



ATIS-0100071

**Network Reliability Steering Committee 2021-2022
Operational Report**



As a leading technology and solutions development organization, the Alliance for Telecommunications Industry Solutions (ATIS) brings together the top global ICT companies to advance the industry's most pressing business priorities. ATIS' nearly 200 member companies are currently working to address the All-IP transition, 5G, network functions virtualization, big data analytics, cloud services, device solutions, emergency services, M2M, cyber security, network evolution, quality of service, billing support, operations, and much more. These priorities follow a fast-track development lifecycle — from design and innovation through standards, specifications, requirements, business use cases, software toolkits, open source solutions, and interoperability testing.

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**Network Reliability Steering Committee 2021-2022
Operational Report**

March 2023

DATE: March 2023

TO: Stakeholders of the Nation’s Public Communications Networks

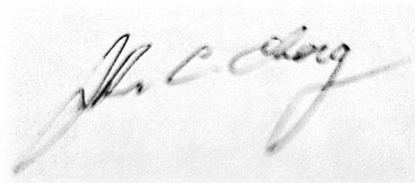
Service disruptions, although infrequent, remind us how dependent we are on communications networks. During these events, communication providers demonstrate how seriously they take their responsibility to provide reliable services for consumers and businesses, expending significant efforts to mitigate outages and quickly restore service. Once service is restored, equal efforts are expended to analyze the disruption, identify areas for improvement, and implement those improvements. The owners and operators of these networks, along with the equipment vendors they partner with, are firmly committed to building and maintaining reliable and resilient networks. This commitment has been demonstrated again and again – on a day-to-day basis, and in the face of natural and manmade disasters.

The Network Reliability Steering Committee (NRSC) remains committed to this effort by analyzing outage and reliability trends and recommending actions that can help prevent outages or reduce their impact. Its members work together to ensure that communication systems continue to remain secure and reliable. These efforts ultimately benefit consumers, business, the industry, and the nation as a whole.

This report provides a snapshot of the issues addressed by the NRSC over the last two years (2021-2022). As you will see, the efforts of the NRSC, guided by input from member company subject matter experts, as well as the FCC, are primarily directed toward ensuring that meaningful data is being collected and analyzed to better understand the cause and mitigation of outages, and provide agencies with situational awareness of the health of the nation’s communications networks. Likewise, NRSC has worked to encourage the streamlining of outage notifications for public safety purposes. Ultimately, the NRSC utilizes this information to develop industry guidance that directly impacts and improves the nation’s networks. These efforts build upon previous NRSC work and form a strong foundation for ensuring that communication networks continue to be reliable and resilient. This foundation is especially useful in light of ongoing changes to the communications network, including the significant growth of wireless networks, expansion of 5G networks, and the evolution to an all-Internet Protocol (IP) network. The nation depends on these networks to provide emergency communications, enable commerce, and support individual communications. As these changes to the network occur, the NRSC remains committed to, and will continue working toward, maintaining network reliability and resiliency.



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Executive Summary

About the NRSC

The Alliance for Telecommunications Industry Solutions' (ATIS) NRSC addresses network reliability improvement opportunities of service providers and vendors, in a noncompetitive environment, and allows participants to develop standards, technical requirements, technical reports, bulletins, Best Practices, and reports on the health of the nation's communications networks. The NRSC also coordinates industry improvements in network reliability through outage analysis. The mission statement¹ of the NRSC is:

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.

The NRSC accomplishes this through:

- identifying potential network reliability issues through an opportunity evaluation process,
- establishing subcommittees that address network reliability issues, and 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 the Network Outage Reporting System (NORS) and the 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.

This Operational Report covers the period of 2021 through 2022. A brief history of the NRSC is provided in the *Introduction* of this report (page 1).

Changing Regulatory Environment & Changing Industry

The last two Operational Reports (2017-2018 and 2019-2020) cited an increased focus on issues related to network reliability and resiliency and to the obligation of industry to report communications outages. This focused attention has, if anything, increased over the last two years, with numerous regulatory measures being enacted and industry responding to various high-profile service interruptions. Continuity of emergency services, information sharing, cybersecurity, and the continued move to an all-IP network have received the bulk of attention, although reliability of legacy networks remains a critical piece of the equation.

Network Reliability and Resiliency

On May 25, 2016, the FCC proposed new reporting rules and thresholds aimed at improving the resiliency of mobile wireless networks by simplifying the methodology required to calculate reportable events. These rules went into effect in May of 2018 and have drastically increased the number of outages reported to the FCC. Looking at the increase, one might conclude that reliability and resiliency have decreased; however, that would not reflect the true nature of the outages in the context of a growing network and increased reporting requirements. In 2022, NRSC filed a Petition for Rulemaking to address this (see clause 2.2.2.3 for further details). The NRSC is committed to partnering with the industry and the FCC to look at reliability and resiliency through the lenses of outage reporting.

9-1-1

On September 11, 2017, the FCC held a 9-1-1 roundtable with the carriers, the industry, and public safety. The objective of this roundtable was to discuss outage notifications to public safety and public safety notifications to the public, including reaching out to persons with disabilities. As a result of this roundtable, the NRSC formed the Situational Awareness for 9-1-1 Outages Task Force to investigate standardizing a best practice for how to notify public safety entities during a 9-1-1 outage event. Unlike other NRSC Task Forces, this one was open to the public, which afforded the NRSC the ability to partner with Public Safety Answering Points (PSAPs), public safety, the Association of Public-Safety Communications Officials (APCO), the National Association of State 911 Administrators (NASNA), and the National Emergency Number Association (NENA). While the Task Force was sunset in October 2019, the NRSC continues to work with PSAPs and public safety entities to standardize PSAP

¹ This mission statement can be found on NRSC's webpage at < <https://www.atis.org/committees-forums/nrsc/nrsc-mission/> >

outage notifications. In October 2020, the NRSC provided a proposal to the FCC for an industry safe harbor when using a proposed national PSAP outage contact database.

On November 17, 2022, the FCC adopted new 9-1-1 outage reporting rules², requiring both 9-1-1 Covered Service Providers (9-1-1 SPs) and Originating Service Providers (OSPs) to notify PSAPs of any outages that may affect service to PSAPs. These rules recognized the NRSC's work to standardize PSAP outage notifications.

Cybersecurity

With the transition to an all-IP network, cybersecurity has taken on added significance and the FCC has increased its attention to this topic. During the FCC's Communications Security, Reliability, and Interoperability Council (CSRIC IV) and its Technological Advisory Council (TAC), the FCC chartered a CSRIC Working Group (WG4) to determine how best to ensure implementation of cybersecurity measures. That Working Group delivered a 300+ page Final Report, and the FCC immediately issued a Public Notice about this report, seeking comments on how well the Final Report met the goal and what other measures could be taken to ensure cybersecurity.

While the industry and the underlying network technologies may be evolving, the role of the NRSC remains constant. The NRSC provides expert industry guidance regarding communications reliability issues to ensure that U.S. communications networks remain highly reliable and robust, throughout their constant evolution.

Outage Reporting and Data Sharing

On September 30, 2022, the FCC's Second Report & Order³, released in March 2021, was implemented, such that outage reports from the Network Outage Reporting System (NORS) and Disaster Information Reporting System (DIRS) would be shared with qualifying federal, state, local, and tribal agencies. While the Commission has acknowledged the sensitive nature of this outage data and sought input to implement appropriate measures to ensure its secure handling, it has determined that such data sharing is necessary to ensure that public safety officials have the information to appropriately and effectively respond to emergency situations.

Highlights

During the 2021 to 2022 timeframe, the NRSC convened four Task Forces and investigations, and reviewed and provided comments for high profile regulatory filings. Along with these initiatives, the NRSC also had three standing Subcommittees. The covered topics included:

Special Studies/Task Forces

- Determining Best Counts for NG 9-1-1 Outage Reporting
- FCC Request NRSC to Further Investigate TSP Rule Change and Request for Change to Telecommunications Service Priority (TSP) 2 Outage Reporting Threshold
- Impact of Rule Changes to Wireless Reporting and Request for Change to Wireless Outage Reporting Threshold
- Investigate Recommendations for PSAP Contact Database

Subcommittees

- Best Practices Subcommittee
- Outage Reporting Advisory Subcommittee
- Regulatory Subcommittee

NRSC Initiatives, Studies, and Filings

- Completed and Ongoing Initiatives:
 - Review and Updates to Best Practices Website
 - Review and Updates to NRSC Pandemic Checklist
 - Review and Updates to NRSC Emergency Preparedness and Response Checklist
 - Review and Provide Recommendations for NORS User Manual and NORS Glossary Revisions to FCC

² *FCC Second Report and Order* (Dkt No 15-80) (Dkt No 13-75) (Dkt No 04-35), Federal Communications Commission, Washington, D.C., adopted November 17, 2022, released November 18, 2022.

³ *FCC Second Report and Order* (Dkt No 15-80), Federal Communications Commission, Washington, D.C., adopted March 17, 2021, released March 18, 2021.

- Work with FCC to Develop a Mechanism to Incorporate Best Practices Developed Outside CSRIC into Database
 - Request for Change to Telecommunications Service Priority (TSP) 2 Outage Reporting Threshold
 - Request for Change to Wireless Outage Reporting Threshold
 - Request for Change to method for determining counts for NG 9-1-1 Outage Reporting
 - Determine Best Methods to Normalize Network Growth
- Filings⁴
 - *Joint ex parte notification* with CCA, CTIA and US Telecom regarding FCC Draft 911 reliability order
 - *Comments* in response to FCC Public Notice seeking input on proposing training materials on use of and access to NORS and DIRS data, August 24, 2022
 - *Petition for Rulemaking* proposing changes to the FCC's Part 4 rules to address issues associated with the reporting of NG911, wireless and TSP outages, August 18, 2022
 - *ATIS NRSC Input to CSCC* regarding the continuity of the economy, August 15, 2022
 - *Comments* in response to FCC NRPM on potential safeguards in connection with the sharing of Network Outage Reporting System (NORS) and Disaster Information Reporting System (DIRS) data with agencies acting on behalf of the Federal government, U.S. states and/or territories, the District of Columbia, and Tribal Nations, March 9, 2022
 - *Comments* in response to NASNA petition requesting that the Commission initiate a rulemaking or inquiry to facilitate the implementation of and transition to Next Generation 911 services (NG911), January 19, 2022
 - *Reply Comments* in response to comments submitted to the FCC NPRM on measures to improve the Wireless Network Resiliency Cooperative Framework (Framework), promote situational awareness through its Disaster Information Reporting System (DIRS) and Network Outage Reporting System (NORS), and address electric power outages, January 14, 2022
 - *Comments* in response to FCC NPRM on measures to improve the Wireless Network Resiliency Cooperative Framework (Framework), promote situational awareness through its Disaster Information Reporting System (DIRS) and Network Outage Reporting System (NORS), and address electric power outages, December 16, 2021
 - *Comments* opposing the CA PUC Petition to maintain the presumption of confidentiality for information contained in Network Outage Reporting System (NORS) and Disaster Information Reporting System (DIRS) filings, August 13, 2021
 - *Comments that suggest ways that the Commission can reduce consumer confusion, promote effective 911 notifications, and recognize the important role that Public Safety Answering Points (PSAPs) have in the process*, July 30, 2021
 - *Request for FCC action to establish a streamlined process for waiver of Sections 4.5(e) and 4.7(e) for covered 911 service providers to use census data rather than the number of assigned telephone numbers to calculate the number of user minutes potentially affected by an outage*, April 27, 2021
 - *Comments on efforts of mobile service providers to improve network resiliency, PS Docket 11-60*, April 26, 2021

Publications

- NRSC Bulletins/Reports:
 - ATIS-0100067, *Network Reliability Steering Committee 2017-2018 Operational Report*
- ATIS Standards:
 - ATIS-0100018(2021-02), *NRSC Pandemic Checklist*
 - ATIS-0100019(2022-01), *NRSC Emergency Preparedness and Recovery Checklist*
 - ATIS-0100021(2022-01), *Analysis of FCC-Reportable Service Outage Data*

⁴ Filings can be found on ATIS' Legal and Public Policy webpage at < https://www.atis.org/01_legal/public-policy/ >

1 Introduction

1.1 History of the NRSC

1.1.1 Several Catastrophic Outage Events

From 1988 through the early 1990s, the United States communications industry experienced several network outages that impacted a large number of 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.

1.1.2 The Network Reliability Council is Established

In November 1991, the Network Reliability Council (NRC) was established by the FCC to bring together telecommunications industry leaders and telecommunications experts from academic and consumer organizations to explore and recommend measures to enhance network reliability.⁵

1.1.3 The FCC Mandates Outage Reporting

In April 1992, the FCC required the reporting of outages by exchange and interexchange service providers. For an event to be reportable, it had to last 30 minutes or more and potentially affect at least 50,000 customers.⁶ The industry-led National Communications System (NCS) afterward recommended that the reporting criteria be lowered to 30,000 customers. Another NRC recommendation was to report all outages affecting 9-1-1 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 NCS accepted the task of reporting such outages to the FCC. In August 1994, FCC outage reporting regulations were revised.⁷ Most of the changes had already been accounted for by 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.

1.1.4 The NRC Recommends the Formation of the NRSC

In its 1993 *Report to the Nation*, the NRC⁸ recommended the formation of the NRSC, under the auspices of the ATIS, for the purpose of monitoring network reliability on an ongoing basis. As defined at that time, the NRSC’s mission was 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.”⁹

1.1.5 The FCC Makes Changes in Outage Reporting

In 2005, FCC regulations regarding outage reporting were put in force.¹⁰ These mandates can be summarized as having three major aspects: (a) expansion regarding who was required to report; (b) new reporting thresholds, timeframes, and concepts; and (c) limited access to the outage data due to confidential protection under the Freedom of Information Act (FOIA). Regarding the reporting expansion, in addition to wireline providers, the new 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 these criteria, the overall number of reportable events substantially increased. In 2012, the FCC expanded the outage reporting criteria and thresholds to include VoIP services.

⁵ Daugherty, H.T., Klein, W. J., “U.S. Network Reliability Issues and Major Outage Performance,” *Proceedings: IEEE Symposium on Computers and Communications, 1995*, June 27-29, 1995, pp.114, 119.

⁶ *FCC Report and Order, CC Docket No. 91-273*, Federal Communications Commission, Washington, D.C., adopted February 13, 1992, released February 27, 1992.

⁷ *FCC Second Report and Order, CC Docket No. 91-273*, Federal Communications Commission, Washington, D.C., adopted July 14, 1994, released August 1, 1994.

⁸ Due to subsequent re-charters under the name “Network Reliability and Interoperability Council (NRIC)”, this first Council is sometimes referred to as “NRC-1”.

⁹ *Network Reliability: A Report to the Nation*, Network Reliability Council, June 1993. Section I, p. 6.

¹⁰ *FCC Report and Order and Further Notice of Proposed Rulemaking*, ET Docket No. 04-35, adopted August 4, 2004, released August 19, 2004; *Errata*, ET Docket No. 04-35, released September 3, 2004.

In July of 2016, the FCC published a Report and Order¹¹ updating several of the Part 4, Disruption to Communications, rules with some significant changes. The changes: better defined required reporting at airports; shortened the threshold for reporting Simplex conditions from 120 hours to 96 hours; increased the minimal reportable transport outage from DS-3 to OC-3; defined the methodology for determining Wireless Potential Users; implemented required reporting for Partial PSAP Outage Reporting; and applied Telecommunications Service Priority (TSP) as the way of defining Special Offices and Facilities.

1.1.6 Disaster Response

In the summer of 2017, the United States and its territories experienced several hurricanes that shattered not only communication networks, but also people's lives. Hurricane Maria, in particular, devastated the island of Puerto Rico in a manner that had not been seen since Hurricane Mitch of 1998. In the aftermath of Hurricane Maria, the Information and Communications Technology (ICT) industry came together in a powerful way to enable recovery from this traumatic event. Carriers aided each other in procuring and providing generators, security teams, food, water, and the necessities to survive while restoring communications infrastructure. Parts of the island were without power and critical infrastructure for months, and the FCC activation of DIRS lasted 182 days, the longest in the history of DIRS. Additionally, in 2020, NRSC provided the Government Accountability Office (GAO) with industry feedback on wireless network resiliency in the aftermath of Hurricane Maria.

Under the threat of COVID-19 and with the World Health Organization (WHO) declaration of a global pandemic, NRSC's previous work on ATIS-0100018, *NRSC Pandemic Checklist*, as well as ATIS-0100019, *NRSC Emergency Preparedness and Response Checklist*, served as critical models in the telecommunications industry's response to this global crisis, given the increased demand for socially distanced telework, telemedicine, online learning and more.

The NRSC briefed the FCC's Broadband Deployment Advisory Council (BDAC), and the Disaster Response & Recovery Working Group (DRRWG) on industry response to the COVID-19 crisis. Following this presentation, NRSC elected to review these Checklists and update documentation based on lessons learned during the response to the pandemic. ATIS-0100018(2021-02), *NRSC Pandemic Checklist* was published with additional guidance in February 2021. ATIS-0100019(2022-01), *NRSC Emergency Preparedness and Response Checklist* was published with additional guidance in January 2022. NRSC continues to review disaster response for potential Best Practices.

1.2 Factors Affecting Network Reliability

The NRSC has historically recognized that identifying and understanding the underlying causes of outage trends are important parts of learning from past experiences and preparing for future challenges as networks evolve. When evaluating negative or positive trends that affect network reliability, having standard analytical methodologies and trending schemas has proven to be a solid link to the past, while providing a bridge into the future. The NRSC works to identify the direct and root cause(s) associated with particular trends, evaluates these against existing Best Practices, and develops new Best Practices or recommends modifications to existing Best Practices when appropriate. Additionally, the NRSC will recommend the development of new (or modification of existing) cause code categories, review other completed studies, review internal company outage data, determine contributing factors, and review associated federal and state regulations.

2 Health of the Nation's Public Networks

The members of the NRSC have a historic and unique perspective on network reliability. Nowhere else in the world have subject matter experts from competing companies gathered regularly for the purpose of analyzing network outage data, developing consensus determinations about the data analyzed, and offering expert guidance on actionable countermeasures to improve network reliability. Through this collaboration, high reliability for the nation's public networks is promoted, expert guidance is offered, and an ongoing accurate view of the health of networks is provided at a national level. The NRSC continues to believe that the reliability of the nation's public network is the best in the world.

¹¹ FCC 16-63, *Amendments to Part 4 of the Commission's Rules Concerning Disruptions to Communications*, PS Docket No. 15-80, ET Docket No. 04-35, PS Docket No. 11-82, Report and Order, Further Notice of Proposed Rulemaking, and Order on Reconsideration, available at < https://apps.fcc.gov/edocs_public/ >

2.1 Introduction to Special Studies/Task Forces

The NRSC had four active special study teams and Task Forces during 2021 and 2022. The purpose of these special studies was to bring industry experts' attention to network reliability issues or concerns, to determine the underlying causes behind national trends, to determine the most effective Best Practices or other means for preventing and ameliorating the impact of such events, and to provide industry level guidance regarding the issue or concern. The keys to the success of these teams are open dialogue, meaningful information sharing, and collaboration among the industry participants on potentially sensitive issues. To protect the interests of participating companies and their sensitive and critical infrastructure data, a Non-Disclosure Agreement (NDA) between the NRSC member companies is in place.

These studies represent the thousands of hours that NRSC members have contributed to the painstaking scrutiny, documenting, and publishing of publicly available findings and results. These efforts are instrumental in providing expert industry guidance and ensuring high network reliability in the United States.

2.1.1 Investigate Recommendations for PSAP Contact Database

2.1.1.1 Background

Following the work of the NRSC Situational Awareness for 9-1-1 Outages Task Force (NSA-TF) to develop ATIS-0100066 and ATIS-0100068, a business need was identified for developing a PSAP contact database. In December 2019, the NRSC determined that a national PSAP contact database for outage notification purposes could consolidate the existing PSAP data collection work being done by individual carriers and be a resource to member companies should a company desire to use such a tool.

2.1.1.2 Team Activity

In February 2020, at the request of James Wiley (FCC), the NRSC created an educational presentation to instruct PSAPs of the Outage Notification Requirements to be followed by carriers as established by the FCC. In April 2020, the NRSC reached out to Harriet Rennie-Brown, Executive Director of the National Association of State 911 Administrators (NASNA), to review the draft presentation and to establish a workshop with the State 911 Administrators. NASNA members representing several State 911 Authorities throughout the US volunteered for a test-run of the educational program and was launched in August 2020.

Additionally, in August 2020, the NRSC met with FCC staff to discuss a safe harbor or indemnification process for carriers, should they desire to use a national PSAP database. The NRSC reminded the Commission that service providers are responsible for maintaining their own internal PSAP contact databases and without indemnification for the use and accuracy of a third-party national PSAP Contact Database, service providers will continue to use internal systems, rather than risk action from the FCC.

The NRSC provided input to Mr. Wiley regarding safe harbor for industry use of a third party national PSAP Contact Database in October 2020 and closed this investigation in December 2020. In December 2020, the FCC published a Public Notice seeking comment on a national 9-1-1 call center contact information database, which cited NRSC's letter.

2.1.1.3 Conclusion/Ongoing Work

In 2021, the FCC NPRM to Improve 911 Reliability included references to the proposed national third-party PSAP Contact Database. In July 2021, NRSC filed comments in response to this NPRM, reiterating its support for the proposed database. NRSC will continue to highlight its work on PSAP education and encourage the creation of a PSAP Contact Database. In November 2022, NRSC joined with other industry associations to advocate once more for a national PSAP Contact Database in an *ex parte* filing.

2.2 Subcommittees

2.2.1 Best Practices Subcommittee

2.2.1.1 Background

The Best Practices Subcommittee, which is a standing NRSC Subcommittee, is charged with improving the quality of Best Practices and updating and/or expanding them as appropriate. The Subcommittee operates from the premise that Best Practices are voluntary, are *not* standards, and *implementation of any Best Practices should not be mandated*. Best Practices provide guidance, based on assembled industry expertise and experience, to improve network security, reliability, and resiliency. The applicability and possible implementation of any Best Practice by

an organization is best determined by someone with expertise in both the topic of the Best Practice and the particulars of the organization itself.

ATIS manages one of the two Best Practices websites¹², with the FCC maintaining the other site¹³. The Subcommittee monitors the ATIS website and suggests enhancements as appropriate to improve its usefulness.

2.2.1.2 Best Practices Team Activity

In August 2020, it was determined that this Subcommittee should review and update ATIS-0100018, *NRSC Pandemic Checklist*, as well as ATIS-0100019, *NRSC Emergency Preparedness and Response Checklist*, noting lessons learned in industry response to the COVID-19 pandemic as well as record hurricane and wildfire seasons. The Subcommittee focused its work in 2020 on the *Pandemic Checklist*, which was last revised in 2015. ATIS-0100018(2021-02), *NRSC Pandemic Checklist*, was published in February 2021 and updated with over 50 new suggested Best Practices.

In 2021, the Subcommittee began its review of the *Emergency Preparedness and Response Checklist*. This revision focused on lessons learned from COVID-19 and the 2020-2021 hurricane seasons, which were particularly impactful. Consultation with cross-sector groups led to the recommendation that “Power” be added as an Industry Role for Best Practices due to the necessity of power to enable telecommunications. ATIS-0100019(2022-01), *NRSC Emergency Preparedness and Recovery Checklist*, was published in January 2022 with these updates. Additional Best Practices regarding supply chain, water, power, and cybersecurity were developed and reviewed in 2022 for possible inclusion in a further revision of this checklist.

In December 2020, NRSC proposed a framework for incorporating non-CSRIC generated new Best Practices and edits to Best Practices into the industry BP database. It was suggested that the NRSC could propose changes to Best Practices and present these edits to CSRIC once per charter for review and approval.

This proposal was not incorporated in the CSRIC VIII charter in March 2021, and the NRSC opened an Issue entitled “Consider New NRSC-Generated Best Practices for Submission to the Communications Security, Reliability, and Interoperability Council (CSRIC)” to address this challenge. The NRSC has emphasized the need for new Best Practices to be promptly published and made available to the industry at-large. Further, the NRSC has recognized the FCC’s increased acknowledgment of Best Practices in its own rulemakings, noting that the FCC has referenced Best Practices and mandated the voluntary, and based in Best Practices, Wireless Network Resiliency Cooperative Framework in its July 2022 Report & Order and Further Notice of Proposed Rulemaking.¹⁴

2.2.1.3 Conclusion

The presence of an FCC Advisory Committee (i.e., CSRIC) that regularly advances new and revised Best Practices along with frequent reference in both industry and government documents demonstrates the value that this collection of industry knowledge holds, and the influence that Best Practices have on improving network security, reliability, and resiliency. The value of synchronous Best Practice databases is derived both from the collective industry knowledge that created the Best Practices, and the voluntary nature of their implementation. This allows users to benefit from their guidance while maintaining their flexibility to be applied appropriately as determined by experts. The Best Practice Subcommittee will continue to work with the FCC to ensure consistency and usability of this valuable resource, while ensuring additional resources such as checklists are updated to reflect new experiences and information. The NRSC will also continue to work with the FCC to find a method of incorporating Best Practices developed by groups outside of CSRIC into a Best Practices database.

2.2.2 Regulatory Subcommittee

2.2.2.1 Background

The ATIS NRSC Regulatory Subcommittee addresses and responds to network reliability, resiliency, and outage reporting related regulatory activity. To accomplish this work, the Subcommittee monitors, reviews, and responds

¹² The ATIS Best Practices website is available at < <https://bp.atis.org> >

¹³ The FCC Best Practices website is available at < <https://opendata.fcc.gov/Public-Safety/CSRIC-Best-Practices/qb45-rw2t/data> >

¹⁴ *Report and Order and Further Notice of Proposed Rulemaking*, PS Docket No. 21-346, PS Docket No. 15-80, ET Docket No. 04-35, adopted June 27, 2022, released July 6, 2022.

to various local, state, and federal regulatory activities. Where appropriate, the NRSC develops and files comments. Refer to the *NRSC Initiatives, Studies, and Filings* section of this report for a list of these filings.

2.2.2.2 Regulatory Team Activity

The Regulatory Subcommittee met consistently to establish and refine the issues for the NRSC membership and provide a forum for members to contribute to the comments on each of the Rulemaking procedures that were provided on behalf of ATIS NRSC. The comments provided to the FCC are available on the ATIS and FCC websites.

The Subcommittee also monitored and kept membership apprised of significant regulatory activity from state legislatures and commissions.

2.2.2.2.1 NRSC comments on FCC Public Notice (PN) on Wireless Service Providers' Safety Measures for their Customers During Disasters

In April 2021, the NRSC filed comments in response to this PN, noting its earlier work on documents like the *NRSC Emergency Preparedness & Response Checklist*, and *Disaster Roaming Guide and Resource*, which provide guidance to providers. In addition to these documents, ATIS maintains the industry BP database, as a resource to industry participants. Finally, the NRSC noted that the collaborative environment of organizations like ATIS allows industry participants to improve network reliability and inter-company cooperation in the aftermath of disasters.

2.2.2.2.2 NRSC comments on FCC Notice of Proposed Rulemaking (NPRM) to Improve 911 Reliability

In July 2021, the NRSC filed comments in response to this NPRM. These comments addressed several proposals regarding PSAP outage notifications. The NRSC pointed to PSAPs as the appropriate entities to provide the general public with 911 outage updates. The NRSC also expressed concern about the FCC's suggested notifications, citing notification fatigue and customer confusion from likely over-notification, as well as public safety and competitive concerns at the release of sensitive information to the public. The NRSC reiterated its support for a national PSAP contact database in these comments, as well as the use of US census data as the basis for NG 911 outage counts.

2.2.2.2.3 NRSC opposition to California Public Utility Commission (CA PUC) Petition for Reconsideration (PFR)

In August 2021, the NRSC filed comments in opposition to a PFR from the CA PUC suggesting that the FCC reconsider the presumption of confidentiality for Network Outage Reporting System (NORS) and Disaster Information Reporting System (DIRS) data to be shared with state, tribal, and local agencies. The NRSC urged the FCC to reject this petition, highlighting that the FCC had explicitly sought comment on confidentiality in the NPRM and that the CA PUC had not demonstrated any new underlying facts for consideration. The NRSC also noted that the CA PUC had not provided any support to its assertion that public disclosure of outage information would promote public safety. Instead, the NRSC asserted that the publication of sensitive outage data could adversely impact public safety.

2.2.2.2.4 NRSC comments and reply comments on FCC Notice of Proposed Rulemaking (NPRM) to Promote Network Resiliency

In December 2021, the NRSC filed comments in response to this NPRM, highlighting support for voluntary agreements between providers. In particular, the NRSC noted the Wireless Resiliency Framework as an example of voluntary roaming and mutual aid agreements and expressed opposition to mandating similar private agreements between providers. Additionally, the NRSC opposed mandatory DIRS participation and broadband outage reporting. The NRSC supported increased coordination between telecommunications and power companies, noting the participation of NRSC members in several cross-sector groups. Further, the NRSC suggested that power companies be involved in discussion of power-related service disruption.

In January 2022, the NRSC filed reply comments in response to this NPRM, again supporting voluntary agreements over regulatory mandates, including regulations for backhaul and backup power suggested in other organizations' comments. The NRSC supported voluntary coordination, including the Cross-Sector Resiliency Forum (CSRF), and the development of Best Practices. The NRSC also suggested that the Communications Security, Interoperability, and Reliability (CSRIC) determine a method to incorporate Best Practices suggested by external groups, including the NRSC.

2.2.2.2.5 NRSC/ESIF comments on National Association of State 911 Administrators (NASNA) Petition to Facilitate the Implementation of and Transition to NG 911

In January 2022, the NRSC, in cooperation with the Emergency Services Interconnection Forum (ESIF), filed comments in response to NASNA's petition. Both the NRSC and ESIF noted no objection to the initiation of an inquiry to investigate NG911 demarcation points for allocating costs requested by NASNA in these comments.

2.2.2.2.6 Input to the Communications Sector Coordinating Council (CSCC) Regarding CISA Questions on Continuity of the Economy (COTE)

In July 2022, the CSCC requested input from the NRSC regarding industry resilience planning in preparation for disaster events. It was noted that the NRSC provides resources including Best Practices, the *NRSC Pandemic Checklist*, and the *NRSC Emergency Preparedness and Response Checklist*. Additional industry resiliency plans including the Wireless Resiliency Cooperative Framework were also noted in this response. The NRSC also commented that cross-sector communications and coordination served an important role in resiliency.

2.2.2.2.7 NRSC Joint Ex Parte Presentation Regarding FCC PSAP Notifications and 9-1-1 Reliability Certifications

In November 2022, the NRSC joined together with representatives from the Competitive Carriers Association ("CCA"), CTIA and USTelecom – the Broadband Association to discuss this rule change. The associations jointly supported FCC goals of enhancing situational awareness but sought changes to ensure the Draft Order would not be applied retroactively, to extend the time period for providers to implement notification changes, and to encourage the FCC to prepare PSAPs for a major increase in outage notifications. The *ex parte* also reiterated the NRSC's suggestion that the FCC develop a national PSAP Contact Database, rather than relying upon PSAPs to respond to multiple service providers' requests for contact information.

2.2.2.3 Petition for Rulemaking

In August 2022, the NRSC filed a Petition for Rulemaking proposing changes to the FCC's Part 4 rules to address issues associated with the reporting of NG911, wireless and TSP outages. The petition suggests the use of population data to determine outage counts in NG 911. The petition also proposed a four-hour outage reporting threshold for TSP 2. For wireless outages, the petition requests a new site-based de minimis for wireless outage reporting.

2.2.2.3.1 Determining Best Counts for NG 9-1-1 Outage Reporting

During the 3Q2019 NRSC face-to-face meeting, participants noted that the transition from Enhanced 9-1-1 (E 9-1-1) to Next Generation 9-1-1 (NG 9-1-1) would present challenges for 9-1-1 outage reporting. Under legacy networks in an i2 environment, outage reporting was based on a count of telephone numbers (TN Count) potentially affected utilizing the Automated Location Identification (ALI) system to quantify where an outage may affect customers. This method of using the TN count from the ALI database becomes ineffective for the following reasons. The ALI database already does not reflect an increasing number of wireless and VoIP customers, but more importantly i3 NG 9-1-1 uses geospatial location data and the TN Count of wireline TNs in the ALI system is no longer available as a basis for estimating the number of potentially affected customers.

In August 2019, the NRSC confirmed a desire to investigate this Issue, in advance of further NG 9-1-1 implementation, and related regulations. Participants investigated other potential information sources for outage impacts. Upon review, it was determined that Originating Service Providers (OSPs) could continue to use existing metrics, such as subscriber counts, in their outage reporting for NG 9-1-1. However, a new metric for outage reporting was needed for 9-1-1 System Service Providers (SSPs), such as U.S. Census data. Participants compared U.S. Census data to TN Counts from the ALI database and found that the U.S. Census data consistently overstated the potential impact. This overstatement, combined with the complexity of determining call attempts when made on other networks, left NRSC with the recommendation that 9-1-1 SSPs use U.S. Census or other population data to represent the relative potential impact of certain 9-1-1 outages where 900,000 user minutes is the threshold.

In August 2020, participants met with members of the Emergency Services Interconnection Forum Leadership and Advisory Group (ESIF AG) to review the use of U.S. Census data as a relative representation of potential outage impact. Both NRSC and ESIF participants agreed that population data presented the best alternative to ALI data in the i3 environment.

This investigation presented its findings to the FCC in January 2021, including the use of population data in NG 9-1-1 outage reporting for SSPs. This data represents a best effort on the part of carriers and provides a relative representation of the potential outage impacts. U.S. Census and other population data is widely available, can be filtered by localities, and is updated on an annual basis. The reporting recommendation also includes E 9-1-1 and

i2 NG 9-1-1, to mitigate reporting disparities between legacy E 9-1-1 and NG 9-1-1 systems. This is due to possible overreporting of outages with U.S. Census data always being a higher number per geographic area and thus resulting in lower thresholds. In April 2021, the NRSC filed a Request for a Streamlined Waiver to allow SSPs to use population data in place of TN counts. Subsequent comments filed in response to the FCC NPRM to Improve 911 Reliability suggested the use of population data by both legacy providers and NG 9-1-1 providers to ensure reporting consistency across different network types.

Based on Commission feedback recommending that the NRSC file a formal request for rulemaking in January 2022, the NRSC revisited this investigation. In addition to previous suggestions of U.S. Census data to determine NG 9-1-1 outage impacts and reporting thresholds, the NRSC further suggested that PSAPs furnish providers with population data for service areas. The NRSC also reiterated its proposal that all SSPs, including legacy and E 9-1-1, utilize population data when determining outage reporting thresholds to ensure uniform reporting across the industry.

2.2.2.3.2 Request for Change to Telecommunications Service Priority (TSP) 2 Outage Reporting Threshold

Following the resolution of NRSC Issue 0044 (FCC Request NRSC to Further Investigate TSP Rule Change), the NRSC proposed the FCC change the reporting threshold for TSP 1 and TSP 2 to four hours (from 30 minutes). In a study of historical data, this change resulted in an approximate 40% reduction in reports, as well as reducing the number of withdrawn reports by approximately 60%. In November 2021, it was indicated the FCC was more receptive to changes to TSP 2 reporting thresholds. FCC staff also requested that NRSC formally file a request for any changes, in order to ensure appropriate transparency and equitable access for the proceeding.

2.2.2.3.3 Request for Change to Wireless Outage Reporting Threshold

In concluding NRSC Issue 0046, Impact of Rule Changes to Wireless Reporting, the NRSC reviewed member wireless outage report data and confirmed that the significant increase in wireless outage reports was due to the rule change rather than a change in wireless network reliability. After examining a duration-based de minimis, a cell site-based de minimis, and a change to how the Potential User Minutes Affected (PUMA) threshold is calculated, the NRSC proposed a dual site-based de minimis (5 sites for Rural Service Areas, 15 sites for Metropolitan Service Areas) to reduce the volume of less useful reports while ensuring that outages in rural areas with fewer cell sites would remain visible. This proposed solution was presented to the FCC on January 13, 2021. In November 2021, FCC staff indicated that they were considering this proposal, and it was suggested that the NRSC consider a formal petition for rule change with the FCC in order to progress this Issue.

2.2.2.4 Conclusion

The Regulatory Subcommittee provides a platform to address and respond to network reliability, resiliency, and outage reporting related regulatory activity. The Subcommittee monitors, reviews, and responds to various local, state, and federal regulatory activities. Where appropriate, the NRSC has developed and filed these comments or provided feedback to regulatory bodies.

2.2.3 Outage Reporting Advisory Subcommittee (ORAS) (Christopher Desmond and Becky Wormsley)

2.2.3.1 Background

The NRSC established the Outage Reporting Advisory Subcommittee (ORAS) to review issues associated with reporting communication service disruptions pursuant to Part 4 of the FCC's rules. The ORAS was formed as a standing subcommittee that utilizes the experience and expertise of its members to improve the value, accuracy, and consistency of outage data submitted to the FCC, and since its establishment has expanded its role to address disaster information provided to the FCC on a voluntary basis. The ORAS works with the FCC to maintain a mutual understanding of the needs and expectations regarding submitted information, identifies process and system improvement opportunities, and develops appropriate recommendations, from the users' perspective, regarding enhancement of system interfaces, processes, and documentation.

2.2.3.2 NRSC ORAS Team Activity

2.2.3.2.1 Intra-Company Outage Reporting Consistency

This Issue was raised with the NRSC by John Healy (FCC) in October 2019 as an issue with discrepancies across companies reporting OC3 outages. After much discussion within the NRSC, and no issue identified among the

NRSC member companies, clarification was sought from the FCC. The FCC explained that an inconsistency in the methodology/procedure for reporting outages within a single company had been identified as the source of the discrepancy.

In May 2020, following clarification from the FCC that this issue related to inconsistent reporting across different segments of a single company, the NRSC drafted a Best Practice, which was submitted to CSRIC for review. The proposed Best Practice states “Network Operators and Service Providers should ensure intra-company consistency for NORS and DIRS outage reporting.”

As of December 2022, the NRSC was awaiting feedback from the FCC regarding the acceptance of this Best Practice. The NRSC recommended this BP be included in the NORS Manual as a stop-gap measure until the FCC establishes a way to incorporate it in the Best Practice database.

2.2.3.2.2 Update ATIS-0100021, Analysis of FCC-Reportable Service Data Version 2

ATIS-0100021, *Analysis of FCC-Reportable Service Outage Data Version 2*, was published by the NRSC in 2013, with the intention of documenting the techniques utilized by the FCC in its quarterly outage analysis reports. In January 2020, it was noted that this document did not reflect current FCC reporting regulations. Additionally, the document utilized outdated DS3 measures, which have been replaced by larger OC3 measures in the years since this document’s initial publication.

Starting in January 2020, NRSC ORAS undertook a complete review of ATIS-0100021 to ensure the report accurately portrays outage statistical analysis. In December 2021, a final draft was accepted by NRSC for publication. ATIS-0100021(2022-01), *Analysis of FCC-Reportable Service Data*, was published in January 2022.

2.2.3.2.3 NORS and DIRS Information Sharing for State Agencies Accessing Data

In March 2020, the FCC published a Second FNPRM regarding the sharing of NORS and DIRS data with state agencies for public safety purposes. In comments filed in April 2020, the NRSC supported proposals to share data for public safety purposes but requested that the FCC require states to certify to and receive training on the need to appropriately manage their accounts, as well as revoking access should individuals or agencies fail to meet basic criteria to keep this data secure.

In August 2022, the NRSC reviewed proposed FCC training materials for agencies participating in NORS and DIRS information sharing. The NRSC suggested revisions to emphasize the sensitive nature of outage filings, and to appropriately set agencies’ expectations regarding the accuracy of initial filings, which may be based on limited information. The FCC presented an updated training including several of the NRSC’s suggestions prior to implementation of data sharing on September 30, 2022. In December 2022, the FCC announced that providers would be able to request information regarding the agencies currently accessing NORS and DIRS data through information sharing.

2.2.3.2.4 Review and Suggest Revisions to NORS Manual and Glossary

In June 2021, the NRSC suggested that the FCC incorporate the Best Practices developed in response to Issue 0045 into documentation for NORS filers. Upon review of the NORS User Manual and NORS Glossary, it was noted that additional updates were needed to align the documents with current reporting requirements including OC3 metrics and submarine cable outage reporting. The NRSC provided the FCC with these recommendations in August 2021. Upon further review of the FCC’s updated NORS Manual, NRSC ORAS provided additional feedback in October 2022.

2.2.3.2.5 Determine Best Methods to Normalize Network Growth

During a meeting with FCC staff in November 2021, the FCC suggested that they would examine methods to normalize outage data with relation to network growth and requested that the NRSC should also examine its own resources. This is particularly in relation to broadband and OC3 networks.

In December 2021, it was agreed that NRSC ORAS will examine publicly available data to determine methods to normalize network growth in relation to outage reporting. This investigation is awaiting additional FCC guidance as of December 2022.

2.2.3.3 Conclusion

Through close examination of outage trends and reporting requirements, the Outage Reporting Advisory Subcommittee seeks methods to ensure service providers and other stakeholders have well-defined guidance

from the FCC. This guidance leads to a clearer understanding of patterns in outages, that assists both industry and regulators in identifying issues to be addressed in order to improve overall network reliability.

3 Conclusion

Throughout the 2021 to 2022 timeframe, the NRSC has been active in researching and providing guidance on many network reliability issues and responding to various FCC issues and concerns regarding network events. The NRSC continues to work closely with the FCC to improve outage reporting procedures and provides a forum for collaborative industry and government work efforts. The continued efforts of NRSC member companies have directly and positively impacted the resiliency and reliability of the nation’s networks, which ultimately benefits all users.

3.1 For the Common Good

The NRSC clearly demonstrates the spirit of service in the communications industry. Companies that are fierce competitors in the marketplace collaborate via the NRSC, to advance network reliability for the benefit of all users. Working together for the common good is the finest product of the NRSC.

3.2 Future Plans

While the NRSC continues its focus on the network reliability and resiliency of today’s networks, it does so with an eye on the future. Considerable effort has been expended in defining a generic model of what an all-IP network will look like, and the industry’s knowledge of today’s networks will be imperative in addressing reliability and outage reporting issues associated with an all-IP network. The NRSC’s unique model of industry cooperation, along with its perspective of future networks, based on current expertise, will serve the nation well during the coming technological evolution. The NRSC continues to welcome input on topics to be addressed in the future and looks forward to the participation of both existing and new communications provider.

4 Participation

4.1 Participating NRSC Member Companies (2021-2022)

AQSACOM	Intrado
AT&T	JMA Wireless
Brightspeed Connect Holding LLC	Lumen (Formerly CenturyLink)
Charter Communications (Formerly Time Warner Cable)	Motorola Solutions
CISA Emergency Communications Division (Formerly Office of Emergency Communications)	ONE Media 3.0 LLC
Comcast	Open Valley
Comtech Telecommunications	Somos
Cox Communications	T-Mobile
Ericsson	Telnyx
iconectiv	Verizon

4.2 NRSC Subcommittee Participants¹⁵

Best Practices Subcommittee (2021-2022)

Co-Chair: Thomas Smith, Comcast
 Co-Chair: Andis Kalnins, Verizon

DeCuir, Jason	AT&T
Desiato, Robert	AT&T

¹⁵ The following lists provide meeting participation for the 2021-2022 period. NRSC participation outside of meetings may not be captured.

DeVito, Victor	AT&T
Lawrence, Erik	AT&T
Rodocker, Susan	AT&T
Howard, Robin	Brightspeed Connect Holding LLC
Cummings, John	Charter Communications
Hall, Chad	Charter Communications
Nobles, Haleigh	Charter Communications
Obasuyi, Thomson	Comcast
Smith, Thomas	Comcast
Browning, Rodney	Cox Communications
Peay, Mark	Cox Communications
Boyd, Mary	Intrado
Brown, Carolyn	Lumen
Wolf, Karen	Motorola Solutions
Bowie, Jason	T-Mobile
Wormsley, Becky	T-Mobile
Kalnins, Andis	Verizon
Desmond, Christopher	Verizon
Oberg, Chris	Verizon

Regulatory Subcommittee (2021-2022)

Co-Chair: Carolyn Brown, Lumen

Co-Chair: Jason Bowie, T-Mobile

Berry, Darlene	AT&T
DeCuir, Jason	AT&T
Desiato, Robert	AT&T
DeVito, Victor	AT&T
Lawrence, Erik	AT&T
Magdic, Sandra	AT&T
Mosely, Richard	AT&T
Neinast, Mark	AT&T
Rodocker, Susan	AT&T
Tan, Mike	AT&T
Brown, Mary	Brightspeed Connect Holding LLC
Howard, Robin	Brightspeed Connect Holding LLC
Cummings, John	Charter Communications
Hall, Chad	Charter Communications
Nobles, Haleigh	Charter Communications
Collins, Kari	Comcast
Jordan, Beau	Comcast
Obasuyi, Thomson	Comcast
Smith, Thomas	Comcast
Lu, Ruobo	Comtech Telecommunications
Marshall, Roger	Comtech Telecommunications
Ornstein, Susan	Comtech Telecommunications

Browning, Rodney	Cox Communications
Peay, Mark	Cox Communications
Barclay, Steve	Ericsson
Boyd, Mary	Intrado
Brown, Carolyn	Lumen
Wright, Steven	Marconi Pacific
Nelson, Michael	Motorola Solutions
Wolf, Karen	Motorola Solutions
Green, Kevin	Somos
Ajayi, Solape	T-Mobile
Bowie, Jason	T-Mobile
Gormley, Andy	T-Mobile
Hageron, Eric	T-Mobile
Wormsley, Becky	T-Mobile
Desmond, Christopher	Verizon
Kalnins, Andis	Verizon
Oberg, Chris	Verizon

Outage Reporting Advisory Subcommittee (2021-2022)

Co-Chair: Becky Wormsley, T-Mobile

Co-Chair: Christopher Desmond, Verizon

Berry, Darlene	AT&T
DeCuir, Jason	AT&T
Desiato, Robert	AT&T
DeVito, Victor	AT&T
Lawrence, Erik	AT&T
Neinast, Mark	AT&T
Cummings, John	Charter Communications
Hall, Chad	Charter Communications
Nobles, Haleigh	Charter Communications
Collins, Kari	Comcast
Obasuyi, Thomson	Comcast
Lu, Ruobo	Comtech Telecommunications
Peay, Mark	Cox Communications
Rubio, Ed	Cox Communications
Barclay, Steve	Ericsson
Boyd, Mary	Intrado
Brown, Carolyn	Lumen
Wright, Steven	Marconi Pacific
Wolf, Karen	Motorola Solutions
Wormsley, Becky	T-Mobile
Casem, David	Telnyx
Desmond, Christopher	Verizon
Oberg, Chris	Verizon

4.3 Companies/Organizations in Attendance at the 2021-2022 Public NRSC Quarterly Meetings

AT&T
Bandwidth
Brightspeed Connect Holding LLC
Charter Communications
Comcast
Comtech Telecommunications
Consolidated Communications
Cox Communications
Ericsson
Fairpoint Communications
FCC
Intrado
Leaco Rural Telephone Cooperative

Lumen
Marconi Pacific
Motorola Solutions
Nokia
Nsight
Range
Somos
T-Mobile USA
TDS Telecom
University of Pittsburgh
US Cellular
Verizon
Windstream