Appendix 1

Issue Statement - Focus Group

Appendix 1

Network Reliability Council
Issue Statement

Issue Title: Network Reliability Performance
- Local & Regional Basis
- Geographic and Demographic Impact

Team Leader:
Raymond Albers - Bell Atlantic

Steering Committee Champion:
Frank Ianna - AT&T

Problem Statement/Issues to be Addressed

The first Network Reliability Council recommended that the industry establish a group to monitor network reliability utilizing outage reports filed with the FCC as a high level indicator of network reliability. The Network Reliability Steering Committee (NRSC) sponsored by the Alliance for Telecommunications Industry Solutions (ATIS) was established in May 1993 and has to date issued weekly summaries of outage reports, five quarterly reports, and will release its first annual report in October 1994. The NRSC's analysis to date has been focused on a national level. The Network Reliability Council would like the NRSC to add to its mission by analyzing the effects of outages on a local and regional basis and the geographic and demographic impact of outages, and to review the industry's implementation of the recommendations contained in the June 1993 report "Network Reliability: A Report to the Nation."

Areas of Concern & Problem Quantification

1. Local and Regional Impact of Outages - What is the distribution of outages on a local and regional basis and is there variation in the availability of network services?

2. Based on the previous analysis, are specific outages more prone to occurring in certain areas (e.g., Fiber Cuts in warmer climates - South -- Power Outages in colder climates - North)?

3. Best Practices identified in the June 1993 report "Network Reliability: A Report to the Nation" - Are the Best Practices effective in avoiding or mitigating service outages, how are they being implemented by carriers and suppliers and are some more applicable to certain geographic areas? In addition, are the best practices applicable to other telecommunications networks (e.g., cable, wireless and satellite)?

Description of Proposed Work

1) Local and Regional Impact of Outages - Develop (and if approved by NRC, implement) recommendations on Definition, Scope and Metrics. Examples of factors to be considered include:

   a) Identify what data is available from which to determine the reliability of network services on a local and regional basis.

   - For example: Telco data (e.g., FCC Major Outage Reports, ARMIS)? Cellular data (e.g., FCC requires notification of outages of 90 or more continuous days). Satellite data (FCC's Laurel Satellite Monitoring Facility requests notification due to interference). Cable Data.
   - Data for other telecommunications network services.
   - What does the available data tell us about local and regional variation (if any) in the availability of network services.

   b) What are appropriate definitions of "Regions."

   c) Determine an appropriate baseline for service reliability measurement.

   d) Analyze the effects of outages on a local and regional basis and determine where significant differences exist.

   e) Evaluate the usefulness of present reporting mechanisms and available data for investigating the causes of service loss, avoidability of outages and effect of outages on particular services.

   f) Assess how other service providers (e.g., cable, satellite, wireless, etc.) could monitor outage data similar to that reported by telcos.

   g) Determine whether and how customers of carriers should be informed of service outages.

2) Geographic and Demographic Impact - Develop recommendations for appropriate geographic and demographic classifications, determine availability and sources of data and measures for characterizing outage impact. Examples of work include:

   a) Evaluate the existing data and measures to determine if they are useful in analyzing geographic and demographic impact.

   b) Determine if there are outage types more prone to certain geographic areas using currently available data (e.g., Major Outage Reports, ARMIS, NRC Technical Papers, etc.).

   c) Investigate and enumerate ways to assess non-telco services (e.g., T1A1.2 type impact measure for cable, satellite, wireless, etc.).

   d) Evaluate the need and develop plans for further and continuing data collection.

3) Best Practices - Recommend and implement relevant measures of the industry's implementation of Best Practices. Examples of possible factors to be considered include:

   a) Determine if and to what extent industry is implementing applicable best practices (what do the quarterly and annual NRSC reports show).

   b) Evaluate the effectiveness of applicable best practices for avoiding or mitigating service outages?

   c) Determine the cost/value of applicable best practices.

   d) Determine if there are additional or new best practices which should be added to the current set being utilized in industry today.

e) Evaluate if best practices have more applicability and effectiveness in certain geographical areas.

Existing Work Efforts

1. The NRSC solicited input from industry, for inclusion in its first Annual Report, to better understand how carriers and manufacturers went about evaluating, implementing and sharing the ideas and best practices contained in the FCC's "Network Reliability: A Report to the Nation." The NRSC requested input on the general approach to a) Follow-up on NRC recommendations, b) Specific recommendations which have been implemented and shown to be effective, c) Examples where implementation of Best Practices have resulted in improvement and d) Whether NRC recommendations resulted in closer cooperation and coordination in the resolution of outages. These voluntarily supplied data can form the basis for a preliminary report to the NRC.

2. Working group T1A1.2 has identified fifteen areas of future work related to identifying more appropriate methods and associated data to estimate the impact of network outages. These work items include the development of better outage index calculation methods for combined outages, consideration of weekend traffic patterns for modifying the time factors utilized, consideration of redefining services affected and service weights, and the development of new outage reporting criteria based on the network outage impact.

3. The Network Operations Forum (NOF) undertook a review and analysis of all NRC recommendations to identify potential NOF activities and issues. This resulted in the development of a matrix, mapping NOF activity and issues to the NRC recommendations, and the introduction of five new issues.

4. The NOF, through its Internetwork Interoperability Test Plan (IITP) Committee continues to be active in developing test scripts and test configurations, overseeing the performance of the tests and the reporting of test results to the industry. Test scripts have been developed and performed reflecting new and revised standards and requirements. Test Phases are scheduled through 1995.

Team Participants:

Network Reliability Steering Committee (Ray Albers - Bell Atlantic)
- Process and Procedures Team (PJ Aduskevicz - AT&T)
  Network Reliability Performance Committee:
  > Performance Metric Team (Eva Low - Pacific Bell)
  > Best Practices Team (Rick Harrison - NOF)
  > Outage Reporting & Notification Team (Ray Albers - Bell Atlantic)
- Data Assembly and Analysis Team (Harold Daugherty - Bell Atlantic)

Appendix 2

Performance Metrics Team Work Plan

Performance Metrics Team Work Plan

1. Introduction

This work plan is designed to provide a generic methodology that can be used by the telecommunications industry, including but not limited to, Local Exchange Carriers (LEC), Interexhange Carriers (IXC), Cable, Cellular, and Satellite Service Providers, to collect and analyze data in order to determine the reliability of network services on a local and regional basis, and to determine whether and to what extent network outages have disproportionate demographic or geographic impact.

This generic data collection and analysis methodology can be applied to the existing LEC and IC telecommunications providers. This methodology can also be applied to new and emerging telecommunications entrants in the cable, cellular, and satellite industries, contingent upon availability of sufficent valid data (i.e., responses represent 50% or more of the industry) to conduct the analysis.

The intended audiences for this work plan are the Network Reliability Council (NRC II), NOREST II, and Network Reliability Performance Committee's (NRPC) Performance Metrics Team (PMT).

1.1 Reason for Revision

This work plan has been revised for the following reasons:

A. Missing or insufficient valid data from the cable, cellular, and satellite segments. Inclusion of an industry segment will be considered only if the data is received by July 21, 1995, and the data providers cover at least 50% of the total industry business in that segment.

B. Delayed receipt of data from cellular, cable, and satellite segments. In the event valid data are provided, data aggregation for these segments will be rolled up separately and will not be merged with the LEC and IXC data.

C. Minor modifications and upgrades that describe more accurately the scope and extent of the work that will be contained in the final product.

2. Definitions

For the purpose of this Work Plan, we will use, and adapt as required, the standard US Bureau of the Census definitions and conventions for "geographic" areas and "demographic" characteristics.

> "Demographic" shall mean the statistical characteristics of human population. Two specific demographic characteristics have been chosen for our study work, namely:
>
> - Population Size
> - Population Density per square mile
>
> "Geographic" shall mean the physical characteristics of an area. For our study work, we shall focus mainly on counties and regions as defined by the US Bureau of the Census in

its hierarchy of territorial units in the United States as shown in Appendix 1. We shall adopt "as is" the US Bureau of the Census definitions. In ascending order, they are:

County[1]
Metropolitan Statistical Area (MSA)
State
Divisions (9)
Regions (4)

"Local" shall mean County as defined by the US Bureau of the Census.

"Regional" shall mean Region as defined by the US Bureau of the Census.

3. Study Approach and Issues

This work plan seeks to collect, aggregate, and analyze outage data on a "total industry"[2,3] basis, inclusive of traditional and emerging telecommunications segments:

- Local Exchange Carriers (LEC)
- Interexchange Carriers (IC)
- Cellular Providers
- Cable Television (CATV) Providers
- Satellite Service Providers

The aggregated data will be used to examine the following issues in order to determine the reliability of network services on a local and regional basis, and to determine whether and to what extent network outages have disproportionate geographic or demographic impact:

1. What are the demographic characteristics of the counties where outages occur?

2. Do sparsely populated counties experience the same frequency of outages as highly populated counties?

3. Do low population density counties experience the same frequency of outages as high population density counties?

4. Do Census Regions experience the same frequency of outages?

5. Do counties with low concentrations of telecommunications equipment (i.e., End Offices, Interexchange Access Tandems, Mobile Telephone Switching Offices (MTSO), Headends,

[1]The county is the smallest geographic unit, and is the basis for the geographic roll-ups to the 9 Census Divisions and 4 Census Regions, as shown in Appendix 1. The Census treats "independent cities" as separate entities and this convention will be adopted "as is" for our study work.

[2]The original study approach envisioned a "total industry" view. Subsequent delays and difficulties in obtaining data from all industry segments led to a modified study approach where the data was aggregated and analyzed for two separate, stand-alone studies, one for wireline local and interexchange carriers, and the other for wireless cellular carriers. Due to the unavailability or incompleteness of the cable and satellite data, no analysis was done for these two industry segments.

Satellite Earth Stations and Transponders) experience the same frequency of outages per capita as counties with high concentrations of telecommunications equipment?

6. Questions 2 - 5 above will also examine outage duration and outage impact. (The T1A1 outage index will be used to calculate outage impact).

7. What are the major causes of switching outages? of facility outages?

4. Work Plan Study Methodology

1. Demographic and geographic impacts of outages will be examined from three dimensions: outage frequency, duration, and impact[3].

2A. Two major sources of publicly available outage information will be used to study the existing telecommunications industry consisting of LECs and ICs:

- Major service disruptions filed with the FCC per Docket 91-273 between 1/1/93 and 12/31/94

  Data Source: FCC Final Reports, supplemented by data request to industry to add county information

- *Unplanned* total end office and tandem switch outages ³5 minutes between 1/1/93 and 12/31/94. (Total outage events that are duplicates of major outages reported to the FCC per Docket 91-273 will be culled out of this data population.)

  Data Source: ARMIS data submitted by Price Cap LECs, supplemented by data request to industry to add county information.

  Additionally, an industry data request will be sent to non-price cap carriers in the IEC and CAP segments.

2B. An industry data request will be used to gather outage data as specified below from new and emerging telecommunications entrants in the cellular, cable and satellite industry segments.

- Cellular service disruptions - *Unplanned* total MTSO switch outages ³5 minutes between 1/1/93 and 12/31/94.

  Data Source: An industry data request will be sent to the cellular providers.

- Cable service disruptions - *Unplanned* total head end outages ³5 minutes between 1/1/93 and 12/31/94.

  Data Source: An industry data request will be sent to designated cable providers.

- Satellite service disruptions - *Unplanned* total outages of satellite earth stations and/or satellite transponders ³5 minutes between 1/1/93 and 12/31/94.

[3]Other geographic and demographic dimensions were considered by the Performance Metrics Team, but are not included in the scope of the current study due to time constraints and/or difficulty in obtaining data. These other dimensions included: Business vs Residence, Income Levels, outages by equipment failure locations, etc.

Data Source: An industry data request will be sent to designated satellite providers.

3. Each outage (from Item 2 above) will be mapped to a county where the equipment or facility failure occurred.

4. Demographic profiles will be developed for each county, including the ones with outages. The demographic characteristics chosen for the creation of these profiles are: population size and population density. The 1990 Census will be the data source for this information.

5. Counties will be ordered (and grouped) by the demographic characteristics chosen for this study: population size and population density.

6. Equipment concentration profiles will be developed for each county, including the ones with outages. The equipment types chosen for the creation of these profiles are: switching systems, MTSOs, head ends, satellite earth stations and transponders.[4]

7. Actual outage frequency, duration, and impact will be compared for each national county population category.[5]

8. Actual outage frequency, duration, and impact will be identified for each Region.

9. Only aggregate data will be published. (It is believed that aggregated data provides adequate safeguards against misuse of the local and regional comparisons for competitive reasons).

10. Recommendations will be formulated as to whether or not geographic and demographic analysis of outages should be sustained, and if so, by whom. Also, any new reporting requirements and/or tools that may be required by the industry to facilitate continuance of this analysis will be included in the recommendations.

5. Industry Data Request Questionnaire

An Industry Data Request Questionnaire will be developed to collect the aforementioned outage data. This Questionnaire will be developed by the Data Sub-Team with the assistance of Bellcore, and refined through trials by the Data Sub-Team members and other "friendly providers". The expected scope of the data request is described below.

Note: Due to potential strong synergies with the Outage Reporting/Customer Notification Team, we will coordinate our data request with that team, as appropriate.

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[4] Profiles on terrestial transport facilities and systems are not included. There is an extensive array of equipment in this category and standard measurement methodologies do not currently exist. Considerable industry interactions would be required to achieve consensus on the measurement parameters for transport equipment, and such an effort is likely to extend well beyond the time alloted for this instant study.

[5] Predictive calculations will not be performed as part of this study, and should be deferred pending industry consensus on a methodology for conducting such predictive analysis. There currently is no industry standard, although a proposed methodology has been submitted by the National Communication System (NCS) to T1A1.2, and is documented in the report entitled “National Communication System: Service Outage Assessment Report”, March 15, 1994.

1. Carriers that filed major service disruption reports with the FCC will be requested to identify the county in which the equipment outage occurred for each incident.

2. Price Cap LECs that filed ARMIS data with the FCC on unplanned total switching outages will be asked to identify the county in which the equipment outage occurred for each incident ³5 minutes.

3. Carriers will be requested to identify the counties in which the equipment listed below are located, and the number of access lines, or equivalent. (Terrestial transport facilities and systems are not included; see Footnote 3 for explanation).

LEC/RBOC	Local Switches
LEC/RBOC	Access Tandems
IEC	Interexhange Access Tandems
Cellular	MTSO
Cable	Headends
Satellite	Earth Stations, Satellite Transponders

4. Non-price cap carriers (IECs, CAPs), cellular, satellite, and cable providers will be requested to furnish information on total outages ³5 minutes, including the county in which the equipment outage occurred for each incident.

5. All data collected from the industry will be protected by the non-disclosure agreement provisions agreed to by the NOREST II at its January 11, 1995 meeting. Signed non-disclosure agreements should be in place prior to the data provider releasing any data to Bellcore, the NRC II designated data aggregator and collector.

6. Performance Metrics Team Tasks

1. Design the study methodology.

2. Assist Bellcore to design the Industry Data Request questionnaire.

3. Analyze aggregated data and formulate conclusions.

Note: Inclusion of cable, cellular, and satellite data is contingent upon availability of sufficient valid data to perform the data analysis.

4. Document and publish the results of the study. The contents and format of the report will be consistent with documentation standards that may be set forth by the NRSC/NRC II.

5. Share study findings in an Industry Symposium as set forth by the NRSC/NRC II.

6. Team members will interact approximately twice a month via face-face meeting and conference call as per a mutually agreed schedule.

7. Task oriented sub-teams will be formed, as required.

7. Sub-Teams

Study Methodology Design Sub-Team:
Lead: Eva Low
Members: Tim Mack, John Healy, Bill Klein, PJ Aduskevicz, Harold Daugherty

Data Sub-Team:
Lead: Ari Jain
Members: Tim Mack, PJ Aduskevicz, Mike Angi, Chuck Adams, Stan Edinger, Spilios Makris, CAP Representative (TBD)

8. Performance Metrics Team Timeline

A detailed timeline of the Performance Metrics Team's work activities is contained in Appendix 2.

9. References

1. *Revised Charter for the Network Reliability Council*, FCC, May 1994

2. "New Members Appointed to the Network Reliability Council," *FCC Public Notice*, May 12, 1994.

3. *NRC Issue Statement: Network Reliability Performance*, NOREST II, December 12, 1994

4. *Network Reliability Council (NRC) Data Collection and Aggregation Process*, D. Healy, March 21, 1995

5. Letter to NRC Members Regarding Data Collection single Point of Contact and Non-Disclosure Agreement, R. C. Notebaert, March 28, 1995.

6. *Analysis of FCC-Reportable Service Outage Data*, Technical Report No. 38, T1A1.2 Working Group, August 1994.

7. *Enhanced Analysis of FCC-Reportable Service Outage Data*, Technical Report No. 42, T1A1.2 Working Group, August 1995.

8. *National Communications System: Service Outage Assessment Report*, Office of the Manager, National Communications System, March 15, 1994

Performance Metrics Team Timeline

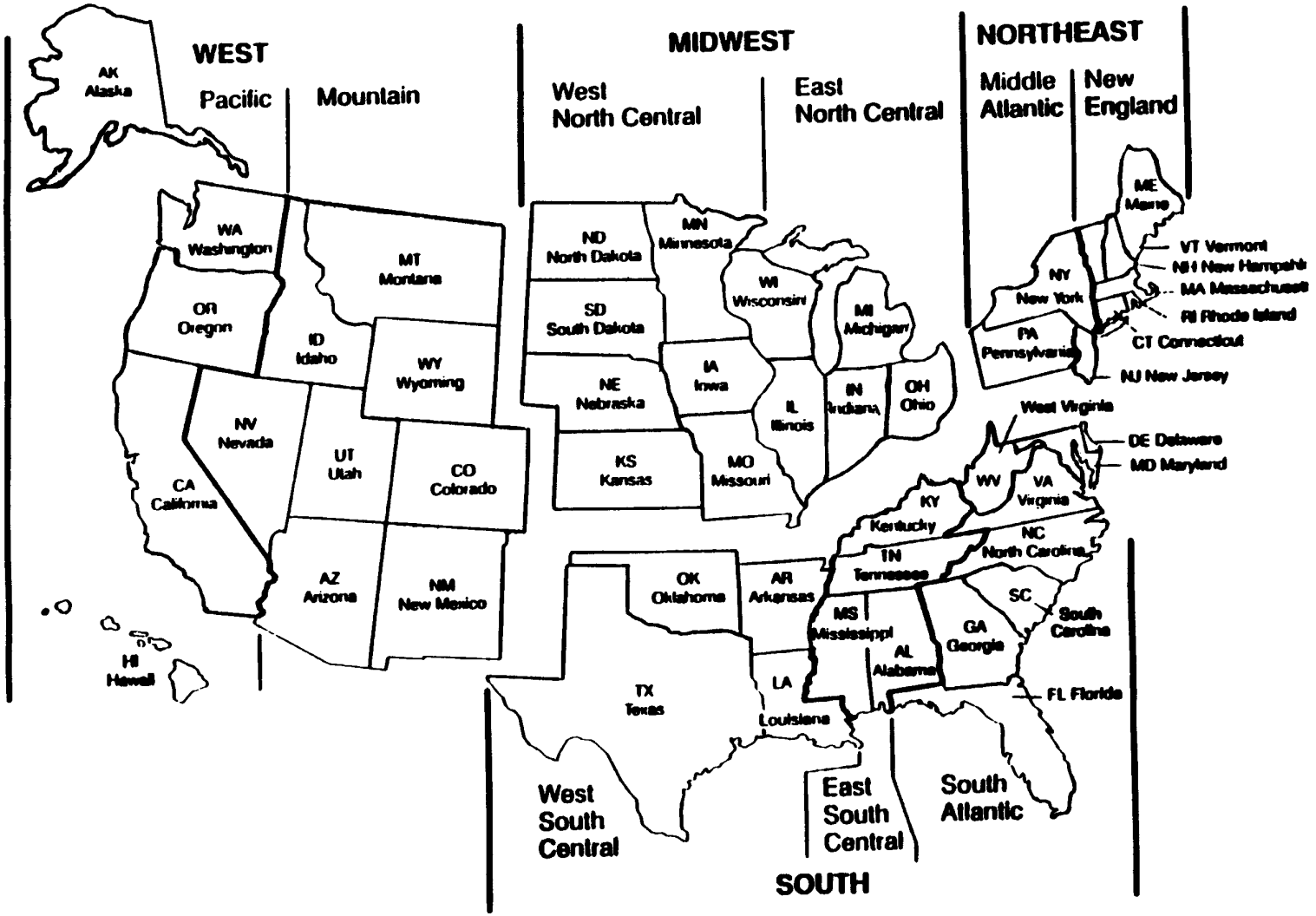
Planned	Actual	Description
1/19/95 (Draft 0)	1/16/95	Draft Work Plan
2/1/95 (Draft 0)	1/29/95	Draft Data Request Questionnaire
2/6/95	2/6/95	• Establish Data Sub-Team to Finalize and Trial Data Request Questionnaire
2/8/95	2/8/95	• NOREST II Approval of Work Plan and Data Request Questionnaire • NOREST II Guidance on Targeted Closure Date for Identification of SPOCs, Execution of Non-Disclosure Agreement
2/13/95	2/13/95	Data Sub-Team Conference Call
3/13/95	3/13/95	• Final Work Plan • Final Data Request Questionnaire
3/10/95	3/30/95	NRC II Letter of Request for SPOC and Non-Disclosure Agreement Approval (Notebaert Letter)
2/23/95	2/23/95	Jim Eibel Data Request Reconciliation Meeting with Focus Team Leaders (PJ Aduskevicz will represent Performance Metrics Team)
²3/1/95	2/13/95 USTA	"Heads Up" Communications to Industry: NOF, CCGG, USTA
3/25/95	3/21/95 - 6/28/95	Industry SPOCs Identified
3/26/95	3/30/95 - 6/29/95	Bellcore Mail Data Request Questionnaire to Industry SPOCs
3/8/95	comp	NOREST II Guidelines on Final Report Format
4/30/95	5/95 - 6/95 LEC/IC	Initial Data Responses From Industry to Bellcore
5/30/95	6/95 - 9/95 Others	• All Data Responses From Industry to Bellcore • Preliminary Aggregated Data Analysis
6/30/95 - 8/15/95	6/30, 7/25, 8/24, 9/28	Aggregated Data Analysis #1 - LEC/IC
7/31/95 - 9/1/95	9/28	Aggregated Data Analysis #2 - Cellular
8/31/95	10/12, 11/	Draft Study Report
9/12/95	comp	Draft Study Report and Readout to NOREST II (Chicago)
9/13/95	comp	Industry Symposium Planning Meeting (Chicago)
10/26/95	comp	NRC II Approval
11/15/95	12/1/95	Final Study Report to NRC II
1/6/96		NRC II Transmittal of Report to FCC
2/96 (Text) 3/1/96 VG		Industry Symposium Compendium/Publication Materials to IEC
415/96 - 4/18/96		Industry Symposium, Washington, D.C.

Appendix 3

Map of U.S. Bureau of the Census Hierarchy of Territorial Units

Figure 1.

Map of the United States, Showing Census Divisions and Regions



Source: U.S. Bureau of the Census