This article is part of the IEEE Reliability Society 2008 Annual Technology Report.

Communications network reliability

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Communications is one of the primary sectors of the Critical Infrastructure Protection program aimed at assuring the reliability and security of vulnerable and interconnected infrastructures of the United States. Communications network reliability, a joint industry/government initiative, is the focal point for maintaining and improving the reliability of communications services. The focus on communications network reliability began in 1991 after several catastrophic network failures of the signaling network that resulted in major metropolitan areas, including Washington DC, losing the ability to process telephone calls for about 8 hours. These failures resulted in the Federal Communications Commission chartering the Network Reliability Council (NRC), a federal advisory committee composed of high level executives from each of the major telecommunications companies. One of the recommendations coming out of the NRC was the need for ongoing data collection of information on major network failures. As a result, the FCC instituted network outage reporting. Whenever a large number of customers could not make phone calls for at least 30 minutes, an outage report was generated and sent to the FCC.

In 2005, the FCC expanded network outage reporting to cover wireless communications companies, satellite providers, paging providers, facility owners and emergency network providers. New thresholds that covered large facility failures, failures in emergency networks (E911), wireline failures, cable telephony failures and wireless failures were instituted. In simplified terms, outages are reported when the product of the number of users affected and the number of minutes the outage last exceeds 900,000. The FCC analyzes the data and works with individual companies to address causes of network outages. Network outage reporting is currently the primary way to gauge communications network reliability and drive towards network improvement. Since communications networks are composed of 1000s of pieces of equipment (each much more complicated than a car), network outage reporting is the only logical way to measure and track the reliability of communications networks.

Along with the collection of network outage data, the Network Reliability Steering Committee (NRSC) was established to analyze the data and to develop Best Practices that could prevent outages or to alleviate the effects of the outages. The NRSC chartered under the Alliance for Communications Industry Solutions is composed of representatives from major wireline and wireless carriers and suppliers of telecommunications equipments. The NRSC meets quarterly to discuss trends in network reliability. The current mission of the NRSC is:

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

In 2008, at quarterly NRSC meetings, the FCC provided summaries of outage information. Counts of outages in numerous categories were analyzed to identify areas where there had been reliability improvement and areas where reliability had deteriorated. Durations of outages were examined as well as the effects of the outages. The NRSC set up subcommittees to analyze network outages when the number of outages in a particular subcategory was statistically large. These subcommittees are composed of experts in the subcategory of outages. In 2008, teams addressed outages in wireless networks, large facility outages, and outages in emergency services networks. Recommendations and Best Practices were developed by these teams that, if applied,

could reduce the number of these major events. Outages in emergency services networks are particularly important since an outage could prevent many 911 calls from getting through to the appropriate emergency services providers.

In 2008, a new system for tracking the status of network equipement during a disaster such as a hurricane was utilized. The Disaster Information Reporting System (DIRS) was first used during several national security exercises as well as during the major hurricanes in 2008 including Gustav and Ike. Information on the status of cell sites, digital switches, digital loop carriers, Public Safety Answering Points (PSAPs), interoffice facilities, broadcast stations (AM, FM, TV), and cable TV systems was collected and analyzed. Hundreds of companies provided information on a daily basis. Not only was information collected on whether equipment was functioning but also the power status of the equipment including whether the equipment was on back-up generators. Because of DIRS and FCC outreach efforts, companies, Public Safety Answering Points, hospitals and other organizations that are vital to recovering from a disaster had a conduit to express their needs for assistance and/or to convey in a consistent manner status of their equipment.

Reports that summarized the status of communication assets in the disaster area were distributed to federal and local government agencies including the Department of Homeland Security (DHS), FEMA, the White House, etc. Trend charts were provided which tracked the effectiveness and speed of the restoration efforts. Maps showed visually where service continued to be impacted.

Overall, during these hurricanes, communications equipment was remarkably resilient. Although there were major counties that lost a majority of their cell sites, restoration occurred rapidly over the days after the hurricane passed through. No large switches were ever completely isolated or completely failed. Only a small percentage of the broadcast stations were out for a long period of time. Companies and government cooperated to recover from these disasters quickly and efficiently.