

Appendix 1

**Network Reliability Council
Issue Statement**

Appendix 1

Issue Title: E911 Systems

Author: Cas Skrzypczak
ECSA/NYNEX

Problem Statement/Issues to be Addressed

The primary goal in providing E911 service is to assure delivery of the call to either an emergency operator or a telephone operator. Sufficient redundancy must be designed into the system such that there is never a mass blockage. The E911 call normally terminates at a Public Safety Answering Point (PSAP) where an operator retrieves automatic location information (ALI), or in the worst case scenario, terminates at a telco operator. To ensure call completion, each segment of the E911 call flow must be evaluated to determine potential single points of failure. Provisions must be made to implement proper failure and overflow routings to guarantee that E911 calls are never terminated in an announcement or overflow tone. Additionally, access to E911 during overloads (high volume calling) needs to be considered.

Areas of Concern & Problem Quantification

The reliability of E911 service, as with most network-based services, is dependent upon switch, facility, and database reliability coupled with a dynamic back-up plan. The areas of concern for E911 network reliability can be summarized by tracing the flow of a call from the customer to the PSAP. (See Fig. 1) Originating single points of failure include the following:

1. The local loop and/or the subscriber's serving central office which would inhibit the dialing of 911 calls. In the event of end office isolation, normal network management controls would take precedent and the ability to complete 911 calls would be a priority when restoring the office to service.
2. The facilities to the E911 serving tandem or a failure of the tandem itself. Consideration should be given to alternate routing scenarios.
3. The dedicated facilities to the PSAP and the availability of PSAP operators. Alternate handling procedures must be established.
4. The ALI data retrieval network and its associated facilities. Diversity and alternate routing require consideration.
5. The ALI database. Consideration must be given to redundancy, availability and accuracy.

Description of Proposed Work

The team working this issue should consider the following total quality process to quantify E911 vulnerability, identify major reliability issues and propose problem solutions.

1. Collect appropriate data from all available industry sources to determine and/or confirm areas of greatest criticality and risk, and with the greatest potential for E911 service reliability improvement.
2. Perform sufficient analysis of the data to determine the root cause(s) of the problem(s).
Sub-analysis should include:

**Network Reliability Council
Issue Statement**

- Design shortcomings
 - Alarms
 - Alarm response
 - Procedures
 - Training
 - Documentation
 - Testing
 - Customer Education (Public service agencies, users, etc.)
3. From the root cause analysis determine an appropriate action plan to reduce/eliminate the possibility or severity of failures in high risk areas. Also consider ways that recovery procedures may be implemented more quickly or efficiently.
 4. Determine industry "Best Practices" for dealing with the root cause analysis findings and share this information with industry participants as soon as possible. Also consider cost/benefit tradeoffs of these "Best Practices."
 5. Develop a timeline and metrics to measure the effectiveness of the team's recommendations.
 6. Consider the following tactics/ideas offered by the Steering Team as potential means to address the findings of the root cause analysis. These represent ideas from the Steering Team which we want to share. They may be accepted or rejected by the E911 focus team.
 - A. While customer local loop and corresponding central office reliability and vulnerability are independent of 911, the advantages and economics of trunking remote switch modules (RSMs) to another host central office or an operator services tandem should be evaluated.
 - B. Dedicated facilities between the originating central office and the E911 tandem should be evaluated to determine overflow and alternate routing to either another E911 tandem or an operator services tandem. Where possible, provisions should be made to route the operator services trunk groups on physically separate circuits. E911 routing plans should be developed to ensure that a telco operator can be reached if all other routing alternatives out of the E911 tandem fail. Study efforts should also look at the issue of keeping E911 calls on MF or utilizing the SS7 network or both as an alternative.
 - C. Dedicated PSAP facilities should be evaluated to determine the overflow/failure routing between the E911 tandem and the PSAP. Factors to consider to determine these requirements include the number of PSAP operators as well as tariff issues associated with stated level of reliability and cost of service. In addition, if a primary PSAP is not available, the call could be alternate routed to a designated secondary PSAP. Backup powering needs at the PSAP should also be considered.

Network Reliability Council Issue Statement

- D. Once the E911 call has reached the PSAP, the ANI information received must be sent to the ALI which then returns location information to populate the operator's screen. Evaluation needs to take place to determine the type of facility (dedicated or switched) and the alternate routing and diversity characteristics of the circuits. For example, in NYNEX the Corporate Information Network (X25 packet) is used which routes messages over two diversely configured circuits.
- E. Investigation of the ALI database platform includes the use of mated pairs of processors, whether they are colocated or physically diverse, capacity and reliability. In addition, it is critical that the process for establishing, reconciling and updating the database be evaluated. In NYNEX, daily recent change information is processed by a Data Management System (DMS), associated with the ALI platform, and transported via a MIZAR/MARCH system to the affected E911 tandems.
- F. Back-up plan. Issues include when to invoke back-up/disaster recovery procedures, what type of facility and switch alternatives are available, and tariff provisions to recover the cost of such a plan.
- G. E911 access during overloads (high volume calling) should be evaluated. Alternatives may be technical, non-technical (e.g. customer education), or both.

Existing Work Efforts

To the best of our knowledge, there are no national industry efforts currently underway to address these issues. However, NYNEX is currently implementing an E911 network that uses operator services tandems (OST) to ensure call completion to either a PSAP or telco operator. (see Fig. 2) Overflow or facility failure between the caller's central office and the E911 tandem routes E911 calls to the OST. The OST will try to automatically reroute the call to the appropriate E911 tandem. If the E911 tandem is unavailable, the OST will attempt to route the call to a predetermined PSAP (if trunking has been established). If no direct trunking has been provisioned between the OST and PSAP, the call will then terminate at the operator's position. If a call successfully routes to the E911 tandem but cannot reach a Primary or Alternate PSAP due to CPE or facility failure, it is routed to the telco operator. If a call successfully terminates at a PSAP, ALI is retrieved using diversely routed X25 links that access duplicated ALI databases. NYNEX is also working with several database vendors on a new ALI platform where reliability and redundancy are of paramount concern.

**Network Reliability Council
Issue Statement**

Team Leader

Bob Powers - Southwestern Bell

Recommended Team Participants

Joel Engel - Ameritech

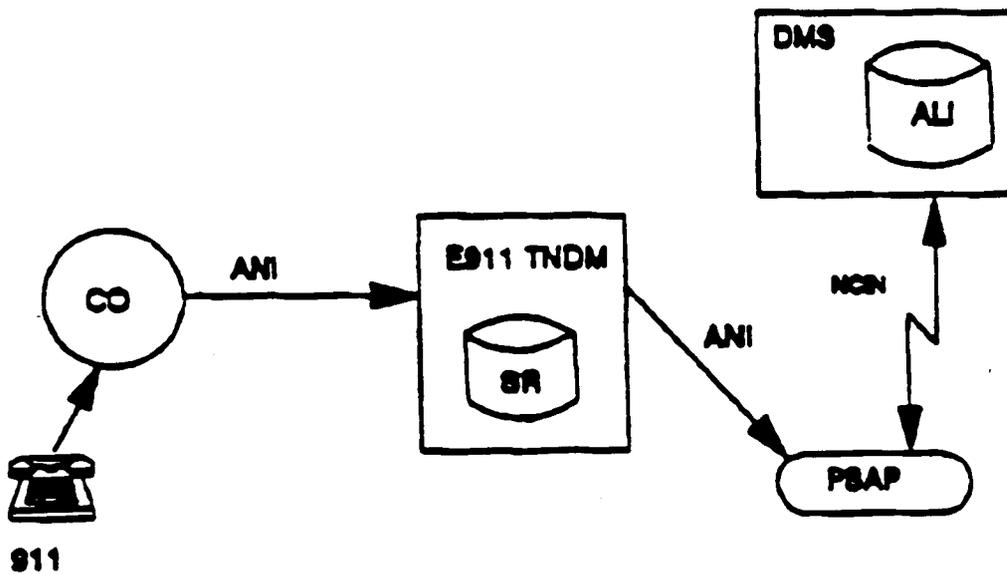
Barbara O'Connor - Alliance for Public Technology
Representative from a National Police Organization

Representative from NASUCA

Representative from NYNEX

Keith Cambron/Peter Reed - Pacific Bell

ENHANCED 911



SR - SELECTIVE ROUTING
ALI - AUTOMATIC LOCATION INFO
PSAP - PUBLIC SAFETY ANSWERING POINT
NCIN - NYNEX CORP INFO NETWORK

FIGURE 1

Appendix 2



NETWORK RELIABILITY COUNCIL STEERING TEAM

E911 SYSTEMS FOCUS GROUP

Questionnaires about E911 Systems

This package consists of three questionnaires to be completed, providing information to the E911 Systems Focus Group. The first questionnaire is a summary sheet to be used for obtaining current information on the way that emergency service access is provided by the Local Exchange Carriers. One summary sheet should be completed for each company.

The second questionnaire is to be used to collect information on any central office that serves as a 911 tandem office or a 911 end office. One questionnaire should be completed for each office that is a 911 tandem or 911 end office.

The third questionnaire is to be used to collect information on all known 911 service disruptions of greater than 30 minutes duration from January 1, 1991 to the present. One questionnaire should be completed for each known service disruption.

A prompt response, no later than October 14, 1992, is requested. Please return the completed forms to

John Healy
Bellcore
NVC 2X-227
331 Newman Springs Road
Red Bank, NJ 07701-7030

Questions relating to this data request should be directed to John Healy at (908) 758-3065 or Richard Fagerstrom at (908) 758-3048.

**Network Reliability Council
E911 Focus Group
Questionnaire #1 - Summary Sheet**

This form is to be used for obtaining current information on the way Emergency Service access is provided by the Local Exchange Carriers. You should fill out a summary sheet for your company.

	E911 with ALI	911 without ALI	7 Digit/10 Digit Telephone Number	Dial Operator	TOTAL
Number of C.O.'s that provide					
Approximate # of Access Lines Served					

Network Reliability Council
E911 Focus Group
Questionnaire #2 - Current 911 Data

This form is to be used to collect current information on any Central Office that serves as a "911" tandem office or a "911" end office (direct access to the PSAP). You should complete one form for each office that is a 911 Tandem or 911 End Office.

Section 1: Office Identification

City _____ State _____

Central Office _____ Tandem or End (T or E) _____

Type of C.O. Switch _____ C.O. Generic _____ Vendor _____

911 Equipment _____ 911 Vendors _____

Section 2: Trunking/Routing Information, End Office to Tandem Office (complete this section only if end office is not directly linked to PSAP)

A. Is the end office to tandem office trunk group

1. dedicated - shared
2. SS7 MF other

B. Is the End Office to Tandem Office trunk group monitored for alarm indications

- all of the time (24 hours/day 7 days /week)
- part of the time
- not monitored

C. What engineering level is used to size the trunk group (example Poisson .01 or Wilkinson .01)

D. Is there an alternate route (check all that apply)

- To the tandem
- Around the tandem
- No alternate route

E. Are any alternate routes served by diverse facilities

- yes no unknown

Section 3: Trunking/Routing information, Tandem office or End Office to the PSAP

- A. Is the tandem office or end office to PSAP trunk group
1. dedicated shared
 2. SS7 MF other
- B. Is the tandem office or end office to PSAP trunk group monitored for alarm indications
- all of the time (24 hours/day 7 days/week)
- part of the time
- not monitored
- C. What engineering level is used to size the trunk group (example Poisson .01 or Wilkinson .01)
-
- D. Is there an alternate route to the PSAP
- yes no
- E. Are any alternate routes served by diverse facilities
- yes no unknown

Section 4: PSAP information

- A. Who engineers PSAP requirements
- LEC other _____
- B. Does PSAP have back up power
- yes no
- C. Does PSAP have a back up
- yes no
- D. Is ALI data base located
- at PSAP remote from PSAP
- E. Is ALI data base duplicated
- yes no
- F. Is ALI data base updated by
- service order other _____
- G. Is ALI to PSAP Link
1. duplicated yes no
 2. diverse yes no

Network Reliability Council
E911 Focus Group
Questionnaire #3 - Service Disruption Data

This form is to be used for collecting information on all known "911" system disruptions of greater than 30 minutes duration from January 1, 1991 to the present. A service disruption is defined by the FCC as a total or partial outage that results in significant loss of 911 call processing. Please use one form for each known service disruption.

Section 1: Time and Impact of Service Disruption

Disruption date (mo./day/yr.): _____ Time of day _____
Service restoration date (mo./day/yr.) _____ Time of day _____
Duration of disruption _____
Number of customers affected _____

Section 2: Location of Service Disruption

city _____ state _____

Was failure in (check all that apply)

- LEC End Office
- Type of Switch _____ Generic Installed _____ Vendor _____
- LEC Tandem Office
- Type of Switch _____ Generic Installed _____ Vendor _____
- Interoffice facility that isolates 911 from the network
- 911 Equipment
Equipment Model _____ Vendor _____
- Other (please specify) _____

Section 3: Probable Cause (check all that apply)

- Hardware failure (ex. circuit pack)
- software failure
- traffic congestion/overload
- cable dig up
- craft, installation or procedural, excluding cable dig ups,
(please specify) _____
- other (please specify) _____
- unknown

Section 4: New Practices

What new practices/procedures/systems were implemented as a result of this event? Please provide any information that might be helpful to the focus group in its evaluation of "best practices".

This form has been completed by:

Name: _____

Company: _____

Address: _____

Tel. # _____ **Date:** _____

The completed form(s) should be returned by October 14, 1992 to the following address:

More forms can also be obtained from the following address:

**John Healy
Bellicore
331 Newman Springs Road, Room 2X-227
Red Bank, New Jersey 07701-7020**

Appendix 3

**NETWORK RELIABILITY COUNCIL
E9-1-1 FOCUS GROUP
USER QUESTIONNAIRE**

This purpose of this survey is to provide insight from the 9-1-1 Users' perspective of total 9-1-1 outages. The survey is being sent to State 9-1-1 Programs, Directors and System Administrators. Please answer the questions in respect to your varied 9-1-1 systems.

NAME _____

TITLE _____

**GEOGRAPHIC AREA
OF RESPONSIBILITY** _____

ENHANCED OR BASIC 9-1-1 SERVICE _____

NUMBER OF PSAPS _____

NUMBER OF CENTRAL OFFICES _____

**SERVING LOCAL EXCHANGE
COMPANIES** _____

**SERVING INTEREXCHANGE
COMPANIES** _____

9-1-1 FAILURES

In ranking order, please identify the most common causes of 9-1-1 failures.

- _____ Tandem Failure
- _____ Central Office Failure
- _____ Interoffice Facilities Failure
- _____ Customer Premise Equipment (CPE) Failure
- _____ Power Outages
- _____ ALI Data Loss
- _____ Other (Please identify)

NETWORK OUTAGES/FAILURES

- 1.1 In the past twelve (12) months how often does an average 9-1-1 PSAP experience total network failures? (Average) _____
- 1.2 Are the 9-1-1 PSAPs notified promptly of any 9-1-1 network outage by the local exchange company? _____ Yes _____ No
- 1.3 Are the PSAPs designed with network backup and/or alternate routes to ensure system reliability? _____ Yes _____ No _____ Don't Know
What percent of PSAPs? _____
- 1.4 Is Alternate Routing offered to you through the tariffed or contract process?
_____ Yes _____ No
- 1.5 Is Physical Loop Diverse Routing (2 Separate Paths) Available to You? Do you Subscribe? _____ If not, Why? _____
- 1.6 Are the 9-1-1 Systems designed for Default Routing and/or Overflow capability? _____ Yes _____ No _____ Don't Know
- 1.7 If not, do you feel this Default Routing and/or Overflow is necessary to ensure 9-1-1 system reliability? _____ Yes _____ No
- 1.8 Do local exchange companies maintain contingency recovery plans for the 9-1-1 systems? _____ Yes _____ No _____ Don't Know
- 1.9 How often is a citizen blocked from access to a 9-1-1 center due to busy trunks? _____ Times per Month (Average) _____ Never

CUSTOMER PREMISE EQUIPMENT (CPE) OUTAGES/FAILURES

- 2.1 How often does the average 9-1-1 PSAP experience CPE failures? _____
Times per Year (Average)
- 2.2 Is the 9-1-1 CPE equipped with functioning Alarms that notify the PSAP in
the event of a failure? _____ Yes _____ No
- 2.3 Do you receive scheduled routine maintenance on the 9-1-1 CPE?
_____ Yes _____ No
- 2.4 How many times per year is scheduled routine maintenance provided?

- 2.5 Is the PSAP notified prior to any maintenance activities and advised of its
possible impact on service? _____ Yes _____ No
- 2.6 If the PSAP experiences a failure within the CPE, are spare parts readily
available? _____ Yes _____ No
- 2.7 Have you noticed a pattern of failures by Equipment Manufacturers?
_____ Yes _____ No

REPAIR RESPONSE

3.1 In the event of 9-1-1 failures, do the PSAPs have repair reporting procedures in place? Yes No

3.2 Does the local exchange company provide the PSAPs with centralized repair centers? Yes No

3.3 Does the local exchange company provide the company with dedicated staff for 9-1-1 repair only? Yes No

3.4 Are the PSAPs satisfied with the repair response you receive from your local exchange company? Yes No

3.5 Once the PSAP places a repair call, what is the average response time?

3.6 Is the repair response time the same for weekends and holidays?
 Yes No

3.7 Do you keep documentation of 9-1-1 service outages? Yes
 No

3.8 How would you classify the overall maintenance and repair service received from the local exchange companies? Excellent Good
 Fair Poor

3.9 Have you implemented any new programs that improved your repair response and maintenance to the 9-1-1 PSAPs? Yes No

3.10 If yes, please explain. _____

9-1-1 DATA BASE

4.1 What percent of your ALI Data Base is accurate? _____%

4.2 What percentage do you feel is adequate in order to provide reliable ALI Data? _____%

4.3 How does the local exchange company receive updates for the Service Order Activity Data Base?

_____ Modem	_____ Hard Copy Documentation
_____ Magnetic Tape	_____ Other

4.4 How does the local exchange company receive updates for the MSAG Data Base?

_____ Modem	_____ Hard Copy Documentation
_____ Magnetic Tape	_____ Other

4.5 How often is the ALI Data Base Updated? _____

4.6 How could the ALI Data Base update and verification process be improved?

Appendix 4

THE NETWORK RELIABILITY COUNCIL'S 9-1-1 OUTAGE QUESTIONNAIRE

- 1.1 In the past twelve (12) months, how often does an average 9-1-1 PSAP experience total network failures?
(Average)
- 1.2 Are the 9-1-1 PSAPs notified promptly of any 9-1-1 network outage by the local exchange company?

1.1				1.2	
0	1	2	Over 2	Yes	No
1002	210	66	22	1125	181
1300				1306	
77%	16%	5%	2%	86%	14%

- 1.3 Are the PSAPs designed with network backup and/or alternate routes to ensure system reliability? What Percent of PSAPs?

1.3			1.3			
Yes	# PSAPs	What %?	No	# PSAPs	What %?	Don't Know
1296	902.5	902.5	2	2	2	28
1326						
98%	68%	68%	0%	0%	0%	2%

- 1.4 Is Alternate Routing offered to you through the tariffed or contract process?
- 1.5 Is Physical Loop Diverse Routing (2 Separate Paths) Available to You?
Do You Subscribe? If not, Why?
- 1.6 Are the 9-1-1 Systems designed for Default Routing and/or Overflow Capability?

1.4		1.5		1.6		
Yes	No	Yes	No	Yes	No	Don't Know
1231	113	573	211	704	144	3
1344		784		851		
92%	8%	73%	27%	83%	17%	0%

- 1.7 If not, do you feel this Default Routing and/or Overflow is necessary to ensure 9-1-1 system reliability?
 1.8 Do local exchange companies maintain contingency recovery plans for the 9-1-1 systems?

1.7		1.8		
Yes	No	Yes	No	Don't Know
380	15	727	65	602
395		1394		
96%	4%	52%	5%	43%

- 1.9 How often is a citizen blocked from access to a 9-1-1 center due to busy trunks?
 (Times per Month) Average

1.9						
Never	1/Yr	1 in 100	1/Mo	4/Mo	5/Mo.	Over 5/Mo.
813	2	220	30	110	1	30
1214						
67%	0%	19%	2%	9%	0%	2%

- 2.1 How often does the average 9-1-1 PSAP experience CPE failures? Times per Year (Average)

2.1							
Times/Yr.							
0-1	1	2	3	4	5	10-12	
706	151	144	17	6	0	53	
1077							
66%	14%	13%	2%	1%	0%	5%	

- 2.2 Is the 9-1-1 CPE equipped with functioning Alarms that notify the PSAP in the event of a failure?
 2.3 Do you receive scheduled routine maintenance on the 9-1-1 CPE?

2.2		2.3	
Yes	No	Yes	No
1015	112	990	345
1127		1335	
90%	10%	74%	26%

2.4 How many times per year is scheduled routine maintenance provided?

		2.4						
Constant	Monthly	Weekly	Six/Yr	Four/Yr	Twice/Yr	Once/Yr	None	
59	23	2	12	38	26	51	47	
258								
23%	9%	1%	5%	15%	10%	20%	18%	

2.5 Is the PSAP notified prior to any maintenance activities and advised of its possible impact on service?

2.6 If the PSAP experiences a failure within the CPE, are spare parts readily available?

2.7 Have you noticed a pattern of failures by Equipment Manufacturers?

2.5		2.6		2.7	
Yes	No	Yes	No	Yes	No
1194	127	971	144	132	1192
1321		1115		1324	
90%	10%	87%	13%	10%	90%

3.1 In the event of 9-1-1 failures, do the PSAPs have repair reporting procedures in place?

3.2 Does the local exchange company provide the PSAPs with centralized repair centers?

3.1		3.2	
Yes	No	Yes	No
1393	0	1129	47
1393		1176	
100%	0%	96%	4%

3.3 Does the local exchange company provide the company with dedicated staff for 9-1-1 repair only?

3.4 Are the PSAPs satisfied with the repair response you receive from your local exchange company?

3.3		3.4	
Yes	No	Yes	No
827	348	1245	52
1175		1297	
70%	30%	96%	4%

3.5 Once the PSAP places a repair call, what is the average response time?

Same Day/ Next Day	3.5									
	2-4 hrs	2 hrs	Less than 2 hours	1-2 hours	1 hour	Less than 1hour	30-45min	Within 30 min	10-15 min.	Immediate
25	11	604	137	34	52	103	12	23	12	234
1247										
2%	1%	48%	11%	3%	4%	8%	1%	2%	1%	19%

3.6 Is the repair response time the same for weekends and holidays?

3.6		3.7	
Yes	No	Yes	No
1197	174	597	722
1371		1319	
87%	13%	45%	55%

3.8 How would you classify the overall maintenance and repair service received from the local exchange companies?

3.8			
Excellent	Good	Fair	Poor
1068	224	10	11
1313			
81%	17%	1%	1%

3.9 Have you implemented any new programs that improved your repair response and maintenance to the 9-1-1 PSAP?
3.10 If yes, please explain.

3.9		3.10
Yes	No	Explain
304	496	See Notes
800		
38%	62%	

4.1 What percent of your ALI Data Base is accurate?
4.2 What percentage do you feel is adequate in order to provide reliable ALI data?

4.1	4.2
% Accurate	% Accurate
4414%	4986%
92%	96%

4.3 How does the local exchange company receive updates for the Service Order Activity Data Base?

4.3				
Modem	Magnetic Tape	Hard Copy Documentation	Other	
411	954	476	107	
1948				
21%	49%	24%	5%	

4.4 How does the local exchange company receive updates for the MSAG Data Base?

4.4				
Modem	Magnetic Tape	Hard Copy Document	Other	
	828	392	1140	
	2454		94	
	34%	16%	46%	
			4%	

4.5 How often is the ALI Data Base Updated?

4.6 How could the ALI Data Base update and verification process be improved?

4.5							4.6
Ongoing	Real Time	Daily	Every 2-3 Days	Several /Mo.	Monthly		
65	57	823	36	33	3		See Notes
1017							
6%	6%	81%	4%	3%	0%		

5.1 Please list three system changes or improvements you would suggest to improve 9-1-1 reliability or accuracy.

See Notes

NOTES--Supporting the Network Reliability Council's 9-1-1 Outage Questionnaire

5.1 Please list three system changes or improvements you would suggest to improve 9-1-1 reliability or accuracy.

- | | |
|------------------------|--|
| Alabama:Calhoun Co. | 1. Required cellular carriers to provide ANI. 10% of our calls are now cellular. All of the time and money spent on 9-1-1 will be wasted if new technology is not made compatible. |
| Alabama:Lauderdale Co. | 1. See 4:6.
2. Create someone to follow up on service orders--new as well as change orders. |
| California | 1. Implement "Custom ALI" as ability to include additional lines of info. on ALI display
This is applicable for centralized system.
2. Deal with and resolve the issue of ANI and more importantly ALI on cellular 9-1-1 calls.
3. Make it easier for large PBX users in campus environments to include their PBX station ALI info. in TELCOs ALI database |
| City of Chicago | 1. PBX actual instrument location--at least by suite or apartment. We have high rise complexes which the ALI is the security desk of one of the towers.
2. Our E9-1-1 network needs to be enlarged to reduce the number of calls on the overflow network. We loose ANI on the present overflow network. Provider is making improvements to improve this situation on their own. |
| D.C., Washington | 1. Computer to record ANI/ALI information.
2. Console mount ACD pads.
3. Console mounted TDD capability. |
| Delaware | Question not answered. |
| Florida | 1. Better way to verify ALI data to ensure accuracy.
2. Full time 9-1-1 coordinators in each county with their position being dedicated to 9-1-1 projects |
| Maryland | 1. Provide more line space on ALI for cross street or other info.
2. Direct access for ADA required equipment.
3. PBX ALI.
4. Centrex ALI.
5. Automatic routine maintenance of all Telco equipment. |
| Massachusetts | 1. We are about to implement statewide E9-1-1. Every effort is being taken to have the most comprehensive complete system in the country. We will have four switches that are interdependent with redundant software.
2. One vendor end to end - One service response center with trained qualified technicians available 24 hours a day
3. Redundant data bases in two separate locations, western area and eastern area.
4. Diversified routing of trunks.
5. Diversified cable routes.
6. Immediate update to date base. |
| MO:DeSoto | N/A |
| Las Vegas, Nevada | 1. Try to do something about privately owned payphones. Because of deregulation, our telephone company has no control of when the telephones are moved around and the owners do not submit a location change. |
| New Jersey | 1. Studying a proposal for "Called Party Hold" from our local exchange companies.
2. Studying a proposal for "Ring Back" from our local exchange companies.
3. AVL for cellular and PCS. |
| North Dakota | 1. Reporting from exchange offices/telephone companies when failure exists.
2. Diverse/alternate routing.
3. Location of caller from PBX. |
| Ohio | 1. Update 9-1-1 database at dist. more quickly.
2. Phone co. should be allowed to main. equipment.
3. Complete tests on entire system from co. to dist. phone monthly. |

Ohio (cont)	<ol style="list-style-type: none"> 4. Design system to prevent dropped E-9-1-1 calls. 5. Improve transfer buttons on Vendor equipment to prevent early failure.
Oklahoma	<ol style="list-style-type: none"> 1. Telco employee adherence to developed outage plans, contingencies. 2. Better service from Vendor. 3. More cooperation from Telco on data base issues.
SC:Aiken	<ol style="list-style-type: none"> 1. Verification of ALI information through the county before entering service orders. 2. Resolve PBX system problems by modifying them with a device that would send the calling party's telephone number and location to the PSAP instead of the main telephone number associated with the PBX system. 3. The invention or installation of equipment to resolve 911 calls that are not fixed to a specific location, such as cellular or cordless phones.
SC:Anderson SC:Charleston	<ol style="list-style-type: none"> 1. More public awareness. 1. Provide a field for name of subdivision. 2. PBX ANI & ALI. 3. Diverse routing from central office to tandem.
SC:Clemson	<ol style="list-style-type: none"> 1. A 911-screen & printer for departments that we transfer 911 calls to, that do not have a 911 system (Remote ANI, ALI Transfer receiver). 2. Also (with the Remote ANI & ALI transfer receiver) a new printer that will print the date and time on one printer and two screens for backup. 3. Also with the Remote ANI & ALI Transfer Receiver, handup call feature. 4. Also with the Remote ANI & ALI Transfer Receiver, 16 one-button transfer and 2-button transfer for 16 more transfer buttons for a total of 32.
SC:Dorchester SC:Goose Creek SC:Horry	<ol style="list-style-type: none"> 1. N/A Did not answer question. 1. Mandate address regulations which was done through state legislature. 2. Mandate training and certification for telecommunications.
SC:Kershaw	<ol style="list-style-type: none"> 1. Stand alone PSAP. 2. Equipment update regularly. 3. Elimination of party lines.
SC:Oconee SC:Spartanburg	<ol style="list-style-type: none"> None. 1. Provide legislation to allow better exchange and comparison of address information with the U.S. Postal Service, Data base coordinators, and phone service suppliers. 2. Require phone companies to send periodic list of data base errors for verification by local government 911 data base coordinator. 3. Better control and verification by phone companies prior to install of any phone.
SC:York	<ol style="list-style-type: none"> 1. Sharing of data base; this would eliminate the county have a data base and the telephone company having a data base, which is often different. The telephone company will not allow the county access to its data 2. Have a schedule of enhancements/improvements and a plan to upgrade the system. 3. Standardization of 911 for all telephone companies, both the local and private companies and the Telcos. Differences in working with different companies is confusing.
Tennessee	<ol style="list-style-type: none"> 1. Require cellular telephone companies to provide ANI data. 2. Require cellular telephone companies to route 9-1-1 calls to the most appropriate PSAP, rather than the PSAP serving the location of the main cellular tower site.
TX:AACOG TX:Abilene TX:Austin	<ol style="list-style-type: none"> N/A--Only ANI system. 1. Cellular back in addition to secondary PSAP operations. 1. True diverse cable routes for both "message" and "tandem" trunks. ("Message" trunks run from the C.O. to the Tandem and "Tandem" trunks run from the tandem to the PSAP. A standard definition of what diverse routing needs to be established. Telco considers circuits to be diverse routed when they are on different trunk groups within the same cable route. If a cable failure occurs, then all circuits are lost. Diverse routing should mean separate cables and routes.

TX.Austin (cont)

2. Automatic tandem alternate routing. The Telco tandem will automatically send overflow calls to our 7-digit numbers, but will not automatically send calls to our 7-digit numbers when it is isolated from the PSAP. Currently, calls are routed to a fast busy tone. Telco maintains the PSAP should activate the "make busy" switch to manually route the calls to the 7-digit number. Our experience shows that when the tandem is isolated from the PSAP, the "make busy" switch is isolated as well and will not function. Even if that switch would work, the PSAP has no knowledge of when a particular group of trunks fails unless it receives complaints from callers regarding the fast busy tones.
3. The current 7-digit backup trunks allow only the voice path to be received. 9-1-1 agencies should be allowed to have "caller-ID" ANI service on these back-up trunks.

TX.Bexar Metro

1. More frequent compares between tandem and DMS. We should be made aware of the error and have the ability to track when the fixes are complete.
2. "Dual path" should be diversified enough that a cable cut does not take "both" links down.
3. Performance standards should be established for the Telcos so if their equipment or service is below expected levels they get penalized \$\$.

TX.Brazos

1. Improve the ability to get software and E-prom updates in a timely manner.
2. Develop system to shorten the time required to process data base corrections. Improve the method for verification of corrections.
3. Develop system to standardize data bases between phone companies. Service order systems should be MSAG driven to prevent the forcing of an address into the system.

TX.CAPCO

1. Increased support for database development and maintenance. This should include ALI DMS support functions such as data comparison routines.
2. Increased 911 system operator training at the PSAPs. This should be provided by the CPE providers.

TX.CBCOG

1. Route diversity on the physical telco network should be provided on both the voice and data to prevent the outages which have occurred. (Ex: the ALI failures that have occurred from San Antonio south due to a node failure on the data network.)
2. A resolution must, also, be found to provide for redundancy for customer record and routing data at enhanced provider sites to overcome loss of data links to the Telco DMS and periodic Tandem failures that have occurred in other areas.
3. Route diversity on the larger PSAPs (Ex: Corpus Christi) to their serving Central Offices should be provided.
4. It is crucial that PUC regulations be formulated requiring a standard for handling customer record data and routing for shared services for 9-1-1 within Texas. The existing method of providing these services varies across the State and has created confusion. Finger pointing and failure to verify corrective action has been a disservice to the customers that we are attempting to serve.
5. Carriers should be required to furnish and provide the capability for their 9-1-1 customers to directly access the Telco DMS and to provide updated information on changes to customer records.

TX.CTCOG

1. I would replace the Vendor systems because I am uncomfortable not having sufficient spares for all components.
2. I would seek Telco provided tariffed CPE.

TX.Dallas

TX.Denco

Did not answer this question.

1. Ability to identify location of mobile calls--at least ALI.
2. Diverse routing.

TX.DETCOG

1. As ALI upgrade begins, plan standardized CPE equipment region-wide.
2. 9-1-1 telecommunicator training. Encourage more participation from county agencies regarding personnel training
3. Improve add. cap among participating agencies.

TX.ETCOG

1. Get counties to do rural addressing. Until then, we'll be stuck with inaccurate databases.
2. Get Telcos to go to true selective routing and not class-marking.
3. Independent telcos need better way to have MSAG verification.
4. Would be good for Telcos to have a field to add remarks.
5. Need to class mark or selectively route calls on county borders.

TX:GCRPC

1. GIS
2. Graphic capability within E9-1-1 equipment.
3. Have all telcos use the same base mapping.

TX:H-GAC

1. An alternate toll center routing system. It has been our experience, twice, that when a cable is cut to a toll center, all interoffice telecommunications are interrupted for a significant length of time. During one incident, the fiber-optic cable cut resulted in loss of 9-1-1 service in five counties, as well as telephone service between central offices, and the Texas Law Enforcement Teletype Network. It took 12 hours to restore telephone service.
2. A standard data base configuration for all telephone companies. Telco prefers to receive data from independent TELCOs via magnetic tape which is a very cumbersome and outdated data transmission method. Recently, Telco has implemented a PC program that can receive data transmitted via modem. This method requires the independent TELCO to handle the data twice and can not be used for initial loads or entire exchange re-loads.

TX:Henderson

Did not answer this question.

TX:HOTCOG

Did not answer this question.

TX:Howard

Because of the limited knowledge this district has of the current systems, we would be hard pressed any changes at this time.

TX:Kerr

Backup lines from central office to PSAP where the equipment is located

TX:LRGVDC

1. Find a better solution to the ESN boundaries. Streets that go into different ESNs are not ABC'D. They have one indefinite range per street per community, therefore, county residents are put together with city residents. Depending on the ESN of that street, for example (if the street is more populated it will carry the ESN of the city or if the majority of the people live outside the county it will carry the ESN of the county making the responding emergency responder wrong.

TX:Lubbock

No suggestions.

TX:Midland

1. 9-1-1 offices must receive complete customer list from local exchange companies (including Non-Pubs) to maintain an accurate data base.
2. Provide "all" 9-1-1 Districts with funds to install county road signs and computer equipment updates.

TX:NCTCOG

1. Database - It is obvious that the integrity of ALI database is the "heart" of the enhanced 9-1-1 system. Mapped ALI should be the next phase/option for E9-1-1 as rural addressing is accomplished. "New" addresses for rural areas look great on the ALI display, but "directionals and visual aides" for dispatchers all impact the effectiveness of ALI systems--Tremendously. Hopefully, the Commission will consider this new dimension for a state-of-the-art 9-1-1 system for Texas!
2. Maintenance -- Some telcos, or most telcos, will not agree -- however, experience might support the ideas on arrangement for dedicated 9-1-1 techs. Telcos do not have 9-1-1 systems specialists for maintenance and repair, troubleshooting, etc. End-to-end service providers use local techs to do everything in a given service area--which includes 9-1-1. No regular inspectors, preventive maintenance, or etc.
3. Network/CPE - I would like to hear a response from the industry -- telcos who provide CPE and networking; and vendors; regarding ISDN, CPE options for future, etc. Perhaps a symposium or workshop. What is the future "technologically speaking" for E9-1-1. Hardware, software, ancillary, etc. Where do we go from here!

TX:PBRPC

1. More diverse routing.
2. Develop a more comprehensive contingency plan.

TX:Potter/Randall

No response at this time.

TX:RGCOG

This section of questionnaire not returned.

TX:SETRPC

1. Satisfied at this time.

TX:Smith

This section of questionnaire not returned.

TX:WCTCOG

This question not answered.

West Virginia

1. Access in order to scroll within the E-911 data base in order to identify subscribers with post office boxes via subscriber locations.

Appendix 5

Network Reliability Industry Initiatives

Focus Area: E011

Topic	Industry Group	Doc. No. Issue No. Standards No.	Version No. and Date	Title	Brief Description
Network Reliability Performance Objectives					

NOTE: SEARCH YIELDED NO FINDINGS

Network Reliability Industry Initiatives

Focus Area: E911

Topic	Industry Group	Doc. No. Issue No. Standards No.	Version No. and Date	Title	Brief Description
Network Architecture and Design					

NOTE: SEARCH YIELDED NO FINDINGS

Network Reliability Industry Initiatives

Focus Area: E011

Topic	Industry Group	Doc. No. Issue No. Standards No.	Version No. and Date	Title	Brief Description
Network Interconnection and Interoperability					

100

NOTE: SEARCH YIELDED NO FINDINGS

F

Network Reliability Industry Initiatives

Focus Area: E911

Topic	Industry Group	Doc. No. Issue No. Standards No.	Version No. and Date	Title	Brief Description
Network Management					

101

NOTE: SEARCH YIELDED NO FINDINGS

F

Network Reliability Industry Initiatives

Focus Area: E911

Topic	Industry Group	Doc. No. Issue No. Standards No.	Version No. and Date	Title	Brief Description
Restoration and Recovery					

NOTE: SEARCH YIELDED NO FINDINGS

Network Reliability Industry Initiatives

Focus Area: E911

Topic	Industry Group	Doc. No. Issue No. Standards No.	Version No. and Date	Title	Brief Description
Operations, Administration, Maintenance	Bellcore	TR-TSY-000529	12, 7/87	Basic 911 Emergency Service. Section 9 of the LSSGR	

Network Reliability Industry Initiatives

Focus Area: E911

Topic	Industry Group	Doc. No. Issue No. Standards No.	Version No. and Date	Title	Brief Description
Human Factors Design					

NOTE: SEARCH YIELDED NO FINDINGS

Network Reliability Industry Initiatives

Focus Area: E911

Topic	Industry Group	Doc. No. Issue No. Standards No.	Version No. and Date	Title	Brief Description
Survivability Analysis Models and Tools					

NOTE: SEARCH YIELDED NO FINDINGS

Network Reliability Industry Initiatives

Focus Area: E911

Topic	Industry Group	Doc. No. Issue No. Standards No.	Version No. and Date	Title	Brief Description
Regulations	Congress	H.R. 4789	4/02	Telephone Network Reliability Improvement Act of 1992	This bill would have required the FCC to establish and enforce network reliability standards (failed to pass in 92)
	Congress	S.237	1/03	National Network Security Board Act of 1993	Bill to create NS board to investigate and make recommendations regarding network security and reliability
	Congress	S.238	1/93	Telecommunications Network Security and Reporting Act of 1993	Bill to require FCC to report to Congress network security and reliability matters