



NRSC Bulletin No. 2009-006

Wireline Outages

October 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 wireline outage reporting, specifically that the number of FCC wireline outage reports being filed by the industry were increasing at a statistically significant rate (i.e., 3.5%/year) from January 2005 through March 2008.

Methodology of the Wireline Outage Study Sub-team

Four service providers and one vendor served on the NRSC Wireline Sub-team. As part of their efforts, the participating service providers submitted their outage data from January 2007 through December 2008 to Telcordia for analysis. The sub-team examined final Network Outage Reporting System (NORS) Wireline – 900,000 User Minute reports, including the detailed descriptions, the direct causes and roots causes for these outages; as well as, looked at whether the events occurred inside or outside a building. While investigating this data, the sub-team focused on determining what was driving the increased number of wireline outage reports across the industry.

In addition to the NORS data, participants reviewed their respective internal wireline outage data to determine whether company specific issue/s contributed to the increase in wireline reports, completed a Network Reliability and Interoperability Council (NRIC) Best Practice (BP) review that focused on external cable damage, completed a Common Ground Alliance (CGA) BP review that focused on Facility Owner BPs, and completed a state law review that focused on One-Call legislation and laws.

The Wireline Outage Sub-team findings were documented and industry recommendations were identified as described below.

Wireline Outage Study Sub-team Findings

This in-depth analysis resulted in the following significant findings:

1. FCC wireline outage reports filed by the participants from January 2007 – December 2008 reflected a 1.3% significant increasing trend.
2. The majority of wireline events occurred outside the building (i.e. 87%).
3. The primary direct cause of the increase in wireline reports was cable damage (i.e. 1.5% significant increasing trend).
4. The primary root cause of the increase in wireline reports was environment external (i.e. 3.1% significant increasing trend).
5. Hardware failure was a relatively small percentage of the direct and root causes identified on the wireline outage reports.
6. Wireline sub-team findings align with the DS3 Outage Team analysis and support recommendations for cable damage, environment external and hardware.
7. The participant's review of their respective internal wireline outage data further supported the Wireline sub-team findings, specifically that carriers have experienced an increase in cable damage related issues.
8. The Wireline sub-team supports the CGA BPs.



Recommendations:

1. The NRSC recommends that the industry review the following NRIC Best Practices again and consider implementation as appropriate:

Number	Description
7-7-5113	Network Operators, Service Providers and Property Managers, when feasible, should provide multiple cable entry points at critical facilities (e.g., copper or fiber conduit) avoiding single points of failure (SPOF).
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.
7-6-1017	Network Operators and Service Providers should have documented plans or processes to assess damage to network elements, outside plant, facility infrastructure, etc. for implementation immediately following a disaster.
7-7-0709	Network Operators should compare outside plant drawings relative to marking cable route maps when locating buried facilities and resolve any discrepancies.
7-7-0728	Network Operators should use industry standard markings for outside plant cables.
7-7-5199	Network Operators and Service Providers should provide appropriate protection for outside plant equipment (e.g., Controlled Environmental Vault, remote terminals) against tampering and should consider monitoring certain locations against intrusion.
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. (See Reference/Comment field for additional information)
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).
7-7-0707	Network Operators should ensure timely response once received from the One Call Center for all locate requests.
7-7-0725	Network Operators and Government should increase stakeholder coordination and cooperation to improve the effectiveness of state one-call legislation efforts.
7-7-0740	Network Operators should implement internal processes needed to support the One-Call Notification legislation.
7-7-0452	Network Operators, Service Providers and Property Managers should post emergency contact number(s) and unique site identification in an externally visible location at unmanned communication facilities (e.g., towers, cell sites, Controlled Environment Vault (CEV), satellite earth stations). This signage should not reveal additional information about the facility, except when necessary.
7-7-5046	Network Operators and Property Managers should ensure critical infrastructure utility vaults are secured from unauthorized access.



7-7-0512	Network Operators, Service Providers and Property Managers should perform periodic inspections of fire and water stopping where cable ways pass through floors and walls (e.g., sealing compounds).
7-7-0705	Network Operators should use warning tape on buried facilities - place tape 12 in. above the cable system.
7-7-0706	Network Operators should use visible cable markings on buried facilities (unless prone to vandalism).
7-7-0708	Network Operators should use appropriate technologies for locating buried facilities and consider upgrading as technologies evolve.
7-7-0715	Network Operators should proactively communicate with land owners regarding rights-of-way or easements near critical buried facilities to prevent accidental service interruption.
7-7-0716	Network Operators should encourage employees to become proactive in preventing buried facilities damages.
7-7-0733	Network Operators, when relocating buried facilities in a common right-of-way, should coordinate activities with other right-of-way occupants to minimize the potential for damage.
7-7-0738	Network Operators and Service Providers should track and analyze facility outages taking action if any substantial negative trend arises or persists.
7-7-0722	Network Operators, Service Providers and Property Managers should consider pest control measures to protect cables where appropriate.
7-P-0783	Cable Management: Network Operators and Service Providers should consider including spare fiber connectors and their locations in asset inventory systems.

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>

2. The NRSC recommends that the industry review the CGA BPs for Facility Owners. (The complete list of CGA BPs can be found at: <http://www.commongroundalliance.com/>)
3. The NRSC recommends that the industry review the DS3 Outage Team Bulletin No. 2009-2 again, with special focus on the recommendations for Cable Damage, Environment External and Hardware. (The DS3 Outage Team Bulletin No. 2009-2 can be found at: http://www.atis.org/nrsc/Bulletins/NRSC_Bulletin_No_2009-2.pdf)
4. The NRSC recognizes the importance of effective state one-call legislation, including the *Call Before You Dig* process, in preventing damage to underground facilities. The NRSC recommends that companies consider becoming more engaged in the one-call and cable damage prevention process(s).
5. The NRSC supports that the NRSC Outage Reporting Advisory Subcommittee (ORAS) work on the hardware failure cause codes.

Conclusion

The Wireline Sub-team determined that the majority of wireline outages occurred outside of the building with the primary direct cause being cable damage and the primary root cause being environment external. There are



existing Best Practices, as well as findings from previous NRSC teams, that address this issue. The NRSC believes that a review of these Best Practices and documents will reduce the number of wireline outages over time.



For more information:

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