a type of circuit-switched network equipment that allows lower-level time-division multiplexing (TDM) bit streams, such as DS0 bit streams, to be rearranged and interconnected among higher-level TDM signals, such as DS1 bit streams. DCS units operate on both older T-carrier/E-carrier bit streams, as well as newer SONET/SDH bit streams.

DCS devices can be used for "grooming" telecommunications traffic, switching traffic from one circuit to another in the event of a network failure, supporting automated provisioning, and other applications. Having a DCS in a circuit-switched network provides important flexibility that can otherwise only be obtained at a higher cost using manual "DSX" cross-connect patch panels.

Purpose of the Special Study

The NRSC commenced this special study in response to analysis by the FCC, presented at the March 2006 NRSC meeting, that suggested that the number of DCS outages reported by providers were outside of the frequency control limits. An analysis of (DCS) outages was initiated to make recommendations on how to reduce the number of events or reduce their impact when they do occur.

Methodology of the Special Study

The participating team members included five service providers and three suppliers. The team devised data collection methodologies to evaluate DCS outages. The study gave particular attention to the potential impact on network reliability and the causes of DCS failures, and how this impact could be minimized using architectural and/or operational procedures. The team also reviewed existing Best Practices that apply to DCS network elements, DCS deployment, and DCS operational procedures.

Findings and Guidance of the Special Study

The study yielded 8 findings from its analysis:

- Approximately 4% of all FCC-reportable events reported by participating team members were directly related to DCS caused events during the 21 month study period.
- Approximately 1% of the events evaluated in the study period resulted in a total DCS system failure (.03% or less of total reports).
- A 93% reduction in reportable DCS events was observed in 2006 compared to 2005 data.
- Single circuit pack fall out was determined to be a leading cause of reported events, and was a major contributor to the overall quantity of reported events.
- Equipment suppliers had insufficient data to conduct analysis of circuit packs from reported events.
- 14.5% of reportable DCS events resulted in an SS7 isolation, PSAP isolation, and/or E911 isolation. These events appeared to be preventable based on existing Best Practices and provider policies.
- A failure of a single DCS optical level card can impact up to 48 DS3's. Therefore, a single circuit pack failure may result in a reportable event.
- It should be noted that there are an unknown number of near misses or "saves" that occur each day where equipment operates as designed and no impact is seen, preventing an accurate

picture of overall operation of a DCS system. Only events resulting in network outages were studied.

Further, the study provided the following next steps and recommendations:

- The industry should support the TL-9000 Standard Outage Template[20] for outage data collection.
- The industry should emphasize Best Practices related to diversity associated with all critical network equipment including, but not limited to, DCS systems.
- Best Practice 7-7-0422, "Failure Data Collection and Review" was reiterated.
- Encouraged providers reporting through FCC NORS to complete the "Name and Type of Equipment that Failed" and "Specific Part of the Network Involved" fields to reflect DCS equipment only when it was the direct or root cause of an event.
- Development of an NRSC Bulletin with team findings.

In addition, the study recommended that the industry should support the development of the NRSC's Standard Operating Environment (SOE) initiatives:

- NRSC-2006-016 Standard on Outage Classification
- NRSC-2006-017 Examples of Standardized Root Causes

Conclusion

The FCC has encouraged the NRSC to keep this team active and to continue monitoring and evaluating DCS outages.

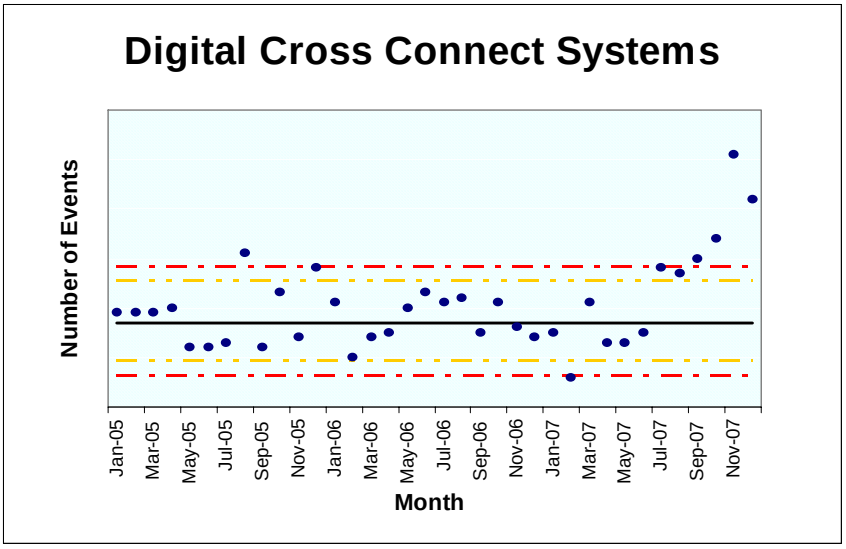


Figure 10: Frequency of Outage for DCS Cause Category

[20] Kipping, Barbara Ellen. *SOTS Solution Design Specification: Minimum Design Document*, 2007.

Hurricane Checklist

Hurricane Katrina struck the gulf coast and New Orleans in August 2005 and caused unprecedented economic and physical destruction. In the wake of Hurricane Katrina, many of the service providers joined together in an NRSC team to develop a checklist of proactive steps that could be taken by a telecommunications service provider to prepare for a hurricane. The NRSC Hurricane Checklist was developed using the input of multiple NRSC member companies, all with considerable experience in hurricane preparation and recovery. The checklist was also submitted as part of the FCC proceeding requesting comments on the Hurricane Katrina Panel. Finally, the NRSC worked with the Association of College and University Telecommunications Administrators (ACUTA) to help them adapt the Hurricane Preparedness Checklist to the special needs of communications for higher education institutions.

The full text of the NRSC Hurricane Checklist is included as Appendix C.

Malicious Activities Opportunity Evaluation

The malicious activities opportunity evaluation was conducted but did not advance to a formal NRSC study. The following summary provides a report on this team's findings.

Background

During the 2006-2007 timeframe, the NRSC membership was presented with reports from the FCC that suggested an increasing trend in the frequency of events that the Commission categorized as malicious. Given the potential impact that such events could have, the NRSC took the initiative to investigate this area. The NRSC commenced this opportunity evaluation on its own initiative after being presented with data that suggested an increasing trend in the number of events in this category. This decision was made during the March 2006 quarterly public NRSC meeting.

Purpose of the Opportunity Evaluation

The purpose of the opportunity evaluation was to better understand the causes of the events categorized as malicious, to determine whether these events were further related than the offered level of analysis suggested, and to gain insights as to what actions could be taken to prevent similar, future occurrences.

Methodology of the Opportunity Evaluation

The participating team members included representatives from network operator companies and equipment suppliers. The approach used in the opportunity evaluation involved each of the network operators conducting research into their own companies' outage event data. The team members used a common set of categories so that analysis could be conducted across data sets. Particular attention was paid to events associated with the following situations:

- A breach of cyber security protective measures.
- The destruction of "low tech" equipment or facilities.
- The destruction of "high tech" equipment or components (e.g., circuit packs).
- The removal (theft) of "high tech" equipment or components.

Findings and Guidance of the Opportunity Evaluation

The principle finding of the opportunity evaluation was that the primary cause of these events is copper theft.

The countermeasures employed by the different companies varied. A number of the practices were determined to be effective based on observed reductions in the frequency of theft when employed. The team assembled guidance in the following areas:

- Stamping "MYCOMPANY-Property" to reduce re-sell value, and thus attractiveness.
- Altering composition (e.g., tinning) to impede ability to re-use.
- Hardening of conduit to hinder physical access.
- Advanced surveillance to enhance detection.

Conclusion

The team presented their observations to the NRSC and it was agreed that the assembled guidance should be developed into industry Best Practices. This work is scheduled for inclusion in the NRSC Best Practices Team that was formed in 2008.

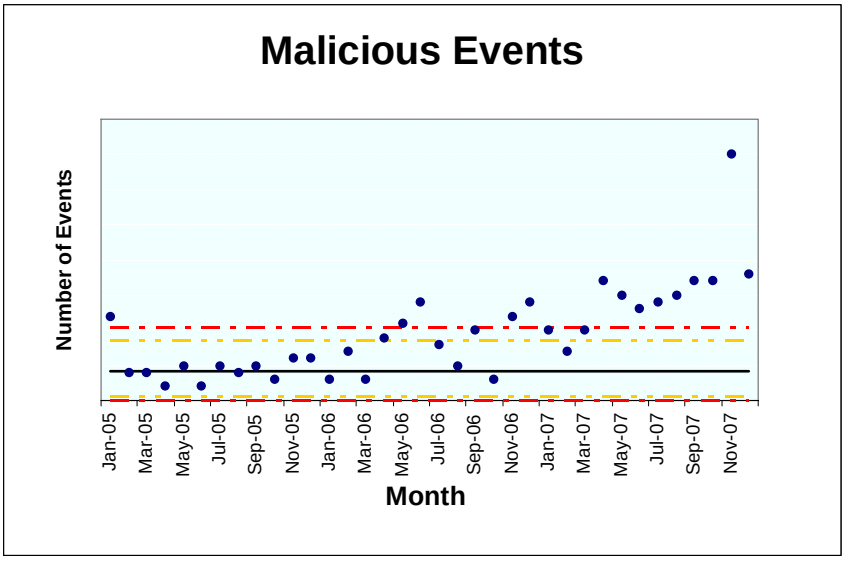


Figure 11: Frequency of Outage for Malicious Activities Cause Category

Outage Reporting Advisory Team

Background

Most types of communications service providers – including wireline, wireless, cable telephony, SS7, E911 providers, and facility owners – are required to report telecommunication service disruptions pursuant to Part 4 of the FCC's rules. These reports are filed using an internet-based system, the Network Outage Reporting System (NORS), and analyzed by the FCC Public Safety and Homeland Security Bureau's Communications Systems Analysis Division (CSAD).

The CSAD also developed a web-based system, the Disaster Information Reporting System (DIRS), to collect the information needed to determine the status of communications services in areas affected by major disasters (e.g. Hurricane Katrina). DIRS collects information on the status of equipment, such as switches, public safety answering points used for E911, inter-office facilities, cell sites, broadcasting facilities, and cable television systems.

Purpose of the Ongoing Study

The NRSC established the Outage Reporting Advisory Team (ORAT) to represent industry and address NORS system improvements. Areas of consideration include: NORS template improvements, cause category recommendations, recommendations on ways to communicate information, and reporting Telecommunications Service Priority (TSP) events. The team's scope was subsequently expanded to include DIRS system improvements.

Methodology of the Ongoing Study

The participating team members were representatives from seven service providers and the FCC provided information on NORS and the analysis techniques used in preparing "Analysis of Network Outage Reports" presentations for the NRSC. ORAT is an ongoing study team that addresses work items identified by the NRSC as being within its scope. The team utilizes the experience of its members and resources, such as the NORS and DIRS User Manuals, to develop documentation and recommendations.

Findings and Guidance of the Ongoing Study

The overarching objective of ORAT is improvement of NORS and DIRS reporting, in particular to improve the ease of use of the process and the consistency of reporting. Both of these components can be enhanced by increased understanding of how users engage the processes, and the meaning and intent of the data being reported. Communication and documentation will likely continue to be primary tools in identifying and improving the processes and the reporting of consistent data.

Accomplishments of the Ongoing Study

The team identified questions of concern to the industry regarding DIRS, and based on information provided by the FCC, documented appropriate clarifications and information. The team developed "Guidelines for Downloading Company Specific Outage Data", which includes the criteria used in FCC's analysis charts, in order to enable companies to analyze their outage reports in a timely manner consistent with the way the FCC performs its analysis for the "Analysis of Network Outage Reports" presentations for the NRSC. The team monitored implementation of cause codes in NORS which were

recommended by the NRSC Sparing Team and did not observe any issues associated with this change. The team developed a process to re-administer the TSP survey, to determine how the NORS TSP question is interpreted by service providers. The data collection/analysis process, including a cover letter for distribution with the survey, was aimed at increasing survey response rate.

Conclusion

In summary, the work of ORAT addressed the need for clarification regarding the DIRS reporting process, monitored implementation of changes to the NORS template, provided guidance on use of the CSAD's analysis methodology to enable service providers to use this analysis for internal communication and reliability improvement, and developed a process to obtain improved survey results regarding service provider use of the NORS TSP field.

STANDARDS AND TECHNICAL REPORTS

In 2007, the NRSC developed two ATIS Standards. An "ATIS Standard" is an ATIS deliverable developed by an ATIS Forum or Committee that defines a technical or operational solution for voluntary implementation by the industry. An "ATIS Standard" includes, but is not limited to, an American National Standard, a Technical Requirement, a Technical Specification, a Technical Report, an industry guideline or a white paper. The NRSC produced one American National Standard entitled ATIS-0100012.2007 *Standard Outage Classification*, and one Technical Report entitled ATIS-0100015 *Categorization of Equipment Deployed within Communications Networks for Use in Outage Classification and Analysis*.

Standards

The ATIS NRSC developed a defined list of classifications for outages as an American National Standard (ANS) for use within the United States. The standard was developed to provide a common list and methodology for classifying communications outages. It provides a consistent approach to the classification of both the direct and root causes of an outage, depending on the needs and perspective of the outage analysis. It is expected that adoption of the new standard will reduce rework such as reclassification between service providers and equipment suppliers.

ATIS-0100012.2007 *Standard Outage Classification*

The ATIS-0100012.2007 *Standard Outage Classification* document identifies a high-level outage reporting process that will help reduce discrepancies in outage reporting for telecommunications vendors and service providers. The *Standard Outage Classification* document eliminates the conflicting terminologies that telecommunications vendors and service providers use to classify and report outages, which can also differ from the FCC's classification system. In accordance with the *Standard Outage Classification* document, telecommunications companies can now use common terminology and reporting structures to collect and report data used for identifying causes of outages.

The high-level system for classification introduced in the new standard uses three categories to define the outage: (1) cause of outage failure, such as hardware, software, cable, wireless transmission or capacity; (2) reason for outage, which includes a primary and secondary description; and (3) responsibility for outage, like acts of nature, reporting service provider, government, or vendor. The category values are broad in nature, making the classification system applicable to any type of network and facilitating sorting and statistical analysis of outage causes.

Technical Reports

In other network reliability analysis work closely related to the *Standard Outage Classification* document, the NRSC also developed and approved a technical report (TR) on the categorization of communications network equipment. The TR will be used to assist in categorizing network equipment when performing outage classification and network reliability analysis.

ATIS-0100015, Categorization of Equipment Deployed within Communications Networks for Use in the Outage Classification and Analysis Technical Report

The ATIS-0100015 *Categorization of Equipment Deployed within Communications Networks for Use in Outage Classification and Analysis Technical Report* published by the NRSC is aimed to complement the *Standard Outage Classification* by providing a naming and classification system for equipment used in communications networks. This technical report allows companies to classify equipment types in universal terms to reduce the confusion often found by using multiple naming systems.

Analysis of FCC Reportable Service Outage Data

Revision of T1A1.2 TR-42, Description of the Calculation of the Outage Index

The TR-42 Outage Index was used to assign a value to each outage reported to the FCC such that the greater the value, the greater the impact on the customer base. The outage index was calculated as the sum of the separate impacts on a set of services (InterLATA, IntraLATA Intraoffice, IntraLATA Interoffice, and E911 service). The impact of each service was calculated as the product of three weights: service, duration, and magnitude. The service weight was dependent on the service affected; E911 service had the highest weight while IntraLATA Intraoffice service had the lowest weight. The duration weight was a function of the duration of the outage as reported to the FCC. The magnitude weight was a function of the number of subscribers potentially affected by the outage. The functions for duration weight and magnitude weight were S-shaped curves which rose slowly at low levels of duration and customers potentially affected, rose rapidly at mid-levels and tapered off at an asymptote at high levels; this shape allowed outage indexes to be summed without the sum being dominated by isolated extreme outages.

The most complex facet of the calculation was the determination of the number of customers affected. This calculation was based either on the number of subscriber lines potentially affected or on the number of blocked calls as reported to the FCC. The determination of which metric (lines or blocked calls) to use as the basis of the calculation was determined by the service affected, the network element affected, the outage cause, and alternative routing capabilities. The calculation of customers affected based on subscriber lines potentially affected was also influenced by the service impacted plus the day of the week and time of day spanned by the start and end of the outage. The calculation of customers affected based on blocked calls was also influenced by whether the blocked calls reported to the FCC were measured at the time of the outage or estimated from historical traffic records over a period of time similar to that of the outage.

In addition to defining the outage index, TR-42 also included techniques for:

- Analyzing trends in outage frequency over time.
- Adjusting the outage index calculation for gradual restoration of service.
- Estimating confidence intervals for a sum of outage indexes from a set of outages.
- Adjusting or normalizing an outage index for network growth.

Revision of TR-42

The TR-42 outage index was designed for the wireline segment of the industry – the only segment required to report outages to the FCC prior to 2005. The revision of TR-42 defines the calculation of outage indexes for reports made by the wireless, satellite, and cable segments, as well as wireline. The revision defines the calculation such that the outage index based on a report from one industry segment will be comparable to that from another industry segment.

Reports of outages to the FCC via NORS do not provide the level of detail on services affected with respect to call types. This is a reflection of changes in the telecommunications industry since TR-42 was published in 1995. The revision of TR-42 simplified the service weight structure of the original outage index.

The revision of TR-42, like its predecessor, contains techniques for analyzing trends over time for outage index and frequency, as well as control chart techniques for identifying periods of high outage index and frequency that may require further investigation. Techniques for normalizing outage indexes and outage frequency with respect to network growth require greater effort for development because of the complex nature of the problem; for this reason, their development has been left to future work by the NRSC.

CONCLUSION

During the period 2006-2007, the NRSC was active in both documenting network reliability related information, and investigating and responding to negative trends based on FCC reportable outage data. The network reliability documentation work included the creation of new technical reports, the updating of existing reports, and the creation of the first ATIS Standard ever drafted by the NRSC. Indications of possible problems in the network, as evidenced by statistical trend data based on FCC reportable outages, were investigated by NRSC study teams made up of subject matter experts from the industry, working together to determine whether an actionable problem existed, and responding where appropriate.

Future Plans

The NRSC strives to be proactive and not purely reactive. To that end, the NRSC has developed a work plan to address the needs of the telecommunications industry in the area of network reliability.

Looking forward to 2008, the NRSC will complete a revision of the Technical Report used to analyze major outages that are FCC reportable in order to align industry practices with the current FCC outage reporting rules. The NRSC study teams will continue to identify improvements within their focus areas. Finally, the NRSC will continue to work with the FCC to identify outage trends, and to supply industry resources where necessary to reverse negative trends as identified.

For the Common Good

The NRSC is an example of the spirit of service in the telecommunications industry. Companies that are normally fierce competitors in the marketplace come to the NRSC putting competition aside to work together – for the benefit of all end customers and the general advancement of network reliability. Working together towards the common good of all telecommunications customers is the finest product of the NRSC.

NRSC Participating Companies

Alcatel-Lucent
AT&T
BellSouth (now AT&T)
Cingular Wireless (now AT&T)
Cox Communications
Embarq
FCC
Juniper Networks
Lucent (now Alcatel-Lucent)
National Communications System
Nortel
NTT-MCL
Qwest
SBC (now AT&T)
Sprint
T-Mobile
Telcordia Technologies
US Cellular
Verizon Business
Verizon Telecom
Verizon Wireless

NRSC Meeting Representatives

Karl Rauscher, Alcatel-Lucent, Bell Labs
Jim Runyon, Alcatel-Lucent, Bell Labs
Greg Wasson, Alltel
Mark Bowden, AT&T
Rick Canaday, AT&T
John Chapa, AT&T
Janice Darty, AT&T
Perry Kimbrough, AT&T
Sandra Lawson, AT&T
Archie McCain, AT&T
Alex Reader, Cox Communications
John Blystone, Dobson Cellular (SME)
Norris Smith, Embarq
Jeffery Goldthorp, FCC (Invited Guest)
John Healy, FCC (Invited Guest)
Whitey Thayer, FCC (Invited Guest)
Terry Brown, Level 3 (SME)
Gabriel Martinez, National Communications System
Haruhiko Nishida, NTT-MCL
Seiji Yoshida, NTT-MCL
Paul Diamond, Qwest
Stacy Hartman, Qwest
Jeff Hubbard, Qwest
Chance Richardson, Rural Cellular Corp (SME)
Gary Williams, Rural Cellular Corp (SME)
Waqar Habib, Sprint
Bill Hitchcock, Sprint
Mark Pace, Sprint
Lisa Siard, Sprint
Todd Tobis, Sprint
Becky Wormsley, Sprint
Frank Winder, TDS Telecom
Jay Bennett, Telcordia
Spilios Makris, Telcordia
Rajajesh Baliti, T-Mobile
Rose Fiala, T-Mobile
Gary Jones, T-Mobile
Kelly Jackson, US Cellular
Paul Knurek, US Cellular
Ed Griffin, US LEC Corp (SME)
Paul Brigner, Verizon
Robin Howard, Verizon
Mike Vassios, Verizon Wireless
Don Shaw, Verizon Business
Chris Oberg, Verizon Wireless

NRSC Leadership Team

Archie McCain, AT&T
Karl Rauscher, Alcatel-Lucent, Bell Labs

NRSC Study/Opportunity Evaluation Teams

Outage Reporting Advisory Team
Rick Canaday, AT&T (Lead)
Percy Kimbrough, AT&T
Rich Mosley, AT&T
Mike Roden, AT&T
Mark Adams, Cox Communications
Norris Smith, Embarq
Paul Diamond, Qwest
Stacy Hartman, Qwest
Lisa Siard, Sprint
Todd Tobis, Sprint
Becky Wormsley, Sprint
Rajesh Baheti, T-Mobile
Rose Fiala, T-Mobile
Bill Hackett, T-Mobile
Harold Salters, T-Mobile
Aaron Borbon, Verizon
Robin Howard, Verizon

Sparing Team
Todd Tobis, Sprint (Lead)
Michael Potts, Alcatel-Lucent Jim Runyon, Alcatel-Lucent
Rick Canaday, AT&T
Percy Kimbrough, AT&T
Joe McKinney, AT&T
Norris Smith, Embarq
Stacy Hartman, Qwest
Bill Hitchcock, Sprint
Mary Brown, Verizon
Kerry Schmidt, Verizon

DS3 Simplex Team
Jim Runyon, Alcatel-Lucent, Bell Labs (Lead)
Karl Rauscher, Alcatel-Lucent, Bell Labs
Rick Canaday, AT&T
John Chapa, AT&T
Janice Darty, AT&T
Archie McCain, AT&T
Norris Smith, Embarq
Stacy Hartman, Qwest
Mark Pace, Sprint
Todd Tobis, Sprint
Jay Bennett, Telcordia
Spilios Makris, Telcordia
Mary Brown, Verizon
Robin Howard, Verizon

Wireless Team
Harold Salters, T-Mobile (Lead)
Karl Rauscher, Alcatel-Lucent, Bell Labs
Percy Kimbrough, AT&T
Steven Leicht, AT&T
Charles Oscarson, AT&T
Mike Roden, AT&T
Archie McCain, AT&T
Fred Stringer, Juniper Networks
Lisa Siard, Sprint
Todd Tobis, Sprint
Becky Wormsley, Sprint
Jay Bennett, Telcordia
Rose Fiala, T-Mobile
Bill Hackett, T-Mobile
Miles Schreiner, T-Mobile
Dana Taylor, T-Mobile
Chris Oberg, Verizon Wireless

NRSC Study/Opportunity Evaluation Teams Cont'd

DCS Team
Robin Howard, Verizon (Co-Lead)
Jim Runyon, Alcatel-Lucent, Bell Labs (Co-Lead)
Tom Loper, Alcatel-Lucent
Steve Pickett, Alcatel-Lucent
Michael Potts, Alcatel-Lucent
Jim Asbell, AT&T
Rick Canaday, AT&T
John Chapa, AT&T
Janice Darty, AT&T
Mike Roden, AT&T
Jeff Townend, AT&T
Willy Williamson, AT&T
Stacy Hartman, Qwest
Jeff Hubbard, Qwest
Mark Pace, Sprint
Todd Tobis, Sprint
Becky Wormsley, Sprint
Brian Nagle, Tellabs (SME)
Mark Peek, Tellabs (SME)
Mary Brown, Verizon
Jason Watts, Verizon

E-911 Outages Team
Chris Oberg, Verizon Wireless (Lead)
Brad Ruark, AT&T
Jim Runyon, Alcatel-Lucent, Bell Labs
Janice Darty, AT&T
Percy Kimbrough, AT&T
Kenny Mack, AT&T
Charles Oscarson, AT&T
Norris Smith, Embarq
Paul Diamond, Qwest
Todd Tobis, Sprint
Becky Wormsley, Sprint

Hurricane Checklist Team
Brad Ruark, AT&T (Lead)
Karl Rauscher, Alcatel-Lucent, Bell Labs
Jim Runyon, Alcatel-Lucent, Bell Labs
Dale Williams, Alltel (SME)
John Chapa, AT&T
Percy Kimbrough, AT&T
Archie McCain, AT&T
Jim Smith, Cox Communications
Rick Krock, Alcatel-Lucent
Tim Hines, Nortel
Stacy Hartman, Qwest
Bill Hitchcock, Sprint
John Thomas, Sprint
Todd Tobis, Sprint
Robin Howard, Verizon
Alex Rokowetz, Verizon
Chris Oberg, Verizon Wireless
Greg Watson, Windstream Communications (SME)
Leonard Proseus, Verizon Business
Chris Oberg, Verizon Wireless

Malicious Activities Opportunity Evaluation Team
Karl Rauscher, Alcatel-Lucent, Bell Labs (Lead)
Rick Canaday, AT&T
Percy Kimbrough, AT&T
Charles Oscarson, AT&T
Jim Runyon, Alcatel-Lucent, Bell Labs
Stacy Hartman, Qwest
Lisa Siard, Sprint
Todd Tobis, Sprint
Becky Wormsley, Sprint

NRSC Quarterly Meeting Participants

In Person

Karl Rauscher, Alcatel-Lucent, Bell Labs
Jim Runyon, Alcatel-Lucent, Bell Labs
Rick Canaday, AT&T
Percy Kimbrough, AT&T
Archie McCain, AT&T
Mike Roden, AT&T
Brad Ruark, AT&T
Mark Adams, Cox Communications
Rick Kemper, CTIA (Invited Guest)
Norris Smith, Embarq
Jeff Goldthorp, FCC (Invited Guest)
John Healy, FCC (Invited Guest)
Whitey Thayer, FCC (Invited Guest)
Mark Neibert, Intelsat (SME)
Gabriel Martinez, National Communications Systems
Brent Anderson, Nortel
Seiji Yoshida, NTT-MCL
Haruhiko Nishida, NTT-MCL
Paul Diamond, Qwest
Stacy Hartman, Qwest
Jeff Hubbard, Qwest
Todd Tobis, Sprint
Lisa Siard, Sprint
Becky Wormsley, Sprint
Jay Bennett, Telcordia
Spilios Makris, Telcordia
Bill Hackett, T-Mobile
Harold Salters, T-Mobile
Mike Hussey, US Cellular
Paul Brigner, Verizon
Robin Howard, Verizon
Chris Oberg, Verizon Wireless

By Phone

Greg Wasson, Alltel
Mark Bowden, AT&T
John Chapa, AT&T
Janice Darty, AT&T
Perry Kimbrough, AT&T
Sandra Lawson, AT&T
Colleen Meisinger, AT&T
Paul Moore, AT&T
Paul Orr, AT&T
Carla Mattingly, Centwire
Mary Daudelin, Charter Communications
Alex Reader, Cox
John Blystone, Dobson Cellular
Allen Gall, Edison Carrier Solutions
Andrew Russell, France Telecom
Howard Feldman, Inmarsat
Ken Cogan, Intelsat
Barbara Bouley, Iowa Telecom
Terry Brown, Level 3
George Wazeter, Loral Skynet
Haruhiko Nishida, NTT-MCL
Bill Italia, OnStar
Ryan Gallagher, Qwest
Jeff Hubbard, Qwest
Connie Moffatt, Qwest
Chance Richardson, Rural Cellular Corp
Thomas Nash, Savvis
Judy Vernon, Savvis
Mark Pace, Sprint
Waqar Habib, Sprint
Dwight West, Syniverse
Todd Van Ells, TDS Telecom
Rajajesh Baliti, T-Mobile
Sumit Sharma, T-Mobile
Mike Hussey, U.S. Cellular
Jim Farrell, UP
Kelly Jackson, US Cellular
Paul Knurek, US Cellular
Ed Griffin, US LEC Corp
Josh Tuel, Verisign
Paul Brigner, Verizon
Jim Lawson, Verizon
Don Shaw, Verizon
Vicky Smith, Verizon
Leonard Proseus, Verizon Business
Mike Vassios, Verizon Wireless
Sherrie Widlund, EdgeWireless
Gary Williams, Rural Cellular Corp
Frank Winder, TDS Telecom

APPENDIX A – NRSC BULLETIN NO. 2006-1

NRSC BULLETIN No. 2006-1

February 2006

The ATIS Network Reliability Steering Committee (NRSC) recently completed a study of the DS3 Simplex conditions reported to the Federal Communications Commission (FCC). The objective of the study was to address the FCC's concern regarding what it believed to be a large number of reports filed based on the FCC's DS3 Simplex reporting threshold.

The NRSC examined DS3 Simplex conditions from January 2005 through September 2005 by utilizing data provided by the participant service providers. During this interval, there were 894 DS3 Simplex conditions[1] with 2.2% of these escalating to a duplex failure[2]. As a result, the study group recommended one new Best Practice, and that all Service Providers and Network Operators review pertinent Best Practices for application in their operations. These Best Practices address:

- The tracking & reporting of network outages
- Human procedures, training and Methods of Procedures (MOPs)
- Cable damage or cable cuts
- Equipment spares
- Maintaining redundancy
- Disaster recovery

*The NRSC has identified the following **new Best Practice** specific to DS3 Simplex conditions:*

7- P- 0782 DS3 Simplex Conditions

- **Network Operators and Service Providers should detect DS3 simplex events and restore the duplex protective path in a timely manner by executing appropriate incident response and escalation processes. Restoration of simplex events should be coordinated with the restoration of customer affecting outages. Incident response and escalation processes should prioritize and assign higher priority to those events with the greatest risk of customer impact.**

- **Reference/Comments: DS3 Simplex events should be resolved within 7200 minutes (i.e. 5 days). DS3 Simplex events exceeding this time limit become FCC reportable events.**

As a result of its review, **the NRSC urges all Service Providers and Network Operators to review** the following Best Practices for application in their operations:

Tracking & Reporting Outages Best Practices

- **7 - 7- 0548 Post Mortem Review: Network Operators and Service Providers should have an internal post mortem process to complete root cause analysis of major network events with follow-up implementation of corrective and preventive actions to minimize the probability of recurrence. Network Operators and Service Providers**

[1] These events were identified by the six Service Providers participating in this NRSC DS3 Simplex study.
[2] This percentage excludes those events caused by the 2005 hurricanes.

should engage Equipment Suppliers and other involved parties, as appropriate, to assist in the analysis and implementation of corrective measures.

- **7- 7- 0583 Network Operators, Service Providers and Equipment Suppliers should adopt an industry uniform method of reporting and tracking significant service outages (e.g., TL-9000 standard outage template).**

Human Procedures/Training/MOPs BPs

- **7- 7- 0588 Network Operators, Service Providers and Equipment Suppliers should provide awareness training that stresses the services impact of network failure, the risks of various levels of threatening conditions and the roles components play in the overall architecture. Training should be provided for personnel involved in the direct operation, maintenance, provisioning, security and support of network elements.**

- **7- 7- 0589 Network Operators, Service Providers, and Equipment Suppliers should establish a minimum set of work experience and training courses which must be completed before personnel may be assigned to perform maintenance activities on production network elements, especially when new technology is introduced in the network.**

Cable Damage/Cuts Best Practices

- **7- 7- 0710 Network Operators should use 'dig carefully' concepts and utilize guidance from industry sources for the protection of underground facilities when excavation is to take place within the specified tolerance zone.**

- **7- 7- 0719 Network Operators should use 'dig carefully' concepts and utilize guidance from industry sources when installing underground facilities.**

- **7- 7- 0741 Network Operators and Service Providers should review, and adopt as appropriate, best practices aimed at reducing damage to underground facilities that are maintained by the Common Ground Alliance (www.commongroundalliance.com).**

Equipment Spares Best Practices

- **7- 7- 5080 Network Operators should identify and track critical network equipment, location of spares, and sources of spares to ensure the long term continuity and availability of communication service.**

- **7- 7- 5083 Network Operators, Service Providers and Equipment Suppliers should maintain the availability of spares for critical network systems.**

Maintaining Redundancy Best Practices

- **7- 7- 0731 Network Operators should provide physical diversity on critical inter-office routes when justified by a risk or value analysis.**

- **7- 7- 5079 Network Operators and Service Providers should, where feasible, provide both physical and logical diversity of critical facilities links (e.g., nodal, network**

element). Particular attention should be paid to telecom hotels and other concentration points.

Disaster Recovery Best Practices

- **7- 7- 5237 Network Operators, Service Providers and Equipment Suppliers should verify the integrity of system spares and replenish utilized spares, as appropriate, as part of a disaster response at a facility.**

- **7- 6- 5249 Network Operators should consider geographic separation of network redundancy during restoration, and address losses of redundancy and geographic separation following restoration.**

- **7- 7- 5252 Network Operators should evaluate the priority on re-establishing diversity of facility entry points (e.g., copper or fiber conduit, network interfaces for entrance facilities) during the restoration process.**

A complete copy of the DS3 Simplex Events Study Group Report may be found at http://www.atis.org/nrsc/grouprpt.asp . All industry Best Practices may be found at www.nric.org.

APPENDIX B – NRSC BULLETIN NO. 2007-1

NRSC BULLETIN No. 2007-1
January 2007

Background
During the NRSC's June 2006 quarterly public meeting, the FCC expressed concern regarding the "major" E-911 outages and asked the NRSC to investigate. Major E-911 outages are defined by the FCC as affecting 300,000 or more users for 60 minutes or more.

The NRSC recently completed a study of major E-911 outages reported to the FCC during the period of January 2005 through July 2006. The NRSC examined 73 major outage reports (14% of total E-911 outages). Nearly half (49%) of the major outages were due to procedural errors. The study showed that once these errors were identified they were quickly corrected. For the remaining outages there were a number of contributing causes that might have prevented or mitigated the impact of these outages. These causes indicate a need for:

- Improvement in engineering, installation, and documentation of E-911 assets
- Improvement in monitoring and maintaining E-911 assets
- Improvement in growth and change activities concerning E-911 assets

Suggested Action
As a result of its review, **the NRSC urges service providers and network operators to review the following industry best practices with the aim of considering their implementation within their operations:**

7-7-0510 Network Operators, Service Providers and Equipment Suppliers should, by design and practice, manage critical Network Elements (e.g., Domain Name Servers, Signaling Servers) that are essential for network connectivity and subscriber service as critical systems (e.g., secure, redundant, alternative routing).

7-7-0571 Network Operators, Service Providers and Property Managers should emphasize the use of Methods Of Procedures (MOPs), vendor monitoring, and performing work on in-service equipment during low traffic periods.

7-7-0590 Network Operators, Service Providers and Equipment Suppliers should prepare Methods of Procedure (MOPs) for core infrastructure hardware and software growth and change activities as appropriate.

7-7-0693 Network Operators, Service Providers and Property Managers should emphasize the use of Methods of Procedures (MOPs), vendor monitoring, and performing work on in-service equipment during low traffic periods.

A complete copy of the Major E-911 Outages Study Group Report may be found at:
http://www.atis.org/NRSC/Docs/NRSC_E911_study_status_report_final.pdf

All industry Best Practices may be found on the NRIC web site at:
http://www.bell-labs.com/USA/NRICbestpractices/

APPENDIX C – HURRICANE CHECKLIST

NRSC HURRICANE CHECKLIST

Prepared by the Network Reliability Steering Committee (NRSC)

The Alliance for Telecommunication Industry Solutions (ATIS) is a technical planning and standards development organization that is committed to rapidly developing and promoting technical and operations standards for the communications and related information technologies industry worldwide using a pragmatic, flexible and open approach. Participants from more than 350 communications companies are active in ATIS' industry committees and its Incubator Solutions Programs.

The ATIS Network Reliability Steering Committee (NRSC) was formed at the request of the first Network Reliability Council (NRC-1) to monitor network reliability. NRSC is a consensus-based industry committee that analyzes the communications industry's reporting of network outages, makes recommendations aimed at improving network reliability, distributes the results of its findings to industry, and, where applicable, refers matters to appropriate industry forums for further resolution. The NRSC also reviews regulatory developments affecting network reliability and submits consensus-developed comments on matters of common interest to NRSC members.

This document makes general recommendations regarding possible steps that should be considered by telecommunications companies in preparation for a hurricane. These general guidelines do not provide an exhaustive list of activities that should be taken in preparation for a hurricane. In addition, each telecommunications company should evaluate the applicability of any particular checklist activity to that company's unique network and operational environment.

If there are activities your company performs that are not on this hurricane checklist, and you feel they would be beneficial to others if they were added, feel free to provide us with any feedback concerning additions, changes, etc. This feedback can be emailed to Joy Jump at jjump@atis.org with a reference to the NRSC Hurricane Checklist.

The information provided in this document is directed solely to professionals who have the appropriate degree of experience to understand and interpret its contents in accordance with generally accepted engineering or other professional standards and applicable regulations. No recommendation as to products or vendors is made or should be implied.

NO REPRESENTATION OR WARRANTY IS MADE THAT THE INFORMATION IS TECHNICALLY ACCURATE OR SUFFICIENT OR CONFORMS TO ANY STATUTE, GOVERNMENTAL RULE OR REGULATION, AND FURTHER NO REPRESENTATION OR WARRANTY IS MADE OF MERCHANTABILITY OR FITNESS FOR ANY PARTICULAR PURPOSE OR AGAINST INFRINGEMENT OF INTELLECTUAL PROPERTY RIGHTS. ATIS SHALL NOT BE LIABLE WITH RESPECT TO ANY CLAIM, AND IN NO EVENT SHALL ATIS BE LIABLE FOR LOST PROFITS OR OTHER INCIDENTAL OR CONSEQUENTIAL DAMAGES. ATIS EXPRESSLY ADVISES THAT ANY AND ALL USE OF OR RELIANCE UPON THE INFORMATION PROVIDED IN THIS DOCUMENT IS AT THE RISK OF THE USER.

Published by
Alliance for Telecommunications Industry Solutions
1200 G Street, NW, Suite 500
Washington, DC 20005

CONTENTS

HURRICANE CHECKLIST ACTIVITY	TIME FRAME	ECC (strategic)	EOC (tactical)	Sr. Mgt.	Bldg. / Office	Network Ops	Central Office	Outside
STORM FACTS								
Monitoring Hurricane:	-							
NOAA website (http://www.nhc.noaa.gov/)	5d	x	x					
Major news media	5d	x	x					
Government contacts	5d	x	x					
Local contacts (internal and external to company)	5d	x	x					
Possible Damage:	-							
Gain an understanding of the anticipated event and its likely impacts to the network and resources.	3d	x	x					
Consider impacts from flooding, power outages, limited access, employee evacuations, etc.	3d	x	x					
Identify facilities, personnel, and other resources within the hurricane's potential impact areas.	3d	x	x					
Create Geographical Information System (GIS) maps overlaying hurricane's projected path over company territory.	3d	x	x					
Contact Human Resource (HR) data specialist for a report of potentially impacted areas.	3d	x	x					
Organization:	-							
Assign an emergency response manager with the lead role in gathering, consolidating and disseminating event information.	5d		x					
Create a specific hurricane event folder and log.	5d		x					
Post (and update) GIS maps, real estate spreadsheets, and HR report on an intranet website / bulletin board.	5d		x					
Determine if the impact area is likely to change over the course of the event.	3d		x					
If the hurricane is downgraded to a tropical storm or the path changes, continue to monitor until the threat is gone.	3d		x					
CONTACT LISTS								
Internal Contacts:	-							
Update the emergency organization/function charts and contact lists.	5d	x	x					
Provide emergency contact lists to all area managers.	3d	x	x	x				
Publish alternate Central Office (CO) access numbers.	3d						x	
Update contact lists for internal suppliers.	3d	x	x	x	x	x	x	x
Establish names/numbers for after hours coverage.	1d	x	x	x	x	x	x	x
CO techs should have their local Emergency Operations Center (EOC) contact numbers and a list of techs covering other offices.	1d		x				x	
External Contacts:	-							
Update contact lists, open lines of communication and place on alert as needed:	3d	x	x	x	x	x	x	x
Local, State, and Federal Emergency Management Agencies (EMA's)	3d	x	x					
National Coordination Center (NCC)	3d		x					
External suppliers	3d		x	x	x	x	x	x
Media - public affairs (communicate through Emergency Control Center (ECC))	3d	x	x					
Police, Fire, Hospitals, Emergency Medical System (EMS)	3d		x					
Public Service Answering Points (PSAPs)	3d		x					
Gas, water, and electric utilities	3d		x					
Fuel supplier, electricians, generator/electrical switch gear/battery and transportation, HVAC	3d		x		x	x	x	x
Red Cross	3d		x					
Contractors (tree trimming work, building restoration contractors, cleanup, etc.)	3d		x		x	x	x	x
Government EOC contacts	3d	x	x					
Interconnected communication providers	3d	x	x					
Local, state, and federal regulatory officials	3d	x	x					
EMERGENCY SITES AND LODGING								
Emergency Control Sites:	-							
Reserve and activate the primary or back-up EOC outside of the storm's path for tactical operations.	3d	x	x					
Determine if alternate logistics delivery sites are needed.	2d		x					
Logistics planning for EOC building occupants during storm duty.	2d		x					
Place request for food, beverages, office supplies, etc. for the EOC.	1d		x					
Temporary Lodging / Shelter:	-							
Reserve lodging for critical managers prior to storm.	2d		x					
Pre-plan for temporary housing and work locations for critical work centers in the affected area.	2d		x					
Consider alternate locations or work from home strategies.	2d		x	x				
Pre-select potential sites for tent cities (consider size, parking, etc.).	2d		x					
Designate "last resort" CO buildings as shelters.	2d		x		x		x	

HURRICANE CHECKLIST ACTIVITY	TIME FRAME	ECC (strategic)	EOC (tactical)	Sr. Mgt.	Bldg. / Office	Network Ops	Central Office	Outside
ADMINISTRATION, COMMUNICATIONS, AND MANPOWER								
Communications with Employees:	-							
Practice effective communications.	5d	x	x	x	x	x	x	x
What is the problem we are trying to solve?	5d	x	x	x	x	x	x	x
Why is this important (priority)?	5d	x	x	x	x	x	x	x
What is the time frame we need for resolution?	5d	x	x	x	x	x	x	x
Set expectations and provide specific guidance.	5d	x	x	x	x	x	x	x
Send storm watch / warning alert to first responders and communication to all other employees.	3d	x	x	x	x	x	x	x
Contact impacted field managers.	3d	x	x	x	x	x	x	x
Advise to monitor weather conditions.	3d	x	x	x	x	x	x	x
Advise employees to prepare family and home prior to emergency.	3d	x	x	x	x	x	x	x
Coordinate the release of employees to handle their personal affairs.	3d	x	x	x	x	x	x	x
Give critical employees instructions on the return to the job.	3d	x	x	x	x	x	x	x
Cover employees on place of reporting procedures.	3d		x	x	x	x	x	x
Designate "after storm" assignments for employees and managers to include primary and alternate reporting locations.	3d			x	x	x	x	x
Discuss potential alternatives, such as working from alternate locations to continue operations.	3d			x	x	x	x	x
Establish communication channels and communicate to all personnel.	3d	x	x	x	x	x	x	x
Check the phone number for employees to call and say they're okay.	3d	x	x					
Establish and publish conference bridge numbers.	2d		x					
Determine when to call network monitoring centers.	2d		x	x		x		
Set up a local number for employees to call for local information.	2d		x					
Expand the utilization of liaisons from other internal organizations by temporarily placing them in the EOC.	1d		x	x				
Communicate frequently…hourly check-in with manager.	12h		x	x	x	x	x	x
Communications Methods:	-							
Prepare for total loss of cell phones and landline network.	5d	x	x	x	x	x	x	x
Evaluate the use of radios, next generation satellite phones, text pagers, long distance Foreign Exchange (FX) lines, etc.	5d		x					
Equip more employees with cell phones, “blackberries”, or other similar device if necessary.	5d	x	x	x	x	x	x	x
Evaluate the use of IP-based communications.	5d		x					
Inventory satellite phones, hand and 2-Way Radios (UHF & VHF), cell phones, and pagers by type and location.	5d		x					
Have spare batteries and chargers (AC and 12-volt) on hand for these devices.	5d	x	x	x	x	x	x	x
Make sure cell phones are available from an alternate service provider for network managers trying to restore service.	5d					x		
Have an emergency liaison with the wireless providers advise which cell sites are accessible and work if provided a radio link.	5d		x					
Ensure the emergency communication tools are tested and ready.	3d		x					
Ensure all alternate communication devices are shipped out (as required/requested) before shipping delays may occur.	3d		x					
Test Government Emergency Telecommunications Service (GETS) and Wireless Priority Service (WPS).	3d	x	x	x				
Test Shared Resources (SHARES) High Frequency Radio Program and emergency voice communications network.	3d	x	x					
Charge all cell phones and similar devices.	1d	x	x	x	x	x	x	x
Public Coordination (Sales / Marketing):	-							
Prepare for an emergency supply of customer equipment (phones, handsets, data devices, etc.)	5d	x	x					
Plan post storm activities with customers and establish voice mail services.	3d	x	x					
Prepare for a media campaign, goodwill campaign, etc.	3d	x	x					
Prepare to keep our customers informed on safety, restoration, etc. via radio, television, internet, etc.	3d	x	x					
Ensure sales organizations notify key customers in the potentially impacted areas concerning our preparations.	2d			x				
Conference Bridges:	-							
Establish, post and update all conference bridge numbers used for hurricane activity.	3d		x					
Communicate critical items via daily conference bridge calls…backed up by email.	3d	x						
Assign representatives from all disciplines to monitor and support the various conference bridges.	3d	x	x	x				
Communicate status call timelines and participants to field managers and reinforce standard agenda.	12h	x	x	x				
Conduct conference calls with key management to discuss potential impact sites.	12h	x	x	x				
EOC establishes an open bridge for internal status (24x7).	8h		x					
Reporting and Notification:	-							
Prepare required preparation reports (for Region/National).	3d	x	x					
Review and update the field reporting requirements and procedures for information to and from the EOC.	3d		x	x	x	x	x	x
Create a folder on a shared drive to track status reports.	12h		x					
Coordination:	-							
Inventory priority communications programs:	5d		x					
Government Emergency Telecommunications Service (GETS)	5d		x					
Wireless Priority Service (WPS)	5d		x					
Telecommunications Service Priority (TSP)	5d		x					
Partner with security, federal marshals, National Guard, and law enforcement for ingress/egress and access requirements.	5d	x	x					
Obtain and review Department of Transportation (DOT) rules and waivers, and a copy of the state declaration.	5d		x					
Notify unions of emergency status.	5d	x	x					
Activate emergency core teams (Procurement, Real Estate, Safety and Environmental Management).	3d		x					
Review all the state traffic and evacuation details.	3d		x					
Establish a clearing house for decisions impacting multiple groups as defined by the business continuity plan.	3d		x					
Consumer repair network relocation	3d		x					
Corporate network	3d		x					
Switch replacement philosophy	3d		x					
Review abnormal event procedures with all management.	3d	x	x	x	x	x	x	x
Provide field managers with the strategic list of locations in the potentially affected area (switch, POP, regenerator, MSC, MSO).	3d		x					

HURRICANE CHECKLIST ACTIVITY	TIME FRAME	ECC (strategic)	EOC (tactical)	Sr. Mgt.	Bldg. / Office	Network Ops	Central Office	Outside
Provide field managers with the list of potentially impacted network platforms.	3d		x					
Ensure technical support preparations, checklists, and pre-planning are on schedule.	3d		x	x	x	x	x	x
Remind field managers that requests for higher-level technical support must go through the on-call liaison officer.	3d		x	x				
Develop a re-entry strategy for the area.	3d		x					
Review staffing plans to ensure appropriate staffing levels – shifts covered, alternate reporting locations, etc.	3d	x	x	x	x	x	x	x
Determine the teams to staff the situation room 24x7 for the duration of the event.	2d	x	x					
Coordinate with your EOC to work with your ECC for emergency strike teams deployment:	2d	x	x					
Travel	2d	x	x					
Cell	2d	x	x					
Generator	2d	x	x					
Plant Protection	2d	x	x					
Central Office	2d	x	x					
Management Augmentation	2d	x	x					
E911	2d	x	x					
Safety	2d	x	x					
Regional field operations managers	2d	x	x					
RF Engineering	2d	x	x					
Transport/Facilities	2d	x	x					
Local EOC Team members notified and ready.	2d		x					
Develop checklists for positions of Coordinator, Manpower, General Administration, HR, Fleet, and Lodging.	2d		x					
Notify sales organizations of situation and preparations.	2d		x	x				
Advise business unit of event assessment and potential actions if impacted.	2d		x	x				
Engage representative to the ECC to synchronize response activities with Governmental EOC contacts.	2d	x	x					
Gather information on evacuation routes, road closures and potential office closures.	2d		x					
The technician picked to man each CO must be power proficient.	2d						x	
Establish damage survey preparedness teams and assign areas.	1d		x	x				
If needed, divide areas into sub-turfs and using a "full-scope" approach.	1d		x	x				
Verify readiness to execute power down procedures.	1d		x				x	
Stage additional resources to meet the capacity or service estimates as appropriate.	1d	x	x	x	x	x	x	x
Notify network control centers to be on alert.	12h		x	x		x		
Establish priority activities for the event.	12h	x	x	x				
Establish a mandatory evacuation time.	12h		x					
Loaned Personnel:	-							
Solicit early help from areas with recent experience. Their advice and insight can help start things out on the right track.	5d		x					
Check operability of the database for external and internal personnel loans.	5d		x					
Require loaned techs to receive tetanus shots (or other immunizations) at home location prior to travel.	3d		x					
Review the plan for equipping borrowed installation and maintenance technicians with tools, equipment, and identification.	3d		x					
Accountability and Time Reporting:	-							
Validate the process for employee accountability.	3d		x	x				
Review communications process and advise employees of operations status and how to obtain ongoing instructions.	3d	x	x	x	x	x	x	x
Everyone covered on "abnormal pay" and "refusal to work" policies.	3d	x	x	x	x	x	x	x
Costs:	-							
Temporarily increase limits on company purchase cards (upgrades/cash advances) if needed.	3d			x				
Credit cards and ATMs may be unusable due to power/communication issues.	3d			x				
Obtain storm expense accounting codes.	2d		x					
SAFETY, SECURITY, AND TRAINING								
System Access and Re-entry Credentials:	-							
All center groups should review their systems access and ensure region-wide capability.	5d		x	x	x	x	x	x
Validate the master file for all system access/software issues for each center work group / work function.	5d		x					
Review building access plans for all employees, including those loaned-in.	5d		x	x	x	x	x	x
Develop a list of critical personnel who would need access to restricted areas (include name, DOB, and SSN).	3d		x	x				
Review state's Standard Operating Procedure concerning re-entry into the impacted area:	3d		x					
A valid State Drivers License	3d		x					
A valid company-issued photo ID	3d		x					
Marked company vehicles (with standardized markings)	3d		x					
Letter of Access (LOA) for contractors (with verified phone number) stating that bearer and vehicle is authorized	3d		x					
Notify the necessary vendors, contractors, and support organizations of requirements for gaining access to an impacted area.	3d		x					
Determine if there are special access control and identification measures being put in place by law enforcement.	1d		x					
Security:	-							
Coordinate with corporate security for the protection of assets and employees.	3d		x					
Work with corporate security to determine if additional security measures are warranted for key facilities and assets.	3d		x					
Safety:	-							
Verify safety coordinator list is current prior to the storm.	5d		x					
Plan for employees to evacuate families and themselves if possible.	3d		x	x	x	x	x	x
For employees who do not evacuate, develop a list of names and planned locations.	2d		x	x	x	x	x	x
Avoid dispatches/call-outs during hazardous storm conditions.	1d		x	x	x	x	x	x
Advise employees to consider predicted flood areas when choosing a location to ride out the storm.	1d		x	x	x	x	x	x
Training:	-							
Conduct refresher training and provide instructions on pulling trailers (with generators, etc.).	5d		x					
Prepare for the training and local orientation of loaned employees as early as possible.	5d		x					
Conduct refresher training on identifying power poles and telephone poles in the field.	5d		x					

HURRICANE CHECKLIST ACTIVITY	TIME FRAME	ECC (strategic)	EOC (tactical)	Sr. Mgt.	Bldg. / Office	Network Ops	Central Office	Outside
INVENTORY								
Planning:	-							
Designate a coordinator to handle ordering all supplies and to expedite material shipments.	3d		x	x				
Request and stage additional supplies prior to landfall if possible. The use of pods at remote locations can save time.	3d		x					
Secure agreement from vendors that they will agree to ship products immediately upon request after the storm.	3d		x	x				
Maintain records of materials ordered, received, and transferred.	3d		x	x	x	x	x	x
Availability of emergency supplies:	-							
Flashlights and spare batteries	3d		x		x	x	x	x
Rain gear	3d		x		x	x	x	x
Potable drinking water and Meals Ready to Eat (MRE) (staged in critical locations to hold personnel over until food arrives)	3d		x		x	x	x	x
Cots, blankets, etc.	3d		x		x		x	
Sufficient tools	3d		x		x	x	x	x
First aid supplies, neutralizing agents, eye wash kits, spill kits, etc.	3d		x		x	x	x	x
Toilet paper, portable toilets, etc.	3d		x		x	x	x	x
Other special requirements (helicopters, etc.)	3d		x					
Availability of work supplies:	-							
Mobile office trailers equipped and ready to deploy	3d				x	x	x	x
Manhole pumps	3d							x
Blowers	3d							x
Chain saws	3d							x
Portable generators	3d				x	x	x	x
Wireless resources (COWs, SOWs, satellites, etc.)	3d					x		x
Office supplies (paper, pens, etc.)	3d	x	x	x	x	x	x	x
Stakes	3d							x
Inside wiring	3d				x		x	
Outside Network Interfaces	3d					x		x
Insulating blankets, rubber gloves, aprons, ear plugs, safety glasses	3d				x	x	x	x
Poles (establish source of supply)	3d							x
Cable	3d							x
Select one person to handle the disbursement of all cable.	3d							x
Place orders for bulk cable early (25 pair, 50 pair, etc.).	3d							x
Terminals, enclosures	3d						x	x
Batteries	3d				x		x	x
Drop wire, strand	3d						x	x
Identify need for computer equipment (for field) and pre-identify available (spare) resources through Information Technology (IT).	3d				x	x	x	x
Construction material	3d				x	x	x	x
Coin boxes	3d							x
PHYSICAL ASSETS								
Vehicle Planning:	-							
Have a strategy for vehicle relocation and keep vehicles out of possible flood areas.	3d				x	x	x	x
Maintain a record of all vehicles and locations.	3d				x	x	x	x
Review locations in area to refuel company vehicles after storm.	3d				x	x	x	x
Top off fuel in all company vehicles.	1d				x	x	x	x
Equipment:	-							
Perform computer backups.	3d		x	x	x	x	x	x
Move backup software to high ground, maintain detailed list of storage points.	3d		x	x	x	x	x	x
Ensure all test sets function properly and provide backup batteries.	3d				x	x	x	x
Verify all power connections and equipment are out of basements and low-lying first floor areas subject to potential flooding.	3d				x	x	x	x
Update the list and location of deployable equipment and verify status/operability.	3d							x
COWS, SOWS, etc.	3d							x
Towers (microwave, earth stations, etc.)	3d							x
Land Mobile Radio (LMR) base stations	3d							x
Power equipment	3d							x
SLC trailers	3d							x
Secure and protect computer equipment, documents, electronics, capital tools and test equipment.	2d		x	x	x	x	x	x
Garbage bag wrap PC's, backed-up data files, etc.	2d				x	x	x	x
Vertically evacuate PC's, printers, and telephone sets to inner rooms and cover with tarps (above 1st floor).	2d				x	x	x	x
Protect or move PIC's.	2d				x	x	x	x

HURRICANE CHECKLIST ACTIVITY	TIME FRAME	ECC (strategic)	EOC (tactical)	Sr. Mgt.	Bldg. / Office	Network Ops	Central Office	Outside
POWER AND FUEL								
Communication with Local Fuel Vendors:	-							
Review the plans for acquiring fuel.	3d		x					
Compile a list of external fuel supply locations or sources.	3d		x					
Pre-position fuel tankers so that fuel arrives sooner.	1d		x					
Communication and Coordination with Power Companies:	-							
Provide a utilities coordinator to interface with the power company per agreement.	3d		x					
Review how your CO/building gets power (substation, primary and alternate feeders, etc.).	3d		x		x		x	
Find out where they plan to stage techs and equipment.	2d		x					
Engine/Genset (portable and permanent):	-							
Test to ensure generators (portable and permanent) and transfer switches are functioning properly.	3d				x		x	x
Check chargers, fuel, oil/air filters, oil, antifreeze, belt, fuel pump, water pump, etc.	3d				x		x	x
Establish a generator refueling schedule for each location.	3d				x		x	x
Inventory spare parts (fuel filters, belts, oil & filters, antifreeze, hose clamps, jumper cables, gas cans, etc.).	3d				x		x	x
Review the start & transfer procedures (step-by-step).	3d				x		x	x
Start engine & transfer load to reduce power hits.	1h				x		x	
Fuel Tank:	-							
Ensure leak detection is functioning properly.	3d				x		x	x
Verify that water & sediment are at acceptable levels.	3d				x		x	x
Check spill kits and booms.	3d				x		x	x
Check the day tank operation.	3d				x		x	x
Arrange for propane fuel for portable power units and ensure bottles are full.	3d				x		x	x
Verify that all portable fuel cylinders are stored and secured in appropriate locations (propane, etc.).	2d						x	x
Ensure access ports are closed and covers are in place.	1d				x		x	x
Top off all fuel tanks (do not overfill).	1d				x		x	x
Batteries:	-							
Check condition, electrolyte level, age, and charge (NOTE: lack of start battery maintenance causes most engine failures)	3d				x		x	x
Rectifiers:	-							
Check to make sure rectifiers are working properly.	3d				x		x	x
Inventory spare parts (circuit boards, fuses, etc.).	3d				x		x	x
Staging and Deployment:	-							
Review the existing plan for distributing generators and portable pumps.	3d		x		x		x	x
Plan to stage generators as close to the affected area as possible, out of flood areas and out of harms way.	3d		x					
Verify and update the local generator (and vehicles with generators) list/database.	3d		x					x
Generator deployment teams should be identified, informed, and assigned areas.	3d		x					x
Place local generator dispatch center on alert.	3d		x					
Verify that an experienced power technician is available to accompany the driver.	2d							x
Ensure that maps, keys, and tools are available for those pulling generators.	2d		x					x
Determine generator requirements.	2d		x		x	x	x	x
Remote/cell sites should be prioritized for initial generator deployment.	2d		x					x
Determine the number of critical sites without generators in the “high impact” area of the storm for deployment.	1d		x		x	x	x	x
NETWORK SERVICE								
Work Load:	-							
Review jobs in progress, and achieve a safe/secure stopping point.	2d	x	x	x	x	x	x	x
Prepare for a service order increase due to storm damage.	2d	x	x	x	x	x	x	x
Impose a work moratorium on all nonessential work related to Network Operations.	12h	x	x	x	x	x	x	x
Preventive Measures:	-							
Verify that all multiplexers, rings, and protect facilities are fully operational.	5d					x	x	x
Weatherize or weatherproof Crossboxes and Remotes/Cells as needed.	3d							x
Secure assets in low lying areas and make sure all equipment covers are secure.	3d							x
Review/update vulnerability assessments of critical facilities or networks.	3d		x	x		x	x	x
Begin proactive patrolling of interoffice facility fibers and other critical fiber/cable routes.	2d							x
Begin proactive grid sweeps by engineers.	2d							x
Prepare roaming wireless restoration teams to help in reducing wireless troubles.	2d							x
Test traffic redirection for lines/services in the affected areas.	2d					x	x	
Place network monitoring centers on heightened alert for affected areas.	2d		x			x		
Review back-up plans for loss of key facilities (network re-routes, etc.).	2d		x	x		x	x	
Move loose outside materials inside or secure the materials left outside (with sandbags, etc.).	2d				x	x	x	x
Transport the equipment outside of the impact area if possible.	2d				x	x	x	x
Prepare for possible obstacles (inaccessible locations, road closures, evacuations, decontamination requirements, etc.).	2d	x	x	x	x	x	x	x
Priority Areas:	-							
Prioritize recovery areas (critical outages, largest or highest populated areas, etc.)	2d		x			x	x	x
Establish “Expedite and Escalation Center” to prioritize installation and restoration of critical services and to ensure parity.	2d		x			x	x	x
Prioritize Remote/Cell sites (for hospitals, fire, police, etc.) ensuring routines completed and sand-bag as required.	2d		x			x	x	x

HURRICANE CHECKLIST ACTIVITY	TIME FRAME	ECC (strategic)	EOC (tactical)	Sr. Mgt.	Bldg. / Office	Network Ops	Central Office	Outside
CENTRAL OFFICE AND OTHER BUILDINGS								
Power Failures:	-							
Ensure DC lights, flashlights, and batteries are available and functioning properly.	3d				x	x	x	x
Review power-up and power-down procedures of CO equipment to better sustain battery life by operating in simplex mode.	3d						x	
Review power-up and power-down procedures of CO equipment in case a complete shutdown is needed due to flooding, etc.	3d						x	
Place power technicians in strategic locations.	1d						x	x
Begin using available remote access tools to monitor the status of the CO power and standby power plants.	6h						x	
Prepare to place the engine on manual if CO goes on generator...to avoid it from going back to commercial (saves start battery).	6h						x	
Winds and High Water:	-							
Identify buildings and facilities in flood plains and assess the need to evacuate.	3d		x					
Ensure sandbag requirements are met.	3d				x	x	x	x
Inspect sump pumps for operational readiness.	3d				x	x	x	x
Check for leaking or missing duct plugs in all Controlled Environment Vaults (CEVs)...double-check low lying areas.	3d					x		x
Pump manholes adjacent to CO's and inspect conduit plugs.	2d					x		x
Install storm shutters (or board up) and seal offices.	1d				x	x	x	x
Check cable vaults for trash or material that could cause the sump pump to fail or become ineffective.	1d				x		x	x
Perform a walk-thru of the parking lot (and roof, if applicable) for loose material, supplies, etc.	1d				x	x	x	x
Sandbag doors, loading docks, basement entrances, etc.	12h				x	x	x	x
Inspect all air intakes and exhaust, and sandbag low level intakes if required.	12h				x		x	
Check low lying areas to ensure flood closures are secure, and seal all temporary closures.	12h				x		x	x
Miscellaneous:	-							
Inspect heating, ventilation, and air conditioning (HVAC).	3d				x		x	
Inspect fire alarms and any monitoring systems.	3d				x		x	
Check the availability & security (wind/flood) of compressed gases.	3d				x	x	x	x
Verify nitrogen tanks are in place for buffering air dryers in CO's and/or pressurized cables.	3d				x	x	x	x
Ensure backup tapes have been made and are stored at an off site location (all elements capable of backing up).	1d						x	
LONG-TERM PREPARATIONS								
Maintain Year-Round:	-							
Maintain contacts and communications with the local power company…including escalation procedures.	n/a	x	x	x		x		
Understand their language and document how your CO/building gets power (substation, primary and alternate feeders, etc.).	n/a	x	x	x		x		
Keep up-to-date with all training:	n/a	x	x	x		x		
Required annual compliance coverage	n/a	x	x	x		x		
Pulling trailers (with generators, etc.)	n/a	x	x	x		x		
Safety training	n/a	x	x	x		x		
Identifying power poles and telephone poles in the field	n/a	x	x	x		x		
Cross-train as many people as possible in all aspects of the job. This helps in case of emergencies.	n/a	x	x	x		x		
Improve the skill sets, training, and equipping of power technicians.	n/a	x	x	x		x		
Establish/maintain necessary databases and files:	n/a	x	x	x		x		
Master file for all system access/software issues for each center work group (or work function).	n/a	x	x	x		x		
Database for external and internal personnel loans.	n/a	x	x	x		x		
List and location of deployable equipment and status/operability (SLC trailers, COWS, SOWS, etc.).	n/a	x	x	x		x		
Verify that data circuit designations are maintained in a database for speed of restoration for:	n/a	x	x	x		x		
State and local EOCs	n/a	x	x	x		x		
Fire and police departments	n/a	x	x	x		x		
Hospitals	n/a	x	x	x		x		
Airports	n/a	x	x	x		x		
Military bases	n/a	x	x	x		x		
Utility plants (power, water, sewage)	n/a	x	x	x		x		
Other connected communications companies	n/a	x	x	x		x		
Levee Districts, Corp of Engineers, and Port Authorities	n/a	x	x	x		x		
Name multiple safety coordinators prior to the storm. You can adjust later, but have these people trained and ready to go.	n/a	x	x	x		x		
Establish/maintain a phone number for employees to call and say they're okay during/after emergencies.	n/a	x	x	x		x		
Have a plan for tetanus shots (or other immunizations) for employees that may work hurricane areas in the future.	n/a	x	x	x		x		
Keep vehicles serviced and maintained.	n/a	x	x	x		x		
Maintain a supply of contractor badges, magnetic signs and other credentials.	n/a	x	x	x		x		
Have tools and equipment ready for loaned personnel during hurricane season.	n/a	x	x	x		x		
Ensure that all multiplexers, rings, and protect facilities are fully operational (test as necessary).	n/a	x	x	x		x		
Ensure the generator start & transfer procedures remain up-to-date (step-by-step).	n/a	x	x	x		x		
Test run engines/generators on a routine basis.	n/a	x	x	x		x		
Test fuel reserves for contamination at least once a year or after any event that could compromise the tank housing or pipes.	n/a	x	x	x		x		
Ensure that recorded announcements are specific and identify which carrier is responsible.	n/a	x	x	x		x		
Long-Term Plans / Prevention:	-							
Power connections and equipment should be located in areas that are not likely to flood (basements, etc.).	n/a			x	x	x	x	
Seek agreements with vendors with a willingness to exercise risk management and increase stock prior to hurricane season.	n/a			x		x		
Long range plans for all fiber cable should be to bury.	n/a			x		x		
Pursue development of a higher tensile strength aerial service wire.	n/a			x		x		
Negotiate a wider right-of-way to prevent trees from being the issue that it has been when aerial cable is the only choice.	n/a			x		x		
Trim trees within right-of-ways yearly…in partnership with local power company.	n/a			x		x		x
If possible, consider providing natural gas connections near DLC sites and convert small generators so that they can run from it.	n/a			x		x		
Design the outside network to better withstand flooding and severe weather, and make restoration easier.	n/a			x		x		

HURRICANE CHECKLIST ACTIVITY	TIME FRAME	ECC (strategic)	EOC (tactical)	Sr. Mgt.	Bldg. / Office	Network Ops	Central Office	Outside
POST-STORM ACTIVITIES								
Employee Safety:	-							
Account for the well-being of all employees (utilizing automated systems if available).	n/a	x	x	x	x	x	x	x
Contacts:	-							
Publish and maintain a master list of temporary office telephone numbers for displaced workers immediately after the storm.	n/a		x					
Conference Bridges:	-							
Conduct executive update with necessary teams and ensure the following agenda items are covered:	n/a		x					
Event status	n/a		x					
Environmental status: Wireless and Wireline (switch, pop, earth station, regen)	n/a		x					
Cell site status and damage assessment	n/a		x					
Local coordination (utilities, electrical, authorities, state EOC)	n/a		x					
Technician coordination (lodging, food and services, employee family assistance process)	n/a		x					
Network element coordination (element assessment, technical and vendor support, backup and shutdown process)	n/a		x					
Generator and fuel status	n/a		x					
Other issues	n/a		x					
Action items	n/a		x					
Next call	n/a		x					
Ensure updates to the following information once executive update is concluded:	n/a		x					
Update event log.	n/a		x					
Executive v-mail blast through the ECC	n/a		x					
Update master assessment log.	n/a		x					
Post executive summary to Intranet site.	n/a		x					
Send executive summary e-mail to event distribution list.	n/a		x					
Update the event master assessment log.	n/a		x					
Costs:	-							
Set up accounting procedures for loss recovery.	n/a		x	x				
Secure funds for employee advances/cash.	n/a		x	x				
Remind employees to use correct special accounting codes.	n/a	x	x	x	x	x	x	x
Temporary Lodging / Shelter:	-							
Consider leasing a hotel so that a management teams could operate, and where employees could live temporarily.	n/a		x					
Consider temporary renovations to existing CO buildings as a means to avoid tents for temporary housing.	n/a		x				x	
House restoration strike teams in locations near the EOC to facilitate dispatch efforts.	n/a		x					
Extra Work Force:	-							
Get daily info on incoming/pending load (troubles and service orders) so that decisions can be made on force redeployment.	n/a		x	x	x	x	x	x
Assess post-storm force/vehicle/tool needs.	n/a		x	x	x	x	x	x
Note and escalate any requests for additional resources.	n/a	x	x	x	x	x	x	x
Determine the appropriate dispatch strategy.	n/a		x	x	x	x	x	x
Learn if personnel and/or the emergency response team will go to the impacted area and create a travel list.	n/a		x					
Request that the home location inventory all tools and send a record of the inventory with the borrowed employee and vehicle.	n/a		x	x				
Prepare a list of motor vehicles that arrive with the borrowed employees and send to fleet operations.	n/a		x	x				
Obtain emergency contact information for the borrowed employees.	n/a		x	x				
Ensure safety materials and tools for all borrowed employees upon arrival and departure.	n/a		x	x				
Set expectations (training/orientation sessions) with the borrowed forces whether internal or contractors.	n/a		x	x				
Distribute orientation package to borrowed forces (welcome, work groups, work hours, place of reporting, safety, etc.).	n/a		x	x				
Inventory computer resources for use by contract and loaned engineering forces.	n/a		x	x				
Obtain additional access keys as required for borrowed employees.	n/a		x	x				
Provide transportation arrangements for borrowed employees.	n/a		x	x				
More planning and project management should be allocated immediately to catastrophically damaged areas.	n/a		x	x				
Contact multiple equipment vendors for all outside plant network components (Crossboxes, RT's, etc.).	n/a		x					
Ensure power vendors and electrical contractors have enough resources on-site with adequate materials/supplies available.	n/a		x			x	x	
Safety:	-							
Determine which areas are safe for work.	n/a		x		x	x	x	x
Contact the power company and advise the field as areas become safe for sweep teams and techs to work.	n/a		x					
Deploy outside plant technicians as soon as possible...but not before the power company is out of the way.	n/a		x					x
Put safety teams in place as soon as possible to assist with the many issues related to the storm.	n/a		x					
Assign someone to deliver "after storm" safety training for technicians and management.	n/a		x					
Complete safety coverage of loaned employees before they are deployed into the field.	n/a		x					
Emergency Supply Availability:	-							
Deliver additional portable toilets to locations as needed.	n/a		x					
Arrange for additional house service supplies.	n/a		x					
Obtain portable refrigerators for medical supplies and food.	n/a		x					
Deliver food, water, and ice to locations as needed.	n/a		x					
Power and Fuel:	-							
Continue to monitor the status of power, fuel, and batteries throughout the lifecycle of the event and service as necessary.	n/a		x		x	x	x	x
Immediately after the storm, a local manager should make arrangements for a company generator to power a local gas station.	n/a		x					
Working with local officials the designated station will provide fuel to emergency and company vehicles until tankers arrive.	n/a		x					
Local officials will also have to agree to provide security for this location.	n/a		x					

HURRICANE CHECKLIST ACTIVITY	TIME FRAME	ECC (strategic)	EOC (tactical)	Sr. Mgt.	Bldg. / Office	Network Ops	Central Office	Outside
Damage Assessment and Service Restoration:	-							
Restore service based on established priority lists.	n/a		x			x	x	x
Account for all assets.	n/a	x	x	x	x	x	x	x
Partner with corporate real estate and services to allow decontamination and equipment recovery efforts to occur in parallel.	n/a		x					
Provide instructions and assignments for damage assessment teams.	n/a		x					
Coordinate survey team activities/areas cleared of power hazards.	n/a		x					
Activate the field sweep teams.	n/a		x			x		x
Deploy team for initial CO hazard/damage assessments.	n/a		x				x	
Inspect power plants and switch.	n/a					x	x	x
Dispatch established survey teams to do Digital Loop Electronics (DLE) site damage assessment.	n/a							x
Deploy cell site strike team to restore service immediately after the storm passes.	n/a		x					x
Monitor and report Interoffice Facility (IOF) status…reroute if possible	n/a					x		
Communicate the damage survey information to the designated office.	n/a		x	x	x	x	x	x
Maintain the damage repair progress reports.	n/a		x					
Contact city/county representatives immediately after the storm to identify any service problems.	n/a		x					
Keep our customers informed of our restoration effort via radio, television, internet, etc.	n/a	x	x					
Utilize automation (Interactive Voice Response, etc.) for ticket closeouts.	n/a		x		x	x	x	x
Instruct the cleanup and decontamination personnel that pressure washers cannot be used in the vaults.	n/a				x	x	x	x
An assessment checklist should be provided to the necessary vendors with all critical information, such as:	n/a		x			x	x	
Contact information	n/a		x			x	x	
Nature of disaster and equipment damaged	n/a		x			x	x	
Information on building, switching, transmission, power, software, cables, etc.	n/a		x			x	x	
Work with the other communications companies on getting their networks back up.	n/a		x			x		
Prepare for a service order increase if FEMA and other governmental agencies move in and residents find temporary housing.	n/a					x	x	x
Consider powering HVAC on generator or deploying mobile HVAC units in the event of a power outage.	n/a		x				x	
Adjust the provisioning and maintenance clocks if necessary.	n/a		x	x				