NRSC Bulletin No. 2009-007
Wireless Outages
November 2009

Background

The Alliance for Telecommunications Industry Solutions (ATIS) Network Reliability Steering Committee (NRSC) responded to the Federal Communications Commission (FCC) Public Safety and Homeland Security Bureau's (PSHSB) interest in a perceived increase in wireless outage reporting.

Methodology of the Wireless Subteam

The Wireless Outages study was initiated in May 2007 to address data presented to the NRSC by the FCC that showed the frequency of Network Outage Reporting System (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.

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

The team's effort culminated in an analysis of 49 months of wireless final outage reports covering the period from May 2005 through May 2009 through analysis of keywords used in NORS reports. These keywords, covering both direct and root causes, resulted in a unified cause trend analysis covering the more relevant period of January 2007 through May 2009.

The Wireless Subteam noted that outages assigned to the Power Failure, Diversity Failure, Cable Damage, and Procedural Service Provider cause groups have been increasing at a statistically significant rate; however, the overall outage frequency during the study period did not increase at a statistically significant rate. This bulletin highlights Best Practices and findings concerning the following four cause groups:

- Power Failure
- Diversity Failure
- Cable Damage
- Procedural Service Provider

Power Failure:

Number	Description
7-P-0799[1]	**Cell Site Power Backup**: Service Providers, Network Operators and Property Managers should periodically review the need to provide back up power at cell sites taking into consideration the criticality of the site as well as local zoning laws, statutes, contractual obligations and feasibility.

Number	Description
7-7-5204	Service Providers, Network Operators and Property Managers should ensure availability of emergency/backup power (e.g., batteries, generators, fuel cells) to maintain critical communications services during times of commercial power failures, including natural and manmade occurrences (e.g., earthquakes, floods, fires, power brown/black outs, terrorism). The emergency/backup power generators should be located onsite, when appropriate.
7-7-0679	Network Operators, Service Providers and Equipment Suppliers should provide diverse power feeds for all redundant links (e.g., SS7, BITS clocks) and any components identified as "critical" single points of failure (SPOF) in transport and operations of the network.
7-7-0651	Network Operators, Service Providers and Property Managers should consider providing diversity within power supply and distribution systems so that single point failures (SPOF) are not catastrophic. For large battery plants in critical offices, consider providing dual AC feeds (odd/even power service cabinets for rectifiers). Transfer switches should be listed to a UL standard for Transfer Switch Equipment. When transfer breaker systems are used, they must be mechanically and electrically interlocked.

Diversity Failure:

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

Cable Damage:

Refer to NRSC Bulletin No. 2009-006 – Wireline Outages – October 2009 for a comprehensive examination of cable damage issues that are also relevant for wireless network operators.

- http://www.atis.org/nrsc/Bulletins/NRSC_Wireline_Bulletin_2009-006.pdf

Procedural Service Provider:

Number	Description
7-P-0590	Network Operators, Service Providers and Equipment Suppliers should **review**, prepare, **and update** Methods of Procedure (MOP) for core infrastructure hardware and software growth and change activities as appropriate.
7-P-0755	Network Operators, Service Providers and Property Managers should clearly communicate their installation guidelines (e.g., MOP) **and the necessity of adherence to the MOP** to all involved parties.

[1] "P" indicates a proposed new or modified Best Practice

The most up-to-date (NRIC) Best Practices can be found at:

- http://www.bell-labs.com/USA/NRICbestpractices/
- https://www.fcc.gov/nors/outage/bestpractice/BestPractice.cfm

The NRSC supports the NRSC Outage Reporting Advisory Subcommittee (ORAS) work on the hardware failure cause codes.

Conclusion

While the overall outage frequency during the study period did not increase at a statistically significant rate, the Wireless Subteam determined that these four opportunity areas: Power Failure, Diversity Failure, Cable Damage and Procedural Service Provider had the top four average monthly increases for the period January 2007 through May 2009 at statistically significant rates. Accordingly, the Best Practices listed here most closely address these areas. The NRSC believes that a review of these Best Practices and documents will contribute to further reductions in the number of wireless outages over time.

For more information:

If you have any questions or would like additional information concerning this Bulletin, please contact:

NRSC Committee Administrator
Alliance for Telecommunications Industry Solutions (ATIS)
1200 G Street, N.W., Suite 500
Washington, D.C. 20005
202-628-6380

About ATIS

ATIS is the leading technical planning and standards development organization committed to the rapid development of global, market-driven standards for the information, entertainment and communications industry. More than 250 companies actively formulate standards in ATIS' 20 Committees, covering issues including: IPTV, Service Oriented Networks, Home Networking, Energy Efficiency, IP-Based and Wireless Technologies, Quality of Service, Billing and Operational Support. In addition, numerous Incubators, Focus and Exploratory Groups address emerging industry priorities including "Green", IP Downloadable Security, Next Generation Carrier Interconnect, IPv6 and Convergence.
ATIS is the North American Organizational Partner for the 3rd Generation Partnership Project (3GPP), a member and major U.S. contributor to the International Telecommunication Union (ITU) Radio and Telecommunications' Sectors, and a member of the Inter-American Telecommunication Commission (CITEL). For more information, please visit < http://www.atis.org >

About NRSC

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. 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.

Notice of Disclaimer & Limitation of Liability

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 IGHTS. ATIS SHALL NOT BE LIABLE, BEYOND THE AMOUNT OF ANY SUM RECEIVED IN PAYMENT BY ATIS FOR THIS DOCUMENT, 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 ANY AND ALL USE OF OR RELIANCE UPON THIS 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