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Request for Information

on

An Improved Wireless E91-1 Voice and Data Delivery Network



submitted to:

Indiana Wireless E911 Advisory Board

February 2004



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1. INTRODUCTION

1.1. PURPOSE

The purpose of the Request for Information (“RFI”) is to invite participation in an endeavor with the Indiana Wireless Enhanced 9-1-1 Advisory Board (the “Board”). The Board seeks responses to identify a solution to improve delivery of wireless E9-1-1 calls in Indiana. This solution will include all aspects of wireless E9-1-1 service and delivery, including, but not limited to, Network, Transport, Database, Maintenance, Monitoring and Training.

The Board seeks responses from vendors qualified to assist the Board with designing, implementing, monitoring, maintaining, updating and upgrading a wireless E9-1-1 call delivery system, often referred to in concept as a *Wireless Direct* Solution. The Board will consider all proposed solutions with respect to owning, leasing, and contracting equipment and services.

Goal of this RFI

The goal of this RFI is to solicit solutions from qualified vendors which would provide for the following:

- Better and more consistent wireless E9-1-1 service
- Improve the quality of wireless E9-1-1 service to the public
- Increased accountability over wireless E9-1-1 service
- Decrease potential points of failure in the wireless E9-1-1 network
- Streamline wireless E9-1-1 service *vis a vis* costs, operations, entities
- Provide a seamless infrastructure proactively managed and administered through the Board which delivers a consistent and equitable level of service to PSAPs, enabling PSAPs to improve the quality of wireless E9-1-1 service to the public
- Encourage cooperation between and among PSAPs, wireless carriers and LECs
- More efficient use of public safety resources
- Prepare PSAPs for future technologies
- Increased reliability and disaster recovery
- Clear demarcations of responsibility and accountability

1.2. NUMBER OF CONTRACTORS

The Board requires proposed solutions from a single entity. This entity may be comprised of a consortium of individual companies or subcontractors, provided that a single entity submits the proposed solution and maintains overall control of the project or solution and will serve as the “prime” vendor and the primary Board contact.

1.3. USE OF RFI RESPONSES

The responses to this RFI will be used only by the Board for the purposes of investigation and edification. The responses to this RFI, if deemed qualified, may lead to future procurement activity at the discretion of the Board.

The Board reserves all of its rights under Indiana law, including, without limitation, the right to take no action on any and all responses to the RFI.

1.4. EVALUATION

Each response will be evaluated for completeness, feasibility and compliance with the stated technical specifications outlined in Section IV of this RFI.

1.5. BACKGROUND

The current wireless E9-1-1 network in Indiana consists of point-to-point, analog technologies, in-band signaling, and low-speed data transmissions that are both costly and outdated (developed in the 1960s). New, high-speed fiber optic networks employing digital signaling technologies have overtaken the current network technology.

There are three Local Exchange Carriers (“LECs”) providing 9-1-1 service in Indiana to 162 PSAPs. There are 14 different Selective Routers (“S/Rs”) that serve all PSAPs in Indiana. S/Rs perform the function of routing a 9-1-1 call to the correct PSAP, and are critical components of the existing wireline delivery network.

There are 10 wireless carriers servicing Indiana. To provide Phase I and II wireless E9-1-1 service, each wireless carrier must connect with any one of a combination of the 14 S/Rs. In the spring of 2003, the Board determined that the opportunity exists to provide a higher quality level of wireless E9-1-1 service to the citizens of Indiana. The Board also recognized that the potential exists for faster emergency response times, improved emergency services to the public and reduced costs, specifically through an independently owned and operated wireless delivery network that would route wireless E9-1-1 calls directly to PSAPs and which would overlay Indiana’s existing 9-1-1 networks.

With that goal in mind, the Board commissioned L. Robert Kimball & Associates, Inc. (“Kimball”) to conduct a feasibility study to investigate and explore the feasibility of implementing a *Wireless Direct* Solution in Indiana. After extensive and thorough investigation, which included interviewing key stakeholders in the Indiana 9-1-1 community, Kimball presented its findings and recommendations to the Board in October 2003. Following is a brief summary of Kimball’s feasibility report:

- The Board’s further investigation of a *Wireless Direct* Solution is feasible and warranted based upon the solution’s potential benefits.

- A *Wireless Direct* Solution appears to provide a solid technical foundation for the future. Most public safety industry leaders agree that the future technical direction of 9-1-1 is an Internet Protocol (“IP”) based digital delivery network. Voice Over IP (“VoIP”) and digital signaling technologies, coupled with the expected increase in the volume of information that will be sent to PSAPs in the future, are driving the migration and development of the technologies required to support this type of delivery. A *Wireless Direct* Solution could position the Indiana PSAP community well for future technology changes.
- The specific feasibility of a *Wireless Direct* Solution cannot be determined at this time without further investigation. As such, Kimball recommends the Board issue a RFI to interested parties.
- Actual implementation of a *Wireless Direct* Solution will require the cooperation of all LECs, wireless carriers, PSAPs and the Board at unprecedented levels.
- *Wireless Direct* Solution implementation may vary across Indiana and depend on PSAP customer premise equipment (“CPE”) and the LEC’s 9-1-1 network.
- A *Wireless Direct* Solution using a high-speed digital network could improve call set-up times.
- Currently, because of the various S/Rs that are used for wireless E9-1-1 service, PSAPs may not always be able to transfer a wireless caller’s data (call back number, or ANI, and cell tower address/location, or ALI) to another PSAP if the PSAPs’ calls are routed via different S/Rs. With a *Wireless Direct* Solution, ANI and ALI information could be transferred from one PSAP to another state-wide. This vital information could improve response times.
- A *Wireless Direct* Solution may also increase accountability. Some 9-1-1 Centers do not possess call-tracking software (to track the number of 9-1-1 calls over a given period of time). Centrally collecting and maintaining this information could provide significant insight into the impact of wireless E9-1-1 on PSAPs and yield valuable information about 9-1-1 calls and the 9-1-1 system.
- The Board may save money with a *Wireless Direct* Solution. Currently, wireless carriers pay each of the three LECs specific recurring and nonrecurring charges associated with S/R connections to deploy Phase I (and subsequently Phase II) wireless E9-1-1 for each county in which the carrier offers service. For existing wireless carriers (who have deployed Phase I), their monthly recurring costs could decrease (they have already paid the nonrecurring costs), thereby reducing reimbursement amounts paid by the Board. Because Indiana is a full cost recovery state, the Board would realize those cost savings as well. For new carriers, their initial connection charges could also be less (than under the current system).

1.6. WIRELESS DIRECT EXPLAINED

Wireless Direct is a concept in which wireless E9-1-1 calls are routed directly to the appropriate PSAP via a dedicated network outside the traditional wireline 9-1-1 delivery network.

Faster, time-saving call routing is possible because the *Wireless Direct* Solution uses fewer connection points, newer networking technologies and protocols (such as SS7 or ISDN), and is digital instead of analog. In addition, more information can be passed along the same network and provided directly to the PSAP to help locate the wireless E9-1-1 caller.

Wireless Direct is so named because of the direct path a wireless E9-1-1 call takes from the wireless carrier's network to the PSAP. *Wireless Direct* also generally entails a simplified network design with fewer failure points and streamlined, centralized 24x7 monitoring.

Wireless Direct conceptually supports and parallels the direction in which the public safety industry is heading and provides a solid technical foundation for future development. Most public safety industry leaders believe that 9-1-1 is moving toward an Internet Protocol (IP) based digital delivery network, similar in concept to the typical Local Area Networks (LANs) found in most offices today. Most also believe that the amount of information being sent to PSAPs today is dwarfed by the amount that will be sent in the future. While it is difficult to predict the future, On-Star and telematics offer good examples of the increased data flow which a *Wireless Direct* Solution could easily support. In fact, the FCC recently clarified that On-Star and other telematics meet the definition of "mobile handsets" as defined in FCC Docket 94-102 (First Report and Order).

There are currently three *Wireless Direct* implementations in the country. Rhode Island currently uses *Wireless Direct* to deliver wireless E9-1-1 calls to the state-wide PSAP. Another *Wireless Direct* Solution operates in and around Kansas City, Missouri to deliver wireless E9-1-1 calls to 47 PSAPs. And Washington, D.C. has successfully implemented a *Wireless Direct* Solution.

2. INSTRUCTIONS FOR RESPONSE AND SUBMITTAL

2.1. NUMBER OF COPIES

Respondents must submit to the Board one original and nine copies of their responses in paper form and supply ten copies in electronic format on a compact disk media ("CD").

2.2. RESPONSE SUBMITTAL

All responses shall be received on or before Friday April 9, 2004. Responses delivered after this date will only be accepted if proof of shipping is provided from the carrier indicating service for April 9, 2004 or before. All other responses received after this date, which does not meet the delivery criteria contained within this section, will be considered an invalid response. The Board reserves the right to extend this date if deemed necessary.

Mailed or shipped responses to this RFI shall be delivered to:

Chris Ternet
Office of the State Treasurer
Executive Director
Indiana Wireless Enhanced 9-1-1 Advisory Board
10 West Market Street
Suite 2980
Indianapolis, Indiana 46204

Electronic responses to this RFI shall be sent to:

Chris Ternet
Office of the State Treasurer
Executive Director
Indiana Wireless Enhanced 9-1-1 Advisory Board

Email: cternet@jmco.com

2.3. INQUIRIES

Information concerning the RFI can be submitted and obtained only by electronic format via a dedicated page on the Board's website, www.911coverage.org.

The deadline for submission and receipt of electronic inquiries shall be Friday, March 25, 2004. The Board and Kimball will answer inquiries on or before Friday March 25, 2004.

2.4. INFORMATION SESSIONS

The Board and Kimball will conduct two information sessions related to the release of the RFI. This will enable all potential respondents, who are seeking information, an opportunity to seek clarification for any questions they may have upon review of the RFI.

The first session is scheduled for Thursday February 26, 2004 and will be held at:

Baker & Daniels
600 E. 96th Street
Suite 600, Conference Room B
Indianapolis, Indiana 46240

Time: 10:30 AM.

The second information session is scheduled for Tuesday, March 30, 2004 and will be conducted at:

Baker & Daniels
600 E. 96th Street
Suite 600, Conference Room B
Indianapolis, Indiana 46240

Time: 10:30 AM

2.5. RFI FORMAT AND CONTENT

Responses must address all sections of the RFI. Partial responses will not be considered a valid response to the RFI.

Responses must be explicit, and should provide sufficient detail which conveys understanding and explanation of the proposed solution.

3. TERMS AND CONDITIONS

"THIS SECTION INTENTIONALLY LEFT BLANK"

4. TECHNICAL REQUIREMENTS/SPECIFICATIONS

4.1. INTRODUCTION

This section details the specific technical requirements respondents must address to allow the Board to satisfy the goals outlined in Section I of this document.

These technical requirements are as follows:

- Network Design
- Facilities
- ALI Database
- System Maintenance and Monitoring
- Training

These specifications provide a baseline minimum requirement. Any proposed solution must, at a minimum, satisfy the requirements laid out below. Solutions which satisfy the intent of the requirements while providing other benefits will also be entertained.

It is envisioned that multiple 9-1-1 S/Rs will be required as part of the solution and would be located at points within Indiana that minimize reoccurring lease line costs for both the wireless carriers connecting to the S/Rs as well as the outgoing 9-1-1 trunks from the S/Rs to all PSAP Points of Interface ("POI").

It is further envisioned that any S/R to S/R signaling be supported via SS7. It is understood that some legacy S/Rs may only support MF CAMA type signaling, however no design should include more than one link of MF type signaling.

Proposed solutions are encouraged to utilize traditional network designs such as DS3 backbones to common Network Aggregation Points ("NAPs") and then DS1s or DS0s to the PSAP POI, as alternate solutions.

4.2. NETWORK DESIGN

The *Wireless Direct* network shall be redundant and diverse, leveraging high-speed digital technologies where possible to interconnect all PSAPs with the system.

Respondents must provide a complete and thorough explanation, including diagrams, to demonstrate proposed redundancy and diversity.

The proposed network design and architecture shall improve call set-up time, improve the speed in which wireless E9-1-1 call data is delivered to PSAPs, and provide for the capability to transfer wireless E9-1-1 calls between all PSAPs on the network.

The network shall be designed to handle 2,000,000 calls annually, and be capable of a 20 percent annual growth over the next five (5) years.

The network shall be sized for at least a P.01 grade of service or better (meaning that 99 out of 100 calls presented to the system at any time will reach a PSAP).

The Network shall provide connectivity to a minimum of two S/Rs for each PSAP. If more than two S/Rs are proposed, then connectivity must be sufficiently explained to ensure complete connectivity system wide to each PSAP.

The S/Rs shall be capable of selectively routing wireless E9-1-1 calls to the correct PSAP. The S/Rs must also be capable of transferring wireless calls from the receiving PSAP to any other PSAP on the network. The proposed S/Rs must be capable of load balancing and alternate traffic flow to ensure call routing and delivery.

The network shall provide for dedicated wireless trunks from the S/R to the PSAP ANI/ALI controller. The minimum number of wireless E9-1-1 trunks to each PSAP should be two (2) from each S/R serving the PSAP. The network shall also be capable of handling the delivery of wireless call data and all rebid activities in conjunction with call receipt and processing.

The network shall provide for administrative and maintenance activity access, or consideration shall be given to separate network connectivity to be used for this purpose. This connectivity will be used to provide for the software system updates and data collection and distribution.

The Board also seeks the ability to prepare and/or integrate future technologies into the proposed network and ancillary systems. Respondents should also address interconnection for VoIP, cable telephony, Automatic Crash Notification (“ACN”) and other new technologies known as of the release of this RFI. Sufficient detail will be required in order to understand how this will be accomplished.

4.2.1. Wireless Routing

The wireless routing equipment shall consist of digitally based switching technology. Provisions shall exist to connect an on-line monitoring system, as well as a system administration and maintenance position to the system. This position should have the option of being operated either locally, or remotely through a secure and dedicated network connection or the public switched telephone network.

4.2.2. Interfaces to Network Carriers

Responses must:

- Explain how wireless carriers will connect to the proposed system to deliver wireless E9-1-1 calls

- Describe how the proposed solution will support NCAS, CAS and hybrid CAS (“H-CAS”) wireless E9-1-1 call delivery configurations
- Explain how the prime vendor will coordinate with the LECs, CLECs and wireless carriers to assist with network and interoperability issues that arise during deployment

4.2.3. Integration

Responses must describe how the proposed system will integrate selective routing, call delivery, and ALI database services.

4.2.4. System Configuration

Responses must:

- Describe the system architecture and how the failure of any single component or module will not result in total system failure and only effect loss of service to components served by that module
- Describe how the proposed systems central processors are redundant and protect against system failure without manual intervention
- Describe the proposed systems ability to switch over and test / utilize redundant modules and how this transfer affects in-progress 9-1-1 calls
- Explain how the proposed system will protect against the loss of in-progress calls when a failure occurs and redundant processes takeover for the failed component
- Provide a diagram detailing the proposed network design, including all interconnection points, along with a call flow diagram detailing how wireless E9-1-1 traffic will be processed

Based on the system’s description, proposals must also describe each of the proposed wireless S/Rs and the configuration of each as it relates to the network and wireless call routing.

4.2.5. Trunking

Responses must:

- Describe how the proposed system will simultaneously support any combination of digital and analog trunking, such as SS7, ISDN (BRI or PRI), or MF (enhanced or standard), and interswitch trunking

- Identify the interface requirements necessary to interconnect the various trunk types with the infrastructure equipment
- Describe how the system will support the ability to bypass route traffic between the S/Rs, allowing calls to be seamlessly passed to the other S/Rs for maximum redundancy
- Explain how the system will provide redundancy and diversity for digital and analog trunking

4.2.6. Scalability

Responses must describe the scalability of the proposed system and how it will support state-wide, regional or local implementations for wireless E9-1-1 calls.

4.2.7. Improved Quality of Service

Responses must explain how the proposed system will contribute to the reduction of call set-up times, transfer of calls, and transfer of calls to the secondary PSAPs (ring down centers), dropped calls, and callback requirements. Specifically, the Board expects that call setup times will be improved where possible.

4.2.8. Transfer of Wireless E9-1-1 Calls

Responses must describe how the system shall have the ability to transfer wireless calls and wireless data to any PSAP on the network without degradation, loss or delay of data or voice.

4.2.9. Operating Expenses Reduction

Responses must explain how the proposed system allows the Board to reduce wireless trunking costs and ALI dip fees. The Board requires the vendor to support both a customer-managed network and/or a third party managed network.

4.2.10. Congestion

Responses must explain how the proposed system handles congestion due to multiple wireless E9-1-1 calls. Responses must also explain options for overflows, queuing, default, alternate routing and provide a diagram detailing call flow scenarios as provided for in this section.

4.2.11. VoIP

Responses must describe how the system will support VoIP calls, and provide for Selective Routing of wireless E9-1-1 calls delivered by VoIP technology, along with the interfaces that will be necessary to access ANI/ALI controllers.

4.2.12. Cable Telephony

Responses must describe how the system will support cable telephony calls, and provide for Selective Routing of wireless E9-1-1 calls delivered by cable telephony technology, along with the interfaces that will be necessary to access ANI/ALI controllers.

4.3. SELECTIVE ROUTER/DATABASE FACILITIES

The facility exterior shall be of solid construction and have a minimum setback from public access roadways of at least 50 feet. The property shall be secure with fencing, limiting accessibility and providing a secure perimeter.

The facility shall have the necessary physical barriers in place to prevent unauthorized physical entry as well as environmental contamination such as that caused by fire and flood.

The facility shall be secure and protected by video monitoring systems and swipe card controlled access. The system shall identify who has accessed the facility, along with the date and time. The security card access system must provide an accounting of all entry points accessed on a 24 X 7 basis. The system shall be capable of maintaining a minimum of one year's data. All secure areas shall be alarmed for intrusion detection.

The facility shall provide diverse entry points to maintain redundant connections for transport, network and equipment. The facility shall provide an uninterruptible power supply capable of maintaining system operations for eight (8) hours, with a generator that is capable of maintaining facility operations for a minimum of 72 hours. The equipment and facilities should be protected against secondary lightning exposure from both internal and external sources.

The facility shall have external connections established to provide emergency power to the facility in the event that on site emergency power systems should fail to operate. The response shall provide contingency plans detailing how the facility will support continued operations during a power interruption and the various levels of redundancy being deployed. The facility should also provide measures that prevent accidental disconnection of critical systems at all power strips, rack power distribution units, uninterruptible power supplies and power outlets.

The facility shall comply with all applicable codes in use by the National Electric Code ("NEC"), as well as government and local jurisdictions with regard to grounding and bonding. The grounding system deployed should minimize the potential for ground looping.

Responses must:

- Describe the construction of the proposed facilities that will house equipment used to operate and maintain the system
- Explain how these facilities will provide protection against manmade and environmental elements

4.3.1. Security

Responses must describe the security systems and measures that will be used to ensure that the integrity of the facility and system is protected and maintained.

4.3.2. Monitoring

Responses must describe how the facility (facilities) used to house and operate the proposed system will be monitored and checked to maintain continuity and integrity.

4.3.3. Logging

Responses must:

- Explain how the systems that are used to provide for the security and integrity of the proposed system facility (facilities) are logged
- Describe the plan for archiving and retaining this data

4.3.4. Emergency Power

Responses must explain how the proposed facilities will provide emergency power and what types of redundancy and diversity are employed to prevent system outages due to power interruptions. Responses must also explain how the systems will be restored from an outage that affects back up systems that are deployed and, if in a shared facility, the priority in which the restorative effort will be handled.

4.3.5. Redundancy and Diversity

Responses must explain how the facility provides for diverse and redundant connectivity between the proposed system equipment and network resources.

4.3.6. Environmental

Responses must describe how the facility minimizes exposure to fire, flooding, hazardous materials and other situations that may impact system operations.

4.3.7. Lightning Protection

Responses must explain how the facility and the equipment housed within the facility are protected against lightning strikes and secondary lightning exposure. Measures shall include all voice and data connections, both digital and analog.

4.3.8. AC Power Installation and Labeling

Responses must describe how the AC power supply system used to provide power for the proposed system will be installed and tagged. Responses must also describe how the power supply system will be structured so as to prevent accidental disconnection.

4.3.9. Grounding

Responses must:

- Describe the grounding system that will be used in the proposed solution
- Explain how these systems will provide protection against ground looping and ground fault problems

4.4. WIRELESS DATABASE SERVICES (ALI)

The wireless database services (ALI) shall include the ability to process and receive ALI for Phase I and Phase II (as provided in FCC order 94-102 and subsequent rulings and orders of the FCC related to wireless E9-1-1 service) wireless calls for all carriers regardless of the method chosen by the carrier for delivery (NCAS/CAS/H-CAS). The database services must also support ALI re-bid activity, both manual and automatic.

The ALI system shall be capable of all functions necessary to provide wireless location data to the appropriate PSAP at a minimum of NENA 2 format which includes call back number, longitude and latitude, confidence and uncertainty etc.

The ALI system shall also include the ability to have records input, changed, and deleted for the purpose of maintaining the system in a manual or automated mode.

The ALI system shall be capable of steering ALI requests to other external database systems and returning the data to the correct PSAP and call taker position.

The ALI system must be capable of accepting queries from multiple PSAPs and providing ALI to multiple types of CPE products.

The ALI system must be capable of maintaining audit logs, and must track where ALI requests were steered and the response received for the request.

The ALI system must be capable of identifying the carrier ID in NENA format. The ALI system must also be capable of displaying future features such as speed, height and direction.

ALI system support shall be available on a 24 X 7 basis and be capable of secure, remote accessibility and administration.

4.4.1. ALI Database Configurations

Responses must explain how the proposed solution will support local or centralized ALI database configurations. The Board plans to store its database locally and redundantly. Responses must therefore describe how the solution will support this type of deployment.

4.4.2. Connectivity to Multiple Wireless Carriers and ALI Databases

Responses must describe how the system will interface simultaneously with multiple wireless callers and multiple remote ALI databases. Currently, there are 10 wireless carriers that have the potential to access any one of three remote ALI database service providers and 168 PSAPs. Responses must describe how this connectivity will be handled. Responses must also contain a diagram detailing the connections.

4.4.3. Data Integrity

Responses must describe how the proposed system will enhance data delivery for wireless E9-1-1 calls. This shall include the ability to re-bid ALI information, both manually and automatically. The system must support re-bid requests from authorized PSAPs outside the network.

4.4.4. Dynamic Updates of X,Y

All responses must describe the functionality for dynamic updates of location data. The ALI database shall support dynamic updates for X,Y (lat/lon) location information from each wireless carrier. The Board requires the capability to re-bid data, both manually and automatically.

4.4.5. Boundaries Data Updates

Responses must explain and describe the process used to update the ALI data. The ALI database shall provide the tools to perform data updates required to accommodate changes in relative boundaries for PSAP and cell site/sectors.

4.4.6. E2+ ALI Standard

Responses must describe how the proposed system will support the E2+ interface ALI standard as specified in TIA/EIA J-STD-036 with addenda, and NENA Technical Information Document 05-501 SS7 Guidelines for MSC to Selective Router Connectivity.

4.4.7. Quality of Service

Responses must explain how the proposed system will improve on the time necessary to deliver wireless call data to the appropriate PSAP.

4.5. SYSTEM MAINTENANCE AND MONITORING

All components of the system being proposed shall be monitored on a 24 X 7 basis providing constant and consistent oversight. This will assist in the early detection of potential problems and assist in minimizing downtime. This includes, but is not limited to:

- Network transport
- Selective Routers
- Wireless E9-1-1 trunks
- Wireless databases
- Computer hardware (servers)
- LAN/WAN components, and software

The monitoring of these components shall be performed by a monitoring center or network operations center (NOC), which is staffed 24 X 7 with a toll free number accessible to all users of the system.

Upon notification of any equipment failure not interrupting the delivery of wireless E9-1-1 calls, the responsible party shall respond within four hours. If the failure is interrupting the delivery of wireless E9-1-1 calls, the responsible party shall respond within two hours.

The monitoring center shall maintain a log of all calls that pertain to the system and must identify the caller, location, and description of the problem. The center will issue a control number to the calling party to use as a reference to outage or trouble until the problem has been corrected.

All persons who will be providing support on the system shall be adequately trained. It is the responsibility of the prime vendor to ensure that all subcontractors meet the training requirements for all work performed by subcontractors.

A cache of parts shall be maintained on-site for system components to minimize system down time. Consideration should be given to maintaining current manufacturer revisions, firmware, software etc.

4.5.1. Contact

Responses must describe the method utilized by your company to provide accessibility for 24 X 7 communications to obtain support.

4.5.2. Monitoring

Responses must describe the monitoring capabilities for the proposed system. Responses must also indicate how remote monitoring will be established and how this capability will be supported by both facilities and staffing.

4.5.3. Maintenance

Responses must describe how preventive maintenance will be handled, and the frequency in which it will be completed. Responses must further explain how the proposed system can and will be maintained and upgraded to ensure that industry standards are maintained without interruption of service delivery.

4.5.4. Response

Responses must describe the proposed system's ability to respond to reported outages or trouble reported as explained in Section 4.5 of the RFI.

4.5.5. Reporting

Responses must explain the process to log and report all trouble reports and outages to the Board. Include in the response the frequency, delivery method and information to be provided to the Board to ensure proper monitoring and response.

4.5.6. Training

Responses must explain how all technical and support personnel responsible for the proposed system are or will be trained.

4.5.7. Spare Parts

Responses must describe how an adequate inventory of spare parts will be maintained and tracked. In addition, responses must describe how the inventory will be updated in response to current firmware, software, and manufacturer revisions to ensure proper operation of the proposed system.

4.6. TRAINING

Training for all systems, software, and personnel shall be provided to the Board and its designees through train the trainer, user training, and system administration type training programs. All user and training manuals shall be provided as part of this training.

The staff conducting this training shall be professional teaching staff, and all materials provided as outlined in this RFI will become property of the Board.

4.6.1. Training Methodology

Responses must describe how initial and on-going training will be provided to system administration personnel, supervisory personnel, and users of the proposed system.

Responses must explain how continuing education will be provided for existing staff as system changes and upgrades occur.

5. PRICING

5.1. BOARD REQUIREMENTS

The Board requires that budgetary or estimated pricing be included in the response. It is understood that firm costs may be difficult to obtain, but a best estimate cost would allow for true evaluation of the proposed solution.

Pricing shall be detailed as follows:

- **Continuing/Recurring Costs**

Continuing costs are those costs that are projected to be paid on a monthly basis. Any discounts offered shall be reflected in the monthly rates quoted in the response.

- **One-time Costs**

One-time costs are those costs paid for material and services necessary for the operational implementation of the proposed solution.

5.2. COST BREAKDOWN

Costs shall be detailed to the component level, and shall be specifically categorized as follows:

- Network transport
- Selective Routing equipment
- ALI Database (software and equipment)
- Facility costs
- Maintenance costs
- Monitoring costs
- Training costs

6. ADDITIONAL INFORMATION

Information deemed necessary for a proper response has been compiled and is included on the accompanying CD.

This information includes:

- An instruction sheet on the use of the CD and the applications contained on the CD
- An electronic map of Indiana showing:
 - PSAP locations
 - LEC S/Rs locations
 - LATA boundaries
 - County boundaries
 - LEC service areas
- Approximate locations and numbers of Mobile Switching Centers serving Indiana
- A distance tool that can be used to estimate mileage charges for connectivity of the proposed system
- An Excel spreadsheet of all PSAP locations

The information on this CD is for use in designing and pricing a proposed solution.

7. APPENDIX A - GLOSSARY

1A2 A designation for Key Telephone Systems which use an "A" lead for control.

9-1-1 A three-digit telephone number to facilitate the reporting of an emergency requiring response by a public safety agency.

9-1-1 Service Area The geographic area that has been granted authority by a state or local governmental body to provide 9-1-1 service.

9-1-1 System The set of network, database, and CPE components required to provide 9-1-1 service.

9-1-1 Tandem (See E9-1-1 Control Office)

"A" Lead Control A wire used to control the Key Telephone Unit in a 1A2 type Key Telephone System. In some E9-1-1 systems it is used to identify the position connected to the trunk.

Abandoned Call A call placed to 9-1-1 in which the caller disconnects before the call can be answered by the Public Safety Answering Point (PSAP) attendant.

Access Line The connection between a customer premises network interface and the Local Exchange Carrier that provides access to the Public Switched Telephone Network (PSTN).

Advanced Mobile Phone Service (AMPS) The analog radio interface utilized in cellular telephone systems.

Alarm Dry Contacts A set of relay contacts which are caused to either open or close when an alarm condition occurs. (Ref. NENA 04-001)

ALI Retrieval A request for ALI record from the PSAP to the ALI database.

ALI Retrieval Rate The number of requests for ALI that are not duplicated within a two (2) minute time frame.

Alternate ISDN PSAP (See Alternate PSAP)

Alternate Number Used in Interim Number Portability (INP), the caller's original telephone number which is call forwarded to the new carrier's telephone number. Also known as Call Forward Number.

Alternate PSAP A PSAP designated to receive calls when the primary PSAP is unable to do so.

Alternate Routing The capability of routing 9-1-1 calls to a designated alternate location(s) if all 9-1-1 trunks to a primary PSAP are busy or out of service. May be activated upon request or automatically, if detectable, when 9-1-1 equipment fails or the PSAP itself is disabled.

American Standard Code for Information Interchange (ASCII) This standard defines the code for a character set to be used for information interchange between equipment of different manufacturers and is a standard for data communications over telephone lines. In the context of TDD/TTY this refers to both a binary code and modulation method used for 110/300 baud TDD/TTY communications.

Amplitude Modulated The encoding of a carrier wave by variation of its amplitude in accordance with an input signal.

Angle of Arrival (AOA) A terrestrial Location Determination Technology (LDT) that computes a transmitter's location based upon the angle at which the transmitter's radio signal strikes multiple receivers.

Answering Position (see Attendant Position)

Attendant Position The Customer Premises Equipment (CPE) at which calls are answered and responded to by the Telecommunicator.

Automatic Alarm and Automatic Alerting Device Any automated device which will access the 9-1-1 system for emergency services upon activation and does not provide for two-way communication. (Many states prohibit the dialing of 9-1-1 by an automated device.)

Automatic Call Distributor (ACD) Equipment that automatically distributes incoming calls to available PSAP attendants in the order the calls are received, or queues calls until an attendant becomes available.

Automatic Location Identification (ALI) The automatic display at the PSAP of the caller's telephone number, the address/location of the telephone and supplementary emergency services information.

Automatic Location Identification (ALI) Call Retrieval A process of counting ALI database queries not duplicated within a two (2) minute time frame.

Automatic Location Identification (ALI) Customer Retrieval A process of counting ALI database queries not duplicated within a twenty-four (24) hour time frame.

Automatic Location Identification (ALI) Database The set of ALI records residing on a computer system.

Automatic Location Identification (ALI) Multiplexer A CPE component which performs the function of communicating with the ALI database. An ALI Multiplexer typically works in conjunction with an ANI controller.

Automatic Location Identification (ALI) Retrieval The process of querying the 9-1-1 database for ALI records.

Automatic Number Identification (ANI) Telephone number associated with the access line from which a call originates.

Automatic Number Identification (ANI) Controller A stand-alone CPE component which provides the ANI decoding and function key control for 9-1-1 service.

Automatic Number Identification Information Digits (ANI II Digits) Digits in the Enhanced MF Signaling protocol that indicate to the PSAP CPE ANI display device whether the display should remain steady or flash, or if the call is a test call.

Average Busy Hour The 1-hour period during the week statistically shown over time to be the hour in which the most telephone calls are received.

Backup Public Safety Answering Point (PSAP) Typically a disaster recovery answering point which serves as a backup to the primary PSAP and is not co-located with the primary PSAP.

Basic 9-1-1 An emergency telephone system which automatically connects 9-1-1 callers to a designated answering point. Call routing is determined by originating central office only. Basic 9-1-1 may or may not support ANI and/or ALI.

Baud Rate A measure of signaling speed in data communications that specifies the number of signaling elements that can be transmitted each second.

Baudot Code A five bit encoding scheme that represents text and digits. It is the standard transmission signaling scheme used by TTY (TDD) devices. (per EIA PN-1663)

Binary Coded Decimal (BCD) A coding system in which each decimal digit from 0 to 9 is represented by four binary (0 or 1) digits. (Ref. NENA 04-002)

Busy Hour The hour each day with the greatest call volume.

Busy Tone An audible signal indicating a call cannot be completed because the called access line is busy. The tone is applied 60 times per minute.

Call Check (see Recall Recorder)

Call Detail Logging The process of recording incoming call data. Also known as ANI printout. (Ref. NENA 04-001)

Call Progress Signals Audible cues to advise 9-1-1 callers of the status of their call. (e.g. Busy Tone, Reorder Tone)

Call Relay Forwarding of pertinent information by a PSAP attendant to the appropriate response agency (Not to be confused with Telephone Relay Service).

Call Sequencer A unit which monitors incoming calls at a PSAP and indicates to the answering positions which of the incoming calls has been unanswered the longest.

Call Transfer The capability to redirect a call to another party.

Calling Party Hold The capability of the PSAP to maintain control of a 9-1-1 caller's access line, even if the caller hangs up.

Calling Party's Number (CPN) The call back number associated with a wireless telephone. (Similar to ANI for wireline telephones) (Ref. NENA 03-002)

Code Division Multiple Access (CDMA) A digital radio interface utilized by some North American PCS carriers.

Carrier Frequency The frequency of the unmodulated IRIG B or E signal. (Ref. NENA 04-002)

Cathode Ray Tube (CRT) Video monitor used for displaying information.

Cell The wireless telecommunications (Cellular or PCS) antenna serving a specific geographic area.

Cell face (See Cell Sector)

Cell Sector One face of a cell antenna (typically 3-sided) that operates independently of the other sectors.

Cell Site The location of a cell and related equipment.

Cellular Priority Access Service (CPAS) A uniform nationwide method of providing priority access to authorized wireless subscribers in the event of an emergency.

Central Office (CO) The Local Exchange Carrier facility where access lines are connected to switching equipment for connection to the Public Switched Telephone Network.

Central Processing Unit (CPU) The part of a computer which performs the logical, computational and decision making functions.

Centralized Automated Message Accounting (CAMA) An MF signaling protocol originally designed for billing purposes, capable of transmitting a single telephone number.

Centrex A business telephone service offered by some Local Exchange Carriers that provides PBX type features over access lines.

Circuit Route The physical path between two terminal locations.

Class of Service A designation of the type of telephone service, e.g. residential, business, centrex, coin, PBX, wireless.

Company Identifier (Company ID) A 3-5 character identifier chosen by the Local Exchange Carrier that distinguishes the entity providing dial tone to the end user. The Company Identifier is maintained by NENA in a nationally accessible data base.

Computer Aided Dispatch (CAD) A computer based system which aids PSAP attendants by automating selected dispatching and record keeping activities.

Conference Transfer The capability to bridge a third party onto an existing call. Also known as three-way calling.

Consolidated PSAP A facility where one or more Public Safety Agencies choose to operate as a single 9-1-1 entity.

Customer Comments Supplementary information useful in dispatching, provided in conjunction with ALI displays.

Customer Premises Equipment (CPE) Terminal equipment at a PSAP.

Cutover The activation of a new telephone call processing or switching system.

Data Base An organized collection of information, typically stored in computer systems, comprised of fields, records (data) and indexes. In 9-1-1, such data bases include MSAG, telephone number/ESN, and telephone customer records.

Data Base Management System (DBMS) A system of manual procedures and computer programs used to create, store and update the data required to provide Selective Routing and/or Automatic Location Identification for 9-1-1 systems.

Data Base Management System Provider Entity providing Selective Routing (SR) and/or Automatic Location Identification (ALI) data services.

Data Bit A binary digit, either a zero (0) or a one (1).

Data Exchange The process of exchanging 9-1-1 data between Service Providers and the Data Base Management System Provider.

Data Processing Day The day in which processing of a given service order update occurs.

Decaying Directions from positive to negative, relative to the starting points, whose transient amplitudes decay with time in a ringwave pattern. These transients are typically caused by sources internal to the PSAP (motor, lighting and inductive loads, etc.) (Ref. NENA 04-001)

Dedicated Trunk A telephone circuit used for a single purpose; such as transmission of 9-1-1 calls.

Default Routing The capability to route a 9-1-1 call to a designated (default) PSAP when the incoming 9-1-1 call cannot be selectively routed due to an ANI failure or other cause.

Dial Tone First The provision of dial tone to enable a caller to originate and complete 9-1-1 calls from public telephones without inserting a coin or any other device. Also known as coin-free dialing.

Direct Dispatch The performance of 9-1-1 call answering and dispatching by personnel at the primary PSAP.

Directory Number (DN) A dialable 10-digit telephone number associated with a telephone subscriber or call destination.

Discrepancies A Service Provider term used to describe subscriber records that do not match the MSAG and are referred to an error file or report for resolution.

Disk Operating System (DOS) A personal computer operating system which manages the computer's resources.

Diverse Routing The practice of routing circuits along different physical paths in order to prevent total loss of 9-1-1 service in the event of a facility failure.

Dual Tone Multi-Frequency (DTMF) One of the methods used for signaling in the telephone network. Often referred to as TOUCH-TONE™.

Electronic Key Telephone System (E-Key) A multi-line telephone system which utilizes stored program control technology instead of KSU's and KTU's.

Emergency Call A telephone request for public safety agency emergency services which requires immediate action to save a life, to report a fire or to stop a crime. May include other situations as determined locally.

Emergency Message (EM) Circuits The special service circuits used to carry 9-1-1 calls to the PSAP.

Emergency Ring Back The capability of a PSAP attendant to ring the telephone on a held circuit. Requires Calling Party Hold. Also known as re-ring. (A Basic 9-1-1 feature)

Emergency Service Central Office Number (ESCO) The information delivered to the PSAP when there is an ANI failure between the end office and the 9-1-1 Control Office. When ANI is not available, the 9-1-1 call is default routed and the ANI display at the PSAP will be "911-0TTT" (or 911-TTTT) with TTT identifying the incoming trunk group.

Emergency Service Number (ESN)/ Emergency Service Zone (ESZ) An ESN is a three to five digit number representing a unique combination of emergency service agencies (Law Enforcement, Fire, and Emergency Medical Service) designated to serve a specific range of addresses within a particular geographical area, or Emergency Service Zone (ESZ). The ESN facilitates selective routing and selective transfer, if required, to the appropriate PSAP and the dispatching of the proper service agency(ies).

Emergency Service (ES) Trunks Message trunks capable of providing ANI, connecting the serving central office of the 9-1-1 calling party and the designated E9-1-1 Control Office.

End Office (See central office).

End User The 9-1-1 caller

Enhanced 9-1-1 (E9-1-1) An emergency telephone system which includes network switching, database and CPE elements capable of providing Selective Routing, Selective Transfer, Fixed Transfer, ANI and ALI.

Enhanced 9-1-1 (E9-1-1) Control Office The Central Office that provides the tandem switching of 9-1-1 calls. It controls delivery of the voice call with ANI to the PSAP and provides Selective Routing, Speed Calling, Selective Transfer, Fixed Transfer, and certain maintenance functions for each PSAP. Also known as 9-1-1 Selective Routing Tandem or Selective Router.

Enhanced 9-1-1 (E9-1-1) Tandem Office (See E9-1-1 Control Office)

Essex (See Centrex)

Exchange A defined area, served by one or more telephone central offices, within which a Local Exchange Carrier furnishes service.

Exempt Lines Access lines not subject to 9-1-1 charges.

Fast Busy (see Reorder Tone)

Feature Group D (FGD) An MF signaling protocol, originally developed to support equal access to long distance services, capable of carrying one or two ten-digit telephone numbers.

Fixed Transfer The capability of a PSAP attendant to transfer a 9-1-1 call to a pre-determined location by activating a single button.

Footprint The geographic area covered by a particular wireless cell or cell sector.

Forced Disconnect The capability of a PSAP attendant to disconnect a 9-1-1 call even if the calling party remains off-hook. Used to prevent overloading of 9-1-1 trunks.

Foreign Exchange Service (FX) A telephone line switched in an exchange or central office other than the exchange or central office area in which the telephone is located.

Free Run The operating condition of a clock in which the local oscillator is not locked to an external synchronization reference, and is using no storage techniques to sustain its operating frequency. (Ref. NENA 04-002)

Global Positioning System (GPS) A satellite based Location Determination Technology (LDT).

Grade of Service The probability (P), expressed as a decimal fraction, of a telephone call being blocked. P.01 is the grade of service reflecting the probability that one call out of one hundred during the average busy hour will be blocked. P.01 is the minimum recommended Grade of Service for 9-1-1 trunk groups.

Global Standard for Mobile Communications (GSM) International standard digital radio interface utilized by some North American PCS carriers.

Hearing Carry Over (HCO) A method which utilizes both voice and text communications on the same call, allowing a person who is speech impaired to listen to the other party's conversation and respond by typing via a TTY or other means for text communications.

Highway Call Box A telephone enclosed in a box and placed along a highway that allows a motorist to summon emergency and non-emergency assistance.

Idle Circuit Tone Application A feature which applies a distinctive tone toward the PSAP attendant to distinguish between calls that have been abandoned before the attendant answers, and calls where the caller is unable or unwilling to speak.

Impulse Transient A high energy unidirectional voltage or current impulse resembling a "spike" which is typically caused by sources external to the PSAP (lightning, grid switching, etc.). (Ref. NENA 04-001)

Instant Playback Recorder (see Recall Recorder)

Integrated Services Digital Network (ISDN) A digital interface providing multiple channels for simultaneous functions between the network and CPE.

Inter-local Services Agreement An agreement among governmental jurisdictions or privately owned systems, or both, within a specified area to share 9-1-1 system costs, maintenance responsibilities, and other considerations.

Inter-Range-Instrumentation Group (IRIG) This group, in 1959, proposed a series of time code formats now known as IRIG or NASA time codes. (Ref. NENA 04-002)

Inter-Tandem Transfer The capability of transferring a call over the 9-1-1 network from a PSAP served by one 9-1-1 tandem to a PSAP served by a different 9-1-1 tandem.

Internal Clock A time-of-day reference source for timing information in equipment or systems. (Ref. NENA 04-002)

Interoperability The capability for disparate systems to work together.

ISDN PSAP (See PSAP)

Key Pulse (KP) An MF signaling tone (digit)

Key Service Unit (KSU) Equipment which provides ringing, lamp voltages, conference, etc. for multi-line key telephone sets.

Key Telephone System (KTS) A multi-line telephone system comprised of multi-line telephone sets, KTU's and KSU's.

Key Telephone Unit (KTU) A unit mounted in a KSU, required per line, providing key telephone control functions. e.g. hold, lamp, common ringing.

Light Emitting Diode (LED) Lamps used for display of information. Commonly used on telephone sets to indicate line status.

Local Exchange Carrier (LEC) A Telecommunications Carrier (TC) under the state/local Public Utilities Act that provides local exchange telecommunications services. Also known as Incumbent Local Exchange Carriers (ILECs), Alternate Local Exchange Carriers (ALECs), Competitive Local Exchange Carriers (CLECs), Competitive Access Providers (CAPs), Certified Local Exchange Carriers (CLECs), and Local Service Providers (LSPs).

Local Exchange Routing Guide (LERG) A database which defines inter-exchange call routing in the North American Public Switched Telephone Network. It associates NPA/NXX's with their appropriate network elements.

Local Loop A physical facility between a customer's network interface and the local serving central office. The most common form of local loop is a pair of wires.

Local Number Portability (LNP) A process by which a telephone number may be reassigned from one Local Exchange Carrier to another.

Location Determination Technology (LDT) A system which computes the X and Y coordinates of a wireless E9-1-1 caller.

Logging Recorder A voice-band audio recorder which records to and plays from a permanent storage media such as tape or disk. Logging recorders are typically multi-channel so as to simultaneously record from several sources.

Login The process of identifying and authenticating oneself to a computer, ACD or E9-1-1 attendant position system.

Loopback A type of diagnostic test in which a transmitted signal is returned to the transmitting device and then compared to the original signal.

Main Station (See Access Line)

Management Information System (MIS) A program that collects, stores and collates data into reports enabling interpretation and evaluation of performance, trends, traffic capacities, etc.

Master Clock An accurate timing device that generates synchronization signals to control other clocks or equipment. (Ref. NENA 04-002)

Master Street Address Guide (MSAG) A data base of street names and house number ranges within their associated communities defining Emergency Service Zones (ESZs) and their associated Emergency Service Numbers (ESNs) to enable proper routing of 9-1-1 calls.

Mechanical Dialer (see Automatic Alarm and Automatic Alerting Device)

Micro-Cell Commonly used to describe PCS cells due to their much smaller footprint compared to a Cellular cell.

Millisecond (ms) One-thousandth of a second (0.001 s)

Mobile Directory Number (MDN) (see Calling Party's Number (CPN))

Mobile Identified Number (MIN) A 34-bit binary number that a wireless handset transmits to identify itself to the wireless network.

Mobile Switching Center (MSC) The wireless equivalent of a Central Office, which provides switching functions from wireless calls.

Mobile Switching Office (MSO) (See Mobile Switching Center (MSC))

Modem An interface device which allows digital data signals to be transmitted over analog telephone lines.

Multi-Frequency (MF) A type of signaling used on analog interoffice and 9-1-1 trunks.

National Emergency Number Association (NENA) The National Emergency Number Association is a not-for-profit corporation established in 1982 to further the goal of "One Nation-One Number." NENA is a networking source and promotes research, planning and training. NENA strives to educate, set standards and provide certification programs, legislative representation and technical assistance for implementing and managing 9-1-1 systems.

Nationally Recognized Testing Laboratory (NRTL) Any of several testing laboratories recognized in the United States in accordance with industry and municipal standards.

Network Reliability Council A study group made up of experts in the field of networks as they relate to Public Safety Systems charged with assessing the reliability of the network and to make recommendations concerning service quality.

NNX / NXX A three digit code in which N is any digit 2 through 9 and X is any digit 0 through 9. They are the second set of three digits in the North American Numbering Plan.

No Record Found (NRF) A condition where no ALI information is available for display at the PSAP.

Non-blocking A switching network designed to complete all call attempts.

Non-Selective Routing The routing of 9-1-1 calls based on the NXX or trunk group.

North American Numbering Plan Use of 10 digit dialing in the format of a 3 digit NPA, followed by 3 digit NXX and 4 digit line number. NPA-NXX-XXXX.

Number Plan Area (NPA) An established three-digit area code for a particular calling area. It takes the form of NXX, where N is any digit from 2 through 9 and X is any digit from 0 through 9.

Numbering Plan Digit (NPD) A component of the traditional 9-1-1 signaling protocol between the 9-1-1 Control Office and the PSAP CPE. Identifies 1 of 4 possible area codes.

On-Time-Point The leading edge of a pulse which occurs coincident with the beginning of a second. (Ref. NENA 04-002)

Order of Authority A formal order by the state or local authority which authorizes public agencies or public safety agencies to provide 9-1-1 service in a geographical area.

Originating Switchhook Status Indication An audible and/or visible indication of the status of a calling party being held. (A Basic 9-1-1 feature)

Oscillatory A transient comprised of various impulse transients with alternating characteristics. (Ref. NENA 04-001)

Overflow The process of automatically rerouting calls to an alternate facility.

P.01 Grade of Service (See Grade of Service.)

Pilot Number A telephone customer's main account number, lead number, main listed number, or billing account.

Position Identifier A pulse in the IRIG time code which has a predetermined duration and rate that is used to identify location of time code information. (Ref. NENA 04-002)

Primary ISDN PSAP (See Primary PSAP)

Primary Public Safety Answering Point (PSAP) A PSAP to which 9-1-1 calls are routed directly from the 9-1-1 Control Office. (See PSAP)

Private Branch Exchange (PBX) A private telephone system that is connected to the Public Switched Telephone Network.

Private Switch ALI (PSA) A service option which provides Enhanced 9-1-1 features for telephone stations behind private switches. e.g. PBXs

Pseudo Automatic Location Identification (pALI) An ALI record associated with a pANI, configured to provide the location of the wireless cell or sector and information about its coverage or serving area (footprint).

Pseudo Automatic Number Identification (pANI) A telephone number used to support routing of wireless E9-1-1 calls. It may identify a wireless cell, cell sector or PSAP to which the call should be routed. Also known as routing number.

Public Agency A state, or any unit of local government or special purpose district located in whole or in part within a state, which provides police, fire-fighting, medical or other emergency services or has authority to do so.

Public Safety Agency An entity that provides fire fighting, law enforcement, emergency medical, or other emergency service.

Public Safety Answering Point (PSAP) A facility equipped and staffed to receive 9-1-1 calls. A Primary PSAP receives the calls directly. If the call is relayed or transferred, the next receiving PSAP is designated a Secondary PSAP.

Public Switched Telephone Network (PSTN) The network of equipment, lines, and controls assembled to establish communication paths between calling and called parties in North America.

Pulse Width Coded Modulation of a carrier by the digital representation of an analog signal. (Ref. NENA 04-002)

Rate Center A geographically specified area used for determining mileage and/or usage dependent rates in the Public Switched Telephone Network.

Real-Time The availability of information at the exact time it is occurring.

Recall Recorder A voice-band audio recorder which records to and plays from a media that may not be permanent (such as tape loop, fixed disk or RAM). Recall recorders are typically associated with each operator position for the purpose of recording and playing back their most recent conversations. Also known as Call Check or Instant Playback Recorder.

Redundancy Duplication of components, running in parallel, to increase reliability.

Remote Call Forwarding As utilized within Interim Number Portability, a permanent call forwarding feature that allows a call to one Directory Number to be automatically advanced to a Directory Number of another Local Exchange Carrier.

Reorder Tone An audible tone of 120 interrupts per minute (ipm) returned to the calling party to indicate the call cannot be processed through the network. Sometimes referred to as fast busy.

Re-Ring (see Emergency Ring Back)

Response Agency The public safety agency having legal or consensual obligation to respond to a call for service.

Ringback Tone A tone returned to the caller to indicate that a call is being processed.

Route Diversity (See Diverse Routing)

Routing Number (see pANI)

RS-232C An electrical and mechanical standard for the serial transfer of digital information between digital systems, such as computers, printers or communications equipment.

Secondary ISDN PSAP (See Secondary PSAP)

Secondary PSAP A PSAP to which 9-1-1 calls are transferred from a Primary PSAP. (See PSAP)

Selective Routing (SR) The routing of a 9-1-1 call to the proper PSAP based upon the location of the caller. Selective routing is controlled by the ESN which is derived from the customer location.

Selective Routing Data Base (SRDB) The routing table that contains telephone number to ESN relationships which determines the routing of 9-1-1 calls.

Selective Transfer The capability to transfer a 9-1-1 call to a response agency by operation of one of several buttons typically designated as police, fire, and emergency medical; based on the ESN of the caller.

Service Address The physical location of a subscriber access line. Service Address is the recommended address for 9-1-1 use. (May be different from the listed address or billing address)

Service Order Local Exchange Carrier document used for additions, changes or removals of telephone service.

Service Provider An entity providing one or more of the following 9-1-1 elements: network, CPE, or database service.

Serving Central Office The central office (CO) from which a subscriber is served. (See Central Office)

Signaling System 7 (SS7) /Common Channel Signaling 7 (CCS7) An inter-office signaling network separate from the voice path network, utilizing high speed data transmission to accomplish call processing. (The Public Switched Telephone Network is in the process of upgrading from MF Signaling to SS7)

Signature Control A means to control the output of a time code signal based on the sync or lock status of the PSAP master clock. (Ref. NENA 04-002)

Single Point of Failure A hardware or software component or sub-system which experiences a failure causing more than 50% of the total system to fail. (Ref. NENA 04-001 Reliability Objectives)

Source Data Base The data base maintained by each Service Provider which provides customer telephone number and location information for the initial load and ongoing updates to the ALI database held by the Data Base Management System Provider.

Splash Ringing The capability to provide an audible signal simultaneously with trunk seizure on an incoming 9-1-1 call.

Start (ST) An MF signaling tone (digit).

Start Bit In asynchronous transmission, the first element in each character that prepares the receiving device to recognize the incoming information.

Start Prime (STP) An MF signaling tone (digit)

Stop Bit In asynchronous transmission, the last transmitted element in each character, which permits the receiver to come to an idle condition before accepting another character.

Straight Binary Seconds (SBS) A binary number that appears in the IRIG time code which represents the total number of seconds since midnight. (Ref. NENA 04-002)

Sync Abbreviation for synchronized or synchronization.

Synchronization In the context of timing, synchronization means to bring clocks or data streams into phase so they agree with the PSAP master clock. (Ref. NENA 04-002)

System Provider (See Service Provider)

Tag A unique label that precedes the data for the data element associated with the tag.

Tag Data A method of identifying data elements of varying lengths within a data record.

Tag Data Record A record of varying length, comprised of pre-defined tag labels and their associated data elements. There is no particular sequence of the tag/data combinations within a Tag Data Record. Each tag and its associated data is separated from all other tag/data combinations by a pre-determined field separator. Each Tag Data Record is followed by a pre-determined End Of Record character. The receiving data base management system will specify the minimum set of tag/data elements required by that system to uniquely identify and process the record.

Tandem Central Office (Tandem CO) (See E9-1-1 Control Office)

Telecommunications Device for the Deaf (TDD) Also known as TTY. See Teletypewriter (TTY)

Telecommunications Relay Service (TRS) A federally mandated service provided by states that provides communication relay between TTY users and voice telephone users, via a third party, for communications assistance.

Telecommunicator As used in 9-1-1, a person who is trained and employed in public safety telecommunications. The term applies to call takers, dispatchers, radio operators, data terminal operators or any combination of such functions in a PSAP.

Teletypewriter (TTY) Also known as TDD. A device capable of information interchange between compatible units using a dial up or private-line telephone network connections as the transmission medium. ASCII or Baudot codes are used by these units. (per EIA PN-1663)

Three-Way Calling (see Conference Transfer)

Time Code A series of pulses or characters which represent a digit such as a 4. The location of a particular binary digit in the code defines its meaning, 4 hours, 4 minutes or 4 seconds. (Ref. NENA 04-002)

Time Difference of Arrival (TDOA) A terrestrial Location Determination Technology (LDT) that computes a transmitter's location based upon the times a signal is received at multiple receivers.

Time Division Multiple Access (TDMA) A digital radio interface utilized by some North American PCS carriers.

Time Sync Character A specific character location in the ASCII time code data stream which changes dependent on the lock or unlock status of the PSAP master clock to its source. (Ref. NENA 04-002)

Traceable UTC Source Traceable sources of UTC time are available from various time services of the National Institute of Standards and Technology (NIST) and US Naval Observatory (USNO). These services include telephone dial-up, low and high frequency radio transmissions, and Global Positioning System (GPS). (Ref. NENA 04-002)

Transfer A feature which allows the PSAP Telecommunicator to redirect a 9-1-1 call to another location.

Transfer Key A key which is programmed to dial a telephone number, a selective routing transfer code, or a speed dial code to accomplish the transfer of calls.

Transient A random disturbance of normal voltage with a very short time duration (<8.3ms) that occurs on the power source or data/signal/telecommunications conductors.

Transient Voltage Surge Suppression (TVSS) Devices designed to protect critical PSAP equipment from transients induced on powering and data/signal/telecommunications conductors. (Ref. NENA 04-001)

Trunk Typically, a communication path between central office switches, or between the 9-1-1 Control Office and the PSAP.

Trunk Group One or more trunks terminated at the same two points.

Trunk Seizure The point in time at which a 9-1-1 call is assigned to a trunk and acknowledgment is provided by the equipment at the distant end.

Underwriters Laboratories (UL) One of several nationally recognized testing laboratories (NRTL) whose testing specifications have been adopted as de facto industry standards.

Uninterruptible Power Supply (UPS) An auxiliary power unit which provides continuous battery backup power in the event of a commercial power failure.

Universal Coordinated Time (UTC) Also known as Zulu or Greenwich Mean Time (GMT).

Voice Carry Over (VCO) A method which utilizes both voice and text communications on the same call, allowing a person who is hearing impaired to speak directly to the other party and receive response via a TTY or other means for text communications.

Wireless Phase I Required by FCC Report and Order 96-264 pursuant to Notice of Proposed Rulemaking (NPRM) 94-102. The delivery of a wireless E9-1-1 call with call-back number and identification of the cell-sector from which the call originated. Call routing is determined by cell-sector. (Target date April 1998)

Wireless Phase II Required by FCC Report and Order 96-264 pursuant to Notice of Proposed Rulemaking (NPRM) 94-102. The delivery of a wireless E9-1-1 call with Phase I requirements plus location of the caller within 125 meters 67% of the time and Selective Routing based upon those coordinates. (Target date October 2001)

Wireless Telecommunications The family of Telecommunications services under the heading of Commercial Mobile Radio Service. Includes Cellular, Personal Communications Services (PCS), Mobile Satellite Services (MSS) and Enhanced Specialized Mobile Radio (ESMR).

Web World Wide Web or Internet.