



NRSC Bulletin No. 2017-001

DS3 Non-Simplex Outages

March 2017

Background

In the December 2015 quarterly meeting of the Alliance for Telecommunications Industry Solutions (ATIS) Network Reliability Steering Committee (NRSC), the Federal Communications Commission (FCC) identified that the number of outages per month had risen dramatically. As a result of this observation, the NRSC established the Outage Increase Task Force (TF). Based on this TF's findings, the team was renamed to the DS3 Non-Simplex TF with the acceptance of NRSC Issue 33. During 2016, the NRSC DS3 TF gathered Network Outage Reporting System (NORS) data from all of the NRSC members for the period between March 2015-October 2016 and conducted extensive analysis to attempt to determine if there were any underlying actionable causes to the rise in reportable outages. This Bulletin will describe the analysis and the resulting recommendations; however, other than increased vigilance, no actionable tasks were identified.

Methodology

The FCC presentation to the NRSC indicated that "Hardware Failures", "Power Failures", and "Cable Damage" were the causes that had most increased and thus were the first focus of the analysis. The NRSC member companies initially provided March 2015-March 2016 NORS data to an independent third party for analysis. The analysis examined:

- Root Cause & Direct Cause (both all reports & non-sympathy only)
- Number of DS3s Involved
- Day of Week
- Hour of Day
- State in Which Outage Originated
- Company Code (Note: identities of companies remain confidential)
- Equipment Failed
- Network Involved

The initial view was that there was no primary cause(s) or actionable information within the factors examined; however, a single service provider was identified to have contributed a large portion of the increase within the NRSC-only data. Further analysis indicated that the identified service provider had coded the "Equipment Failed" field as "Customer DS3" in a large number of its NORS reports. An initial report detailing these findings was provided to the FCC in August 2016. At that meeting, the FCC indicated that the DS3 outages were continuing to rise at a higher rate than had historically been seen.

The NRSC continued its investigation focusing on DS3 Outages. Subsequently, the NRSC member companies provided additional NORS data for the period of March-October 2016 to the independent third party for analysis. Analysis of this data followed a similar pattern to the initial data; however, the Best Practices used were also examined.

Findings

While no actionable characteristic of the NORS reports were identified, there are several NRSC observations:

- Technological advances have resulted in a higher number of DS3 equivalent circuits on a single facility which has resulted in a higher number of outages becoming reportable as soon as the 30 minute threshold is met.



- Not all service providers include the name of the vendor on the report; however, among those that do, two vendors were observed more frequently than others.
- The states with the highest proportion of outages generally were on the East Coast of the United States, Texas, and California (i.e., states with large populations).
- One NRSC company reported a higher portion of the DS3 Non-Simplex Outage Report during this time period.

Recommendations

Based on the NRSC’s analysis, it is recommended that service providers revisit ATIS-0100045, *NRSC Bulletin No. 2009-2, DS3 Outage March 2009* and ATIS-0100038, *NRSC Technical Report – Analysis of Large DS3 FCC Reportable Outages*. Additionally, the NRSC recommends service providers review the following Best Practices and assess the applicability of implementation to their operations:

Best Practices Related to Power Failures

Number	Description
9-7-0496	Network Operators and Property Managers should consider storing their portable generators at critical sites that are not otherwise equipped with stationary generators.
9-7-0650	Network Operators, Service Providers, and Property Managers should place strong emphasis on human activities related to the operation of power systems (e.g., maintenance procedures, alarm system operation, response procedures, and training) for operations personnel.
9-8-0799	Cell Site & Remote Location Power Backup: Service Providers, Network Operators, and Property Managers should periodically evaluate the need for and feasibility of providing back up power at cell sites and remote locations, taking into consideration the criticality of the site or location, as well as local zoning laws, statutes, and contractual obligations.
9-9-0548	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 should engage Equipment Suppliers and other involved parties, as appropriate, to assist in the analysis and implementation of corrective measures.
9-9-0819	For the deployment of Residential Internet Access Service, Network Operators should provide backup power for broadband network equipment when economically and technically practical.

Best Practices Related to Hardware Failures

Number	Description
9-5-0511	Network Operators and Service Providers should provide training for their operations personnel on network-level troubleshooting.
9-7-0588	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.



Number	Description
9-7-5080	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.
9-7-5262	Network Operators, Service Providers, and Equipment Suppliers should evaluate the vulnerability of storage locations in an effort to protect critical spares.
9-9-5237	Network Operators, Service Providers, Public Safety, and Equipment Suppliers should verify the integrity of system spares and replenish spares, as appropriate, as part of a disaster response and at the conclusion of a disaster response at a facility.

Best Practices Related to Cable Damage

Number	Description
9-7-0434	Employee Training: Network Operators, Service Providers, Equipment Suppliers, and Property Managers should provide appropriate training and periodic refresher courses for their employees.
9-7-0741	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).
9-8-0731	Network Operators and Service Providers should provide physical diversity on critical inter-office and wireless backhaul routes when justified by a risk or value analysis.
9-8-0755	Network Operators, Service Providers, and Property Managers should document and communicate their installation and maintenance guidelines (e.g., Maintenance Operation Protocol [MOP]) and the expectation of compliance by all involved parties.
9-9-0548	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 should engage Equipment Suppliers and other involved parties, as appropriate, to assist in the analysis and implementation of corrective measures.