

FINAL RECOMMENDATION OF
THE THRESHOLD REPORTING GROUP
OF THE NETWORK RELIABILITY COUNCIL

GEORGE A. BARLETTA
TELESECTOR RESOURCES GROUP
NYNEX
120 BLOOMINGDALE ROAD
WHITE PLAINS, NEW YORK 10605
(914) 644-2288

1. EXECUTIVE SUMMARY

The Threshold Reporting Group (TRG) made its initial recommendation on the appropriate threshold level for major network outage reporting regarding the Federal Communications Commission's Service Disruption Order at the April 29, 1992 Network Reliability Council (NRC) Meeting.

The TRG recommended that the threshold for initial reports (to be filed within 90 minutes of the knowledge of an outage) should continue at 50,000 customers for 30 minutes or greater. However, we recommended that on a six month investigatory basis, the threshold for final reports (due 30 days after an outage) should be lowered to 30,000 customers for 30 minutes or greater. The TRG noted that a further recommendation on the threshold issue would be made at the end of the six month period.

The TRG also recommended that certain offices and facilities be designated as "special" by the carriers and that those be subject to FCC notification for both initial and final reports, regardless of the number of customers affected.

The "Special" categories were recommended to include:

- 911/E911
- Major Airports
- Key Government Facilities
- Major Military Installations
- Nuclear Power Plants

The NRC subsequently approved these recommendations at their April meeting.

The six month study period concluded on November 30, 1992. Along with the outage data the TRG collected and analyzed during this period, other factors were reviewed before coming to our recommendation on an appropriate threshold for reporting. These factors included:

- Overall outage reporting to FCC
- State of the telecommunications network
- TRG straw poll on appropriate threshold level
- Coverage of the reports
- Confidentiality at the lower threshold
- Purpose of the reports

Based upon the volume and diversity of reports filed with the FCC during our study period and the above-noted factors, we submitted before the NRC our recommendation on the appropriate threshold for outage reporting.

1.1 Recommendations

1.11A We recommended that the appropriate threshold level of reporting to the FCC should be:

- ≥50K customers
 - 90 minute initial report
 - 30 day final report
- ≥30K-50K customers
 - 3 day Notice
 - 30 day final report

1.11B We recommended the continued reporting of "special" office and

facilities failures regardless of number of customers affected as described in our initial recommendations. Reporting of outages for key government facilities, major military installations and nuclear power plants would be made through a process described in section 5.23 of this document and in its attachments, and which was agreed to by the industry at the September 1992 NRC meeting.

Rationale

The TRG projected the number of outage reports to be filed with the FCC at 206 per year for outages affecting $\geq 30,000$ customers.

The TRG felt that the 200 reports per year level would adequately provide the industry with the tools to increase reliability within the telecommunications networks.

The TRG was convinced that the reporting of outages at lower threshold levels below 30K customers were adequately taken care of since the major LECs are required to provide this information in the ARMIS 43-05 Switch Downtime Reports.

The TRG also believed that the country's telecommunications networks, as a whole, are working well as evidenced by 99.999% switch uptime over the first two quarters of 1992.

In addressing the report coverage issue, the TRG felt comfortable in the knowledge that over 50% of the nation's telecommunications customers would be covered by a major outage report umbrella by lowering the threshold to $\geq 30K$ customers.

The "specials" category was recommended for retention so that the FCC would receive timely information necessary to monitor outages which could have a major impact on the public yet not meet the recommended threshold.

1.12 We recommended a 3 day Notice for an initial communication to the FCC for an outage in the $\geq 30K-50K$ category. The Notice should be a written document, that is, an abbreviated version of the initial report. This document is to be faxed to the FCC watch officer, the same as in an initial report filing.

1.13 We recommended the following content for the 3 day Notice on the initial communication to the FCC for outages affecting $\geq 30K-50K$ customers: Carrier name, contact, and telephone number; the date of the incident; types of services affected; geographical area of outage; category of incident. Duration of incident, number of customers affected, number of blocked calls, and methods used to restore service should be furnished if available.

1.14 A. We recommended that the $\geq 50K$ outage reports and the $\geq 30K-50K$ final report included in the final recommendation should contain the same information that is stated in the FCC's February 13, 1992 Service Disruptions Order.

1.14 B. The TRG also recommended that the FCC look into the possibilities of changing the 90 minute report for $\geq 50K$ customer outages to a 120 minute notice (notice to include the same information as the 3 day notice in section 1.13).

1.15 We recommended that the IXC's continue using blocked calls to determine threshold level of reporting in the Service Disruptions Order.

1.16 The TRG agreed with the IXC's recommendation for carriers to voluntarily report the $\geq 30K-50K$ outages without confidentiality for a period of one year. This issue should be revisited at the end of the one year period. We recommended that when and if confidentiality is extended to one carrier, that it be extended to all carriers so that a level playing field is in order.

1.17 We recommended that the threshold established by the TRG be used to meet the needs of the industry network reliability and FCC oversight and not to be taken as a basis of establishing a threshold for fines and forfeitures.

2. INTRODUCTION

This document is the Final Recommendation of the Threshold Reporting Group of the Network Reliability Council. An Initial Recommendation was made by the TRG to the Network Reliability Council at the April 29, 1992 NRC meeting in Washington, D.C. This recommendation, regarding the appropriate threshold level of reporting for network outages in accordance with the Federal Communications Commission's (FCC's) Common Carrier Docket 91-273: Notification by Common Carriers of Service Disruptions, was subsequently adopted by the NRC.

This paper provides the process and rationale for the TRG's Final Recommendation which was submitted for approval before the NRC.

2.1 Background

On September 19, 1991, the FCC released a Notice of Proposed Rulemaking (NPRM) regarding the notification by common carriers of major service disruptions in their networks. This Notice was released in response to the various service outages which occurred in the country's telecommunications networks over the past couple of years.

After a round of Comments and Reply Comments on this issue, the FCC adopted an Order on February 13, 1992 in Common Carrier Docket 91-273 regarding these service disruptions. This Order required any facilities-based common carrier that provides access service or that provides interstate or international telephone service to notify the FCC within 90 minutes of any service outage that affects 50,000 potential customers for 30 minutes or longer. The FCC also required that in the event of any such outage, a final report must be filed within 30 days after the incident. These reports are to provide the time, date and cause of the outage, area/customers/services affected, the duration and resolution of the outage, and steps taken to prevent its recurrence.

However, the FCC's Order adopted the 50,000 customer affected threshold on an interim basis only, and charged the NRC

with the task of studying threshold level issues in the Order and making a recommendation on this charge to the FCC within 60 days of the Order's issuance.

2.2 Charge/Goals of the Threshold Reporting Group

The NRC subsequently established a committee, the Threshold Reporting Group, to respond to the FCC's charge in the Service Disruptions Order and to develop a recommendation for the outage threshold.

The charge to the TRG was to determine if the 50,000 customer threshold should be lowered, or if it already was at an optimal level. Also, the TRG was required to decide if there should be a separate threshold for 911 service and major airport failures.

In addressing these issues, the TRG had three goals:

- To inform the FCC of significant network outages
- To help improve network reliability
- To avoid placing an undue burden on reporting carriers and the FCC

The TRG decided that it was possible to achieve the first goal by setting an appropriate threshold and by adding offices in the universe that affect major public facilities regardless of line size.

However, the second goal could only be achieved by analysis of additional data. Currently for switching offices, the Price Cap LECs provide the FCC with downtime data for each outage in excess of 2 minutes. This type of information should be used to examine trends in network reliability.

For the third goal, we sought to limit the data requested from the carriers to that information which is absolutely required to identify meaningful trends and enhance reliability in the network.

It was recommended by the NRC Steering Committee members at their May 28, 1992 meeting that carriers should provide informal notice to the FCC for any $\geq 30K-50K$ failure within 72 hours of the incident.

A voluntary notification process was put in place for carriers experiencing outages in the $\geq 30K-50K$ customer range.

Rationale

It was important to derive an informed calculation as to the number of outage reports that would be filed with the FCC on a yearly basis. The importance lay in the administrative burden to the carriers and the FCC, and the amount of information that would be available to the industry to improve network reliability. To develop a reasonable estimate for the incoming number of reports, the TRG added the Local End Office failures from the ARMIS 43-05 Reports and queried all major carriers for the last 6 months of 1991 for Tandem, Signalling and Facilities failures. For the $\geq 50K$ threshold, 74 reports were projected for the year, while the $\geq 30K$ threshold yielded 178 reports on an annual basis.

Because this data was gathered in an expedited manner, along with the fact that the "special" facilities had yet to be rigorously defined, the TRG felt that a 6 month study period for accumulating and analyzing outage data would serve the best interests of the FCC, industry, and public.

5. ACTIVITIES OF THE TRG

5.1 Outage Summaries

The TRG collected outage data from the FCC reports since April 6, 1992 when the FCC Order on Service Disruptions went into effect. The voluntary $\geq 30K-50K$ outage reporting began on June 1, 1992. Therefore, the 6 month investigatory period requested by the TRG and approved by the NRC ran from June 1, 1992 thru November 30, 1992.

At the July, 1992 NRC meeting, the TRG noted that a potential 30 day lag existed between the actual outage of a $\geq 30K-50K$ service disruption and knowledge of this outage by the FCC and the TRG (for purposes of the outage study). Although this lag indeed existed, the TRG felt that the level of outages reported has been more than adequate to determine an appropriate threshold level as charged. Thus, the outage data provided, herein, constituted 6 months of $\geq 50K$ outages plus "specials", and more than 5 months of $\geq 30K-50K$ outage data (it included all reports at the lower threshold level that were known thru November 30, 1992). The outage data for the study period and analysis thereof is shown in section 6 of this report/recommendation.

5.2 Guidelines for Threshold Reporting

5.2.1 Local Exchange Carriers Guidelines

Early in the process of reporting network outage information to the FCC, the TRG became aware that outages were being treated differently by various carriers throughout the country. Assumptions were made in many areas, such as facilities outages, where the same type outage may be reported by one carrier but not by another. The TRG notes that there was no attempt to "hide" an outage on any carrier's part, but that it was the way one counted that led to these variations. The TRG requested input on the method and rationale used by each local exchange carrier for the purpose of reporting outages. This input, which was received from most local exchange carriers, was analyzed by the TRG and a representative of the Pacific Bell "NO REST" team and incorporated into the "Suggested LEC Guidelines" (see Attachment 1). These voluntary guidelines were adopted by all major LEC carriers in September 1992 and are currently in use by these carriers.

The LEC guidelines were geared towards the major carriers simply because of the greater likelihood of outages occurring in their networks versus those of the smaller LECs which rarely have outages of such magnitude as to be reportable to the FCC. However, the smaller LECs reviewed these guidelines and, where applicable,

will use these parameters to aid in the determination of reportable outages. These guidelines, which established a level playing field for threshold reporting by the LECs were subsequently approved by the NRC at their September 1992 meeting.

5.22 Interexchange (IXC) Carrier Guidelines

The IXCs developed similar guidelines for reporting outages to the FCC and received consensus within their industry for the usage of such guidelines and approval by the TRG.

The guidelines, which use blocked calls as a measure for determining the reportability of outages, are resident in Attachment 2.

5.23 "Special" Government Facilities Reporting Criteria

When the TRG initially recommended reporting the "specials" category for FCC reportability (see section 4) regardless of the number of the customers affected at the April 1992 NRC meeting, there was concern on the part of a few NRC members that some information provided to the FCC would be proprietary, and that other information should not be revealed based on contractual arrangements between the carrier and the government.

The TRG requested that the National Security/Emergency Preparedness (NS/EP) Panel of the President's National Security Telecommunications Advisory Committee and the Office of the Manager, National Communications System (OMNCS) develop a process for reporting telecommunications outages affecting major military installations, key Federal Government facilities and nuclear power plants. This process was developed by these organizations and submitted before the NRC at their September 1992 meeting. The process was approved and has been incorporated into the Suggested LEC Guidelines, Issue 2 (section 5.53) and the IXC Guidelines (pages 3 and 4).

6. NETWORK OUTAGE DATA INFORMATION - "INVESTIGATORY PERIOD"

6.1 Analysis for Six Month Study Period Data

The accompanying charts to this study are summary information derived from the network outage reports filed with the FCC between June 1, 1992 and November 30, 1992. This summary contains outage information in the $\geq 50K$ and "specials" categories, and the $\geq 30K-50K$ category.

CHART 1

FCC REPORTABLE OUTAGES
 $\geq 50K$ CUSTOMERS + "SPECIALS"
 INITIAL REPORTS JUNE 1, 1992 - NOV. 30, 1992

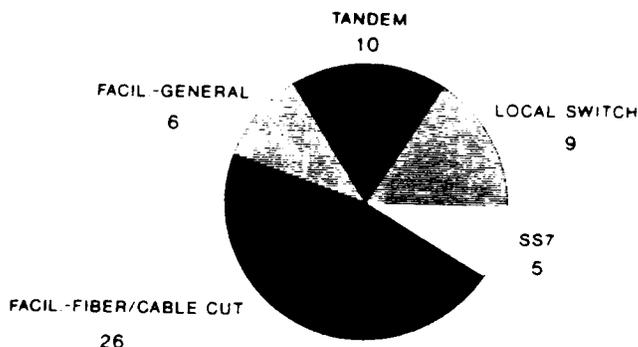
OF DAYS 183

TOTAL INCIDENTS	NET INCIDENTS	SWITCH & FACIL.	OVERLOAD	OTHER
69	62	56	5	1

Chart 1 shows that total incidents recorded for the $\geq 50K$ and "specials" categories during the six month outage study period amounted to 69 filed reports with the FCC. Seven (7) initial reports were subsequently withdrawn when carriers made the determination that the service disruptions were below the threshold reporting levels. Withdrawn reports came from no one particular area of the Switch & Facilities, as at least one report was resident in each of the five Switch & Facilities elements. Thus, the net incidents reported for the study period is 62, or approximately one every three calendar days.

CHART 2
FCC REPORTABLE OUTAGES
≥ 50K CUSTOMERS + "SPECIALS"
INITIAL REPORTS JUNE 1, 1992 - NOV. 30, 1992

SWITCH & FACILITIES - TOTAL 56



Switch & Facilities outages made up over 90% of the total outages for the ≥50K and "specials" reports. As seen in Chart 2, all elements in Switch & Facilities contributed to the overall report total of 56, with Cable/Fiber Cuts far overshadowing the Local Switch, Tandem, SS7, and Facilities-General outages in number.

NRC Focus teams analyzed this data and noted that the final (30 day) reports were extremely useful in evaluating the country's telecommunications networks.

The causes for Local Switch/failures during the study period included:

- Central Processor outage (2)
- Corrupted software (2)
- Failure during planned activity
- Power loss in the switch
- Lightning induced circuit breaker trip
- Faulty hardware in memory sub-system
- Manual data entry error

The causes for Tandem failures during the study period included:

- Failure during upgrade/growth (4)
- Power plant and signalling processor failure
- Peripheral unit BUS failure
- Rectifiers failed during commercial power outage
- Shorted diode caused power failure
- Air-conditioning units failed
- Switch flooded by heavy rains

The causes for SS7 failures during the study period included:

- Dual link failures (4)
- Corrupted software

The causes for Facilities-General failures during the study period included:

- Power loss in interoffice equipment facilities
- Fiber transposition
- Power plant microprocessor failure
- Up converter/modulator failure
- Fiber ring facilities failure
- Radio antenna out of alignment

Cable/Fiber cuts, as noted, made up the largest share of Switch & Facilities outages and is examined in Chart 3.

CHART 3
FCC REPORTABLE OUTAGES
≥ 50K CUSTOMERS + "SPECIALS"
INITIAL REPORTS JUNE 1, 1992 - NOV. 30, 1992

FIBER/CABLE CUTS

TOTAL OF 26 FAILURES :

TYPE CARRIER

IXC	11
LEC	15

LOCATION

NORTHWEST	2	WEST	6
SOUTHWEST	5	NORTHEAST	3
MIDWEST	5	SOUTHEAST	5

Chart 3 shows that Cable/Fiber cuts amounted to 46% of the total Switch & Facilities outages in the ≥ 50K and "Specials" category. Cable/Fiber cuts did not discriminate regarding the type of carrier, with 11 cuts on IXC networks and 15 cuts on LEC networks, nor on a region basis where failures were somewhat evenly divided among each area. We noted, however, the preponderance of cuts in California (6) and Texas (3) that produced major outage reports to the FCC.

CHART 4
FCC REPORTABLE OUTAGES
> 50K CUSTOMERS + 'SPECIALS'
INITIAL REPORTS JUNE 1, 1992 - NOV. 30, 1992

	<u>OVERLOAD</u>	
<u>TOTAL</u>	<u>OVERLOAD NATURAL</u>	<u>OVERLOAD OTHER</u>
5	4	1

Chart 4 displays that there were 5 overload service disruptions during the study period. These resulted from:

- Hurricane Andrew (3)
- Hurricane Iniki (1)
- Network congestion during mass calling event (Garth Brooks ticket sale call-in).

CHART 5
FCC REPORTABLE OUTAGES
> 30K - 50K CUSTOMERS
REPORTS AS OF JUNE 1, 1992 - NOV. 30, 1992

OF DAYS 183

<u>TOTAL INCIDENTS</u>	<u>NET INCIDENTS</u>	<u>SWITCH & FACIL.</u>	<u>OVERLOAD</u>
41	41	40	1

Chart 5 reveals that since the voluntary reporting started as of June 1, 1992, there have been 41 reports filed with the FCC for >30K-50K outages thru November 30, 1992. There were no withdrawals of reports in this category since the carriers had time to assess the outages for the impact on its customers. Net incidents in this category occur approximately one every four calendar days. Switch and Facilities failures made up 98% of the entire outages in this area.

The TRG notes that IXC confidentiality at the lower threshold level did not affect the ability to derive useful data reported in this 6 month study.

CHART 6
FCC REPORTABLE OUTAGES
> 30K - 50K CUSTOMERS
REPORTS JUNE 1, 1992 - NOV. 30, 1992

SWITCH & FACILITIES - TOTAL 40

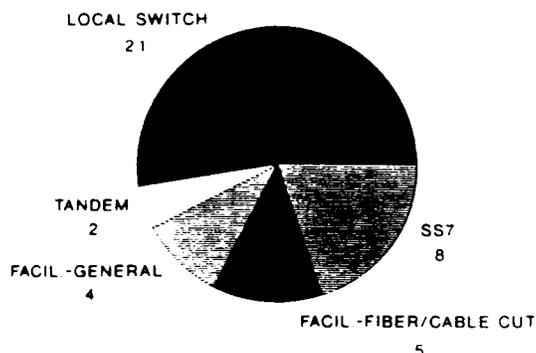


Chart 6 demonstrates that Local Switch outages dominated the reporting in this group with 53% of the failures. Causes for Local Switch failures during the study period include:

- Defective power unit(s) (5)
- Faulty transfer circuits (5)
- Failure resulting from planned activity (4)
- Software problems (3)
- Central processor failure (lightning)
- Duplex processor frame failure
- Trunk line network fault
- Attached processor interface failure

Tandem failures during the study period were caused by:

- Software error
- Procedural (human) error

SS7 failures during the study period were caused by:

- CNI ring failure (3)
- Procedural error (Telco)
- Corrupted buffer
- Vendor error
- System timing problem/signal strength
- Corrupted memory on disk

Facilities failures during the study period were caused by:

- Defective fiber
- Lightwave transmission equipment failure
- Procedural error
- Power failure at repeater (lightning)

Cable/Fiber cuts during the study period were distributed between the LECs with three and the IXC's with two. The LEC cable/fiber cuts were in the South (2) and Southwest (1).

**CHART 8
FCC REPORTABLE OUTAGES
JUNE 1, 1992 - NOVEMBER 30, 1992**

OF DAYS 183

OUTAGES AFFECTING	TOTAL	LOCAL		FACILITIES			OVERLOAD		
		SWITCH	TANDEM	GENERAL	CABLE CUTS	SSZ	NAT	OTHER	OTHER
≥ 50K CUST	47	6	5	5	21	5	4	1	0
'SPECIALS'	15	3	5	1	5	0	0	0	0
TOTAL	62	9	10	6	26	5	4	1	1
≥ 30K - 50K	41	21	2	4	5	8	0	1	0
TOTAL	103	30	12	10	31	13	4	2	1

Chart 8 shows what we have learned from the addition of the ≥30K-50K category to the reporting process.

With the addition of the ≥30K-50K outages, the amount of filed reports with the FCC has almost doubled (47 for ≥50K vs. 41 for ≥30K-50K) when we excluded the "specials" category. The TRG noted that there were more than double the outage reports in the Local Switch ≥30K-50K range than in the ≥50K category. However, this was to be expected since there were more than three times as many LEC switches in the ≥30K-50K range (1,029 switches) than there were in the ≥50K range (309 switches). Thus, the potential for outages seem to indicate that line size was not the determining factor in outages but the number of switches in a particular grouping. Tandem failures, Natural Overloads, and Cable Cuts were more prevalent in the upper threshold range, again to be expected since these represent potentially larger and more extensive outage failures which would affect a greater number of customers.

**CHART 7
FCC REPORTABLE OUTAGES
JUNE 1, 1992 - NOVEMBER 30, 1992
ALL OUTAGES**

OF DAYS 183

OUTAGES ≥ 50K	47	
'SPECIALS'	15	-----
SUB-TOTAL	62	
		PROJ. 124 OUTAGE REPORTS/YR.
ADD :		
≥ 30K - 50K	41	-----
TOTAL	103	
		PROJ. 206 OUTAGE REPORTS/YR.

The summary of outages during the six month study period, as seen in Chart 7, shows a net of 47 outage reports in the ≥50K category, and 15 filed outage reports for "specials". If the Final Recommendation were to retain just the ordered threshold plus "specials" for reporting, there would be a total of 124 outage reports filed on an annual basis with the FCC.

With the addition of the ≥30K-50K category, 41 more reports were received during the six month period.

In projecting total reports for all categories, 206 outage reports would be filed with the FCC on an annual basis.

CHART 9
 OUTAGE COMPARISON
 6 MONTHS 1991 vs. 6 MONTHS 1992 (STUDY)
 (ANNUALIZED)

	<u>ORIG. PROJECTION</u>	<u>NEW PROJECTION</u>
≥ 50K	74 REPORTS	94 REPORTS
≥ 30K	178 REPORTS	176 REPORTS
SPECIALS	**	30 REPORTS
PROJ.	178** REPORTS	206 REPORTS

Chart 9 shows that in the original recommendation of the TRG for outages affecting ≥30K customers, we had anticipated 178 reports (in addition to whatever reports "specials" generated) to be filed with the FCC on an annual basis.

After collecting outage data from June 1, 1992 thru November 30, 1992, the TRG notes that 88 reports were filed with the FCC during this time in the non-"specials" category. Annualizing this figure, we would have 176 reports filed with the FCC for these categories, almost the exact number in our original study which was based on written and verbal information from the 2nd half of 1991. "Specials" would provide an additional 30 reports for the year.

6.2 Summary of Analysis for Six Month Study Period Data

The six month study data provided the TRG with important information in helping determine an appropriate threshold level of reporting. The study confirmed that the data in our original recommendation showing 178 outage reports (plus "specials") per year was right on target. It showed that there were problems in each sector of the network as reporting of outages across all network elements was fairly diverse. It confirmed that cable/fiber cuts were the leading cause of major outages in this country. It also showed a willingness on the part of the industry to cooperate with the intent of the FCC's Service Disruptions Order as a number of reports

were filed which did not meet the prescribed threshold level.

7. OTHER ISSUES CONSIDERED IN RECOMMENDATION

- Overall outage reporting to the FCC
- State of the telecommunications network
- Straw poll on threshold reporting
- Coverage of the reports
- Confidentiality at the lower threshold level
- Purpose of the reports

7.1 OUTAGE REPORTING TO THE FCC

In reviewing the overall picture regarding network outages, the TRG noted that the FCC receives not only the ordered reports on outages affecting ≥50K customers, but reports on "special" offices/facilities, and on voluntary ≥30K-50K reports. In addition, the FCC receives outage data on ARMIS reports which have outages reflected down to 30 seconds for LEC end office switches. The TRG also wishes to acknowledge the reporting of outage information to groups/organizations other than the FCC; i.e., the General Accounting Office and the NRC Focus Groups, for the purpose of improving network reliability. Chart 10 shows the current level of reporting for Price Cap LEC network outages to the FCC.

**CHART 10
 PRICE CAP LECs
 REPORTING TO FCC**

	<u>CRITERIA</u>	<u>INITIAL NOTIF.</u>	<u>FINAL REPORT</u>	
LRG. OFFICES	≥50K	30 MINS.	90 MINS.	30 DAYS
SPECIAL OFFICES		30 MINS.	90 MINS.	30 DAYS
MED. OFFICES	(≥30K - 50K)	30 MINS.	72 HRS.	30 DAYS
ALL OFFICES (INDIV.)		2 MINS.	-	3 MONTHS
ALL OFFICES (CUM.)		30 SECS.- 2 MINS.	-	3 MONTHS

The TRG saw that the current reporting of outages as approaching the limits of one of our goals, to avoid placing an undue burden on the carriers and the FCC. In this regard, the TRG felt that reports for reporting sake was not in the best interests of the carriers and the public.

7.2 State of the Telecommunications Network

The TRG had been asked to review the negative aspects of the nations telecommunications networks ... to see what level of outages was required to make a judgment on our systems. The TRG also wanted to look into the alternative, "switch uptime", to see if the levels of telecommunications reliability were running at an acceptable rate. Chart 11 shows the amount of switch uptime from the Price Cap Reporting LECs for the 2nd quarter in 1992 (the latest quarter available for the study.)

CHART 11
SWITCH UPTIME - LECs
2nd QUARTER 1992

TOTAL SWITCHES :	15,616
TOTAL SWITCH UPTIME :	2,046,320,640 avail. switch mins./Q.
	2,046,320,640 - 24,518 total downtime mins.
	$\frac{2,046,320,640}{2,046,320,640} \times 100 =$
	<u>99.9988% UPTIME</u>

SWITCH UPTIME (EXCLUDING SCHEDULED EVENTS) :	
	2,046,320,640 - 19,902 unsched. downtime mins.
	$\frac{2,046,320,640}{2,046,320,640} \times 100 =$
	<u>99.9990 % UPTIME</u>

The 24,518 downtime minutes in 15,616 LEC switches shows that the overall network has a reliability of 99.999% when we excluded planned event downtime. When the TRG looked into the reliability for the LEC networks for the first quarter of 1992, we came up with the same reliability as listed above. The outage downtime in these calculations translates to approximately one and a quarter minutes of downtime per switch per quarter.

7.3 Straw Poll on Appropriate Threshold Level of Reporting

The TRG decided to conduct a straw poll on the appropriate level of reporting to find out the industry perspective on the reporting threshold. The poll was distributed to all LECs, IXC's, NRC Focus Groups, and Others in November 1992 after over 5 months of reporting outages at the ordered $\geq 50K$ threshold and the voluntary $\geq 30K-50K$ threshold.

The majority of the carriers responding to the straw poll felt that the $\geq 30K-50K$ threshold was not overly burdensome given their experience with the investigatory period reporting.

The Straw poll requested not only the choice(s) of the respondent, but also the reason for this choice. Insight into the choices gave the TRG a good feel for the problems out in the field which may have otherwise been overlooked.

Respondent input included the following:

- "Minimize the paperwork associated with the $\geq 30K-50K$ customer level"
- We are "unable to provide substantial amounts of information within 90 minutes of service failure and feel that notification makes more sense than attempting a report"
- "The level of reporting for this alternative will provide the FCC and industry with additional information on the telecommunications network while balancing the administrative burden on carriers by not requiring a 90 minute report for a $\geq 30K-50K$ outage"

In summary, the Straw poll allowed us to look into the minds of the respondents to get their point of view on issues that will affect them. The TRG team reviewed this Straw poll and associated rationale at our November 25, 1992 meeting and weighed each response before making a final decision on this issue.

7.4 Coverage of the Reports

The TRG sought to determine the coverage of the reports (i.e., what percentage of

lines or switches are covered at the different threshold levels under consideration) in reporting outage in the Service Disruptions Order. The TRG queried the major IXC's, smaller IXC's, and local exchange carriers to determine the amount of "reportable" lines/customers to the FCC.

The major IXC's noted that all tandem switches would be considered as part of the lower $\geq 30K$ customer threshold for reportability purposes. Thus, the entire major IXC network is reportable in the event of a failure, providing the outage meets the parameters in the Order.

For the smaller IXC's, however, the coverability will be low at either the $\geq 30K$ or $\geq 50K$ threshold since these carriers utilize switches and lines of lower capacity.

The coverability of smaller LEC's is minimal since their system capacities rarely, if ever, approach even the lower threshold range.

The coverability of the largest 12 LEC's are shown in the following table:

TABLE 1

Total Access Lines	130.5 Million
Total Access Lines Covered by $\geq 50K$	19.1M (14.6%)
Total Access Lines Covered by $\geq 30K$	53.9M (41.3%)

These coverages did not include "Special" or Tandem offices. Based on data received from responding LEC's, "Specials" added another 9.5 million lines to this coverability and brought the total lines covered by reportability in this order to 63.4 million or 48.6%. Tandem reportability for LEC's increased this coverage on a carrier-by-carrier basis. The increased reportability drove the LEC customer coverage to approximately the 50-55% range.

7.5 Confidentiality at the Lower Threshold

The carriers agreed to continue reporting outages at the $\geq 30K-50K$ customer threshold for a period of one year without requiring confidential treatment. When the interval expires, a review of the process for appropriateness and competitive issues should be reopened.

When confidentiality is reconsidered at this time, any decision regarding this issue should apply to all carriers equally.

7.6 Purpose of the Reports

A concern to many TRG members was that of carrier fines and forfeitures being tied into a threshold level recommended by the TRG. The unanimous feeling among the TRG was that the recommended threshold level should be totally disconnected with any such fines and forfeitures if they were to ever occur.

One of the purposes of the outage reports was to help the industry become more reliable with the dissemination of these reports to industry groups for analysis to help avoid similar problems in the future. Fines and forfeitures would discourage reporting and hurt the overall network reliability effort of the industry.

8. FINAL RECOMMENDATION OF TRG ON THRESHOLD REPORTING

Based on the 6 month outage data during our study period and the issues reviewed in section 7, the following was our final recommendations to the NRC:

8.1 Recommendations

8.11A. We recommended that the appropriate threshold level of reporting to the FCC should be:

- $\geq 50K$ customers - 90 minute initial report
- 30 day final report

≥30K-50K customers- 3 day Notice
- 30 day final report

8.11B. We recommended the continued reporting of "special" office and facilities failures regardless of the number of customers affected as described in our initial recommendations. Reporting of outages for key government facilities, major military installations and nuclear power plants would be made through a process described in section 5 of this document and in Attachment 1, and which was agreed to by the industry at the September 1992 NRC meeting.

Rationale

The TRG reviewed the number and the diversity of the reports that were filed with the FCC from June 1, 1992 thru November 30, 1992. The ≥50K reporting threshold was projected to yield 94 reports/year. By reducing the threshold level to ≥30K customers, outage reporting was almost doubled to 176 reports per year. More importantly, we ended up with three times the outage information (30 reports total vs. 9 reports) for Local Switch at the lower threshold level than at the upper level. We felt this additional information was important to monitor central office reliability as well as the supplemental data it provided on the other elements in this category.

The projected report number of 206 per year for the ≥30K customer outage category plus "specials" appeared right on target with the projection in the TRG's initial report of April 20, 1992. We anticipated with the pluses and minuses of each event, that the reports should stabilize around the 200 reports per year level when the "specials", ≥30K-50K category, and ordered threshold of ≥50K category were totaled.

The TRG felt that the 200 reports per year level would adequately provide the industry with the tools to increase reliability within the telecommunications networks.

The TRG was convinced that the reporting of outages at lower threshold levels below 30K customers is adequately taken care of since the major LECs (see chart

10) are required to provide this information in the ARMIS 43-05 Switch Downtime Reports. Any additional reporting recommendations for LECs or IXC's should come from the NRC Focus Group teams that investigated such matters, and who had been requested to make such recommendations on these issues in the TRG Initial Report.

The TRG also believed that the country's telecommunications networks, as a whole, are working well as evidenced by 99.999% switch uptime over the first two quarters of 1992.

The coverage figures in Table 1 aided our decision to recommend the ≥30K-50K threshold in combination with the ordered threshold. The amount of lines covered by major LECs at the ≥50K level was 14.6% of their total access lines. By adding "specials" and tandems, the percent coverability was approximately 20-25%. With the lowering of the threshold to ≥30K customers, the new coverability percentage increased to 50-55%. For major IXC's, the coverability rate is 100%. Between the two groups, the TRG felt comfortable in the knowledge that over 50% of the nation's telecommunications customers would be covered by a major outage report umbrella by lowering the threshold to ≥30K customers.

In reviewing the straw poll on threshold reporting, most respondents did not object to the lowering of the threshold to ≥30K-50K customers. The key area of difference was the initial report requirements at the ≥30K customers level. Since most of the carriers themselves did not feel that the reduction of the threshold to ≥30K customers was overly burdensome, it confirmed the TRG opinion that the ≥30K-50K customer threshold was reasonable for reporting outages to the FCC.

The "specials" category was recommended for retention so that the FCC would receive timely information necessary to monitor outages which could have a major impact on the public yet not meet the recommended threshold.

8.12 We recommended a 3 day Notice for an initial communication to the FCC for the ≥30K-50K category. The Notice should be a written document, that is, an abbreviated version of the initial report. This document is to be faxed to the FCC watch officer, the same as in an initial report filing.

Rationale

The 3 day Notice was recommended at the lower threshold to give the carriers a chance to assess their network failures and not to make a premature judgment on their causes.

The 3 day Notice should be a written document so that there is a verifiable record of such incident at the FCC.

8.13 We recommended the content in Chart 12 for the 3 day Notice on the initial communication to the FCC for outages affecting ≥30K-50K customers. Chart 12 shows the recommended 3 day Notice vs. initial report requirements.

CHART 12
INITIAL REPORT vs. 3 DAY NOTICE

INITIAL REPORT	3 DAY NOTICE
1 CARRIER NAME, CONTACT, TEL #	1 CARRIER NAME, CONTACT, TEL #
2 DATE AND TIME OF INCIDENT	2 DATE OF INCIDENT
3 GEOGRAPHICAL AREA AFFECTED	3 GEOGRAPHICAL AREA AFFECTED
4 NUMBER OF CUSTOMERS AFFECTED	4 NUMBER OF CUSTOMERS AFFECTED (IF AVAILABLE)
5 TYPES OF SERVICES AFFECTED	5 TYPES OF SERVICES AFFECTED
6 DURATION OF INCIDENT	6 DURATION OF INCIDENT (IF AVAILABLE)
7 NUMBER OF BLOCKED CALLS	7 NUMBER OF BLOCKED CALLS (IF AVAILABLE)
8 CAUSE OF INCIDENT - NAME & TYPE OF EQPT INVOLVED	8 CATEGORY OF INCIDENT
9 METHODS USED TO RESTORE SERVICE	9 METHODS USED TO RESTORE SVC (IF AVAILABLE)
10 STEPS TO PREVENT RECURRENCE	

Rationale

The 3 day Notice content was developed to provide the FCC with the basic information needed to record such an incident while enabling a carrier to focus on the final report requirements.

8.14A We recommended that the ≥50K outage reports and the ≥30K-50K final

report included in the final recommendation should contain the same information that is stated in the FCC's February 13, 1992 Service Disruptions Order.

8.14B The TRG also recommended that the FCC look into the possibilities of changing the 90 minute report for ≥50K customer outages to a 120 minute notice (notice to include the same information as stated in 3 day notice).

Rationale

The TRG did not wish to recommend the unravelling of FCC Order requirements. Therefore, we recommended a status quo regarding the content on outages affecting ≥50K customers. We also recommended full final outage reporting content in the ≥30K-50K category.

However, some TRG members had concern that the 90 minute report for ≥50K customer outages was difficult for carriers attempting to restore a failed system within that timeframe. This was a concern with most of the carriers who provided input. Therefore, we recommended that the FCC review this requirement when a new rulemaking in this area is planned.

8.15 We recommended that the IXCs continue using blocked calls to determine threshold level of reporting in the Service Disruptions Order.

Rationale

The IXCs had been using blocked calls to determine threshold reportability during the study period. This criteria of reporting during the study period appeared to provide the information intended in the Service Disruptions Order. The TRG concluded that the IXCs should continue to use this outage measure for reportability.

8.16 The TRG agreed with the IXC's recommendation for carriers to voluntarily report the ≥30K-50K outages without confidentiality for a period of one year. This issue should be revisited at the end of the one year period. We recommended that when and if

confidentiality is extended to one carrier, that it be extended to all carriers so that a level playing field is in order.

Rationale

The TRG felt that if any rule is made for one carrier, it should be extended to another carrier. It is for this reason that the TRG recommended confidentiality at the lower threshold for all carriers or no carriers.

8.17 We recommended that the threshold established by the TRG be used to meet the needs of the industry network reliability and FCC oversight and not to be taken as a basis of establishing a threshold for fines and forfeitures.

Rationale

The TRG felt strongly that the threshold recommended in this paper be used for the benefit of network reliability and should be totally disconnected with any attempt to set a threshold for fines and forfeitures.

9. EPILOGUE

9.1 Additional Outage Reporting Trends

The TRG made its final recommendations to the Network Reliability Council at the December 15, 1992 NRC meeting. Since that time, end of year 1992 and first quarter 1993 network outage reports have been collected and analyzed. The inclusion of the network outage reports for these periods along with previously collected outage data now gives us a base year for network outage reporting upon which to gauge future network reliability progress. The base year for network outages April 1992 thru March 1993 is as follows:

CHART 13
FCC REPORTABLE OUTAGES
BASE YEAR - APRIL 1992 THRU MARCH 1993

	NET INCIDENTS	LOCAL SWITCH	TANDEM	FACILITIES		OVERLOAD			
				GENERAL	CABLE CUTS	SS7	NAT	OTHER	OTHER
1992	154	45	21	15	40	22	5	5	1
1993	45	7	3	7	21	5	2	0	0
BASE YEAR	199	52	24	22	61	27	7	5	1

The base year total and its components will be monitored by the Exchange Carriers Standards Association (ECSA), the telecommunications industry group which has been recommended to carry on the work of the NRC in the network reliability arena.

The base year has been calculated by taking actual 1992 outage reporting data and projecting it over a full 9 months for 1992. The projection was then added to the actual first quarter of 1993 outage data to obtain the base year figures. Since reporting started on April 6, 1992 for outages affecting ≥50,000 customers and June 1, 1992 for voluntary reporting categories, all categories have been projected for the full 9 months in 1992 as if reporting had started on April 1, 1992.

The components of the base year (i.e. Local Switch, Tandem, etc.) have a somewhat different mix from what was seen during the six month investigatory study. The largest component differentials between the two sets of figures are a (3.0%) change in the Local Switch category, a +1.4% change in Facility-General failures, a +1.0% change in SS7 outages and a +0.6% change in the Fiber/Cable Cut category in the base year over the six month study.

In 1993, there is a dropoff of Local Switch failures in relation to other categories. For example, during the six month study, the ratio of Local Switch outages to Facilities-General outages was 3 to 1. For the first quarter 1993, the Local Switch outage ratio was equal to that of Facilities-General failures.

Also, there was an abnormally high percentage of the fiber/cable cuts in the nation in the first quarter of 1993. The 1993 component mix of fiber/cable cuts to net incidents was 46.7% while the 6 month study showed only a 30.1% ratio for the same variable.

The key determination is which series shows a trend and which is an aberration, and whether any of these outage events are cyclical in nature. The burden for this analysis will fall to the ECSA.

In a comparison of the annual projection of total net incidents for 1992 and 1993, the following chart shows an interesting statistic:

**CHART 14
FCC REPORTABLE OUTAGES
INDUSTRY TOTALS
REPORT PROJECTIONS FOR 1992 & 1993**

<u>YEAR</u>	<u>TIME</u>	<u>ACTUAL REPORTS</u>	<u>PROJ. REPORTS FOR YEAR</u>
1992	270 DAYS	138	204
1993	90 DAYS	45	183

The projected annualized 1993 outage reports number 183, which is underrunning the base year total by 16 outage reports or over 8%. The lower outage projections coming in now suggest that the industry has learned something from the vast amount of outage information it has studied in the last year. With further work and implementation of the "best practices", we look toward improved network outage results over time.

9.2 "Special" Facilities

In Section 4.34 of the Local Exchange Carrier Suggested Guidelines for FCC Reportable Outages (Attachment 1), it is noted that the LECs would continue to report the "special" facilities categories of major military installations, key government facilities, and nuclear power plants to the FCC until the National Communications System (NCS) defined those facilities and implemented the system proposed at the September 1992

NRC meeting. The NCS is now in a position to take over the reporting responsibility for these three (3) "special" reporting categories. The TRG has been notified that an official letter from the NCS on this issue is forthcoming and that a transfer of reporting responsibility looks to be in the July 1993 timeframe.