ANY COUNTY IN FLORIDA

WIRELESS 9-1-1 PHASE I
IMPLEMENTATION CHECKLIST

This checklist is provided as a tool to assist in the implementation of Phase I Wireless 9-1-1 service in _____ County. No claim is made that this document is an all-encompassing list, nor that the steps are listed in the order that applies. The expectation is that the list will be customized as planning meetings are held and the circumstances dictate. This checklist is a collaboration of _____**Insert your county name here**_____ , Leon and Nassau County Coordinators Offices.

This document contains materials that were developed from a number of different professional sources committed to deploying wireless E 9-1-1 services in a professional and cost effective plan. The materials are intended for the use of all Wireless participants as reference material and may/should be modified to fit the need of the end user. Contributors to this document are SCC, BELLSOUTH, GTE, BELL ATLANTIC, SPRINT, NENA, APCO, NASNA, Florida Department of Management Services and the Wireless E911 Board.

The document provides a chronological map, with an attached glossary of terms and acronyms, so that the key activities required for successful deployment are under one cover. The activity list provides both an activity summary and identifies the responsible party. Also included is a detailed discussion of the various deployment activities and a technical overview of the two primary wireless services, CAS and NCAS.

OVERVIEW

Wireless Phase I 9-1-1 deployments can be completed with minimal difficulty when standard processes are understood and employed. The following are steps required for each category within the deployment flow. By understanding each of the steps required for a successful Phase I deployment and their relative order within the flow of the deployment, efficient planning can be put into practice and unexpected surprises can be avoided. The smoothest deployments occur when strong program management is employed. There are multiple players involved in a wireless deployment and the completion of each task is critical to keeping deployment activities on track. The program manager's job is to insure that each participant knows what they need to do, why they need to do it, and the schedule for getting it done.

PRE-IMPLEMENTATION PHASE

_ Determine the need to implement Phase I Wireless 9-1-1 Service.
_ Schedule an initial meeting to include representatives from County Sheriff=s Office, City(Cities)

Police Department, Emergency Medical Services and the Division of Emergency Management to discuss the statutory requirements of Phase I and review this checklist.

Determine the Political considerations of Wireless implementation and make the appropriate meetings take place.

_ Representatives from these agencies should be empowered to make decisions that will reflect the official position of their organization. These representatives will comprise the Development Implementation Team. It would be beneficial that the same individual(s) represent their agency and attend all meetings throughout the implementation process.

_ Minutes will be rendered for each meeting documenting operational and design considerations with copies distributed to the Sheriff, Chief of Police, and EMS Director.

Determine the type of Database Program the County desires to operate under as wireless service is provided. Will GEO Based Mapping be the foundation for 911 growth, will the MSAG be changed from TABULAR to SPATIAL?

_ Issues to be considered:

a) Evaluate operational issues such as trunking, equipment, staffing, the idiosyncrasies of wireless calls, etc.

b) Wireless calls tend to take longer to process than wireline calls, due to the inability of the caller to give an exact location.

c) Typically, more calls are received from wireless telephones per incident than from wireline telephones.

d) There may be a requirement for additional call takers or answering positions at the primary PSAPs. Growth and change is anticipated. Establish some type of Call Reporting analysis on current trunk groups to determine P.01 and trunk loading.

e) Additional trunks may be required from the tandem switch to the primary PSAPs for the delivery of wireless 9-1-1 calls.

6) Review Land verses Wireless trunk grouping and necessities.

g) Wireless 9-1-1 calls are growing each year as the number of wireless phones continues to increase.

8) Revisit Call Diversity, Diverse Trunk inputs and Number Portability.

INITIAL 9-1-1 SERVICE PROVIDER (LEC) CONTACTS

_ The Development Implementation Team will schedule a meeting with LEC marketing and technical representatives to determine the LEC's ability to provide wireless 9-1-1 services and their preferred technology.

a) Determine impact on 9-1-1 equipment, trunk configuration, ALI display format, mapping, and computer aided dispatch systems. Determine what options are available.

b) There is no provision, in any legislation, that requires the County to blindly accept the service in the manner the wireless carriers or 9-1-1 service provider prefer to provide it. Choices are available and technology requirements are neutral under Florida Statutes and FCC regulations.

3) Determine what the Project Time Line dates for the Interconnect Agreement between the Wireless Service Provider (WSP) and the LEC will be at the initial meetings.

4) Provide to all parties associated with the Wireless Implementation, a **PHASE I DEPLOYMENT ACTIVITY FLOW DIAGRAM (figure 1).**

NOTIFICATIONS

_ Determine what wireless providers are currently providing service in the County.

a) Send the wireless carriers certified letters, indicating the desire to begin negotiations to accept wireless Phase I 9-1-1 calls. (Nowhere is the term contract used.)

b) Establish a date for the first planning meeting with the wireless carriers, Sprint, and the Development Implementation Team allowing at least 30 days notice.

c) Copy LEC and the State 9-1-1 Coordinator on letters to wireless carriers.

4) Inform out of state wireless carriers of the Florida Sunshine Law, F.S. 119.

_ This step begins the process of developing the cost estimates, workload estimates, and technology choices available to the County on an individual case basis. The State of Florida 911 Wireless Board has met and established a cost recovery program for all WSPs in Florida.

PLANNING MEETING

_ Conduct a AGet-to-know-one-another@ meeting with all of the participants that will be involved in the implementation process. Indicate to the wireless providers that proprietary issues will not be discussed.

a) This meeting should include:

- _ The Development Implementation Team
- _ All wireless carriers (Include any subcontractors they utilize)
- _ Local LEC
- _ Possible CAD vendors if required
- _ Mapping vendor, GIS

b) Attempt to resolve the following issues at this meeting:

- _ The method of wireless Phase I call delivery to be employed, agreed to by all participants. It will be Call Associated Signaling (CAS), Non-Call Associated Signaling (NCAS w/SCP or NCAS w/WID) or a Hybrid delivery solution.
- _ Ensure WSPs discuss how the number of trunks from each wireless carrier to the routing tandem will be determined. This is solely a WSP responsibility and there is no cost to the PSAP. Also, determine the trunking and signaling requirements between Carrier and MSC and the LEC selective router. **PSAP must be careful to not get drawn into any payment requirements during this discussion!!**
- _ The wireless carrier is responsible for determining how many trunks are required to provide a P.01 grade of service from the MSC to the tandem.
- _ WSP should show a plan for congestion control (management of the volume of calls from any one area) and determine default and alternate routing assignments. Select default and alternate PSAPs if applicable during this discussion.
- _ Determine the number of separate wireless 9-1-1 trunks necessary from the tandem to the primary PSAPs. (Separate wireless trunk groups provide a guard against the blocking of wireline 9-1-1 calls in the event of a major public incident). Do not duplicate the wireline trunk groups that are current at each primary PSAP.
- _ Wireless trunks from the tandem to the PSAPs can be established by determining the total load offered from all of the wireless carriers. Default overloads from Wireless Trunks to Administrative PSTN lines.

- Select and publish the "**Wireless ESN Default"** that will control **ALL** Wireless routing. Ensure that the MSAG is changed to move any P-ANI location into the Wireless ESN.
- Identify if any of the players are utilizing subcontractors. Understand the role and responsibilities of the subcontractors, as well as who is accountable for their performance. Identify "WHO" is signing the Service Order!!
- All players will provide a plan on how calls will flow (or not flow) if individual components or communications links fail.
- Talk about P-ANIs (pseudo Automatic Number Identification), ESRDs (Emergency Services Routing Digits), and ESRKs (Emergency Services Routing Keys) so that all players know what they are. Make a choice concerning which of these methods of identifying cell sites and or cell faces will be employed in the system. Determine the effects each will have on the ALI information, the ability to identify the response agencies, the support of Selective Transfer, and the flexibility for PSAP reassignment.
- Determine cell sector naming conventions. Establish what information will go in the Subscriber Name field versus the Street Address field. NCAS requires the creation of default records in the ALI database that may require special attention.
- Discuss alternate program routing instead of NCAS if the LEC is capable of HYBRID or CAS solutions at the TANDEM.
- Determine when the ISDN copper or FIBER **DIGITAL TRUNKS** will be needed to be installed for 20 Digit reception FOR Phase 1.5 and Phase II.
- Determine if any of the issues described above create any special demands or problems and if they are financially acceptable for the PSAP's CPE.
- Determine how the mapping system will interface with the wireless calls and how it will be used to provide cellular caller location information and identify the response agencies assigned to the area covered by the cell/sector.
- Determine if the CPE will incur circuit costs, database interface costs, and engineering fees. Details should be obtained in writing in private meetings. Extra costs should only prevail if the PSAP is using a TYPE V Database.
- Establish a mechanism for the wireless carriers to interface with the LEC so that each understands the other=s role. They will need to communicate regarding the ordering of trunks from the MSC to the selective router and database access. Establish a working relationship and ensure it continues beyond implementation.
- Identify the primary contacts for all players in the system so that everyone knows who to keep in the loop. Identify the specific individuals (Project Manager) in each company that will be managing their portion of the implementation. Obtain telephone numbers, pager numbers and E-Mail addresses.
- Identify the NENA company ID and 24 X 7 contact number for each carrier.

_ Develop a test plan that describes, in detail, all the aspects of the testing phase. Ask each carrier to submit a test plan. Decide whether to use each carrier=s test plan individually, or develop a master test plan from those received. Do not let any carrier connect without providing a test plan.

_ Arrange for individual meetings to discuss anticipated workload, cell routing, subscriber base and any other proprietary issues.

_ Discuss any applicable state or local legislation or regulations. The LEC is regulated by the Florida PSC, the wireless carriers are only regulated at the federal level.

_ Set time lines to move forward when all information is received.

_ Establish trouble reporting procedures and expectations.

_ Establish notification procedures for major outages.

IDENTIFY CELL COVERAGE - TREATMENT OF PROPRIETARY INFORMATION

_ Service agreements between Carriers and the County must be negotiated and signed.

a) A limited number of contracts and agreements must be put in place during or in advance of the deployment process. There is significant variance in how much of the deployment process the wireless carrier is willing to complete prior to these contracts being in place. In some cases, the carrier will require the contract to be signed prior to any deployment activities taking place. Other situations may arise where the carrier will require contract finalization prior to trunks being ordered. Still other deployments will be allowed to proceed to pre-production test, requiring all contracts and agreements to be completed just prior to final test and deployment.

b) Interconnect agreement between Carrier and LEC signed and in place. Use the Wireless 911 Board template if the County Attorney has reviewed it and concurred.

c) Have each Wireless Service Provider produce the RF coverage maps for all of their cells that may provide service within the County. Obtain in writing an agreement that all cell site towers will be provided not only on paper, but on a disk in either ESRI or MAPINFO extensions. Require the RF patterns to be marked to scale at least at -75db, -85db and -95db. This may require execution of a non-disclosure agreement or other proprietary information release form. If in doubt as to the proper format, consult the County's legal counsel.

d) From these maps, it is the intent to associate individual cells and sectors with individual PSAPs (ESN=s) based on the area primarily served by that cell sector. The goal is to identify the cells/sectors in each PSAP=s service area, in order to establish selective routing assignments. Ensure each ESN used forces routing of wireless calls to the PSAP's Wireless Trunk Groups only–default routing is the PSAP's choice!! The intent is that calls originating in the City will be selectively routed through the tandem to the City's Police

Department and calls originating in the County will be answered at the County Sheriff=s Office. Default call routing is agency dependent.

· Digital GIS Shape File maps will be created, from the RF coverage maps, depicting each cell sector coverage as a polygon. Color code the polygon to show the RF db power relationship of each cell sector. It is desired that each polygon be of such detail that it represent the geographical area(s) that the given cell face may provide cellular communications based on average atmospheric conditions and obstructions. When a 9-1-1 call is received , the P-ANI assigned to the associated cell sector will be used to initiate a digital map display of the appropriate cell sector polygon at the 9-1-1 answering position. This display, along with location information obtained from the cellular caller will be used in conjunction with the GIS Common Place Name file in an attempt to determine the caller=s physical location.

f) Cells along the County border should be reviewed to determine if the majority of the serving area of one or more sectors is in the jurisdiction of a neighboring agency. This will determine routing for those sectors. These face-to-face meetings should always be done with each carrier individually and the Development Implementation Team. **Remember, This is a Phase I development issue and a mandatory revisit during Phase II for 125 meter control accuracy.**

WIRELESS CALL HANDLING OPTIONS FOR 9-1-1

_ Although "Wireless Technology" is evolving and the interconnection provisions for 9-1-1 access and 9-1-1 service is still being established, Project Management Time Lines need developing now. There does not appear to be a consistent standard from the wireless industry to measure "level of service, P.01" or to solve the problems of call overloading (Diverse Trunking) and still maintain adequate service to their customers.

_ County/City 9-1-1 systems are different based on a variety of factors:

- _ ANI / ALI Provider
- _ Selective Routing
- _ 9-1-1 Controller Equipment
- _ 9-1-1 Call Answering Equipment
- _ Number of PSAPs
- _ Number of Landline Providers
- _ Number of Wireless Providers
- _ Number of Central Offices
- _ Types of Central Offices

_ Because 9-1-1 systems are different and all wireless provider technology is evolving, there cannot be uniform operating standards in the sense the Florida 9-1-1 Plan now covers standards for the

landline providers. Wireless standards will be addressed in their own wireless plan by the State 911 Coordinator.

_ Five major issues exist at this time:

_ How to prevent wireless 9-1-1 calls from swamping the 9-1-1 system and preventing landline 9-1-1 calls from not being answered and realigning land, wireless, and administrative answering paths. Any solution should also prevent landline calls from swamping the wireless or PSTN portion of the 9-1-1 system.

_ Deriving some sort of measurement for a performance standard. This standard would indicate the odds of a wireless 9-1-1 call being blocked.

• Determining "Call Boundary" and "PSAP Crossover"
Prepare a Project Management Time Line (GNATT chart) that visits the various schemes or scenarios for wireless call handling, as well as general discussion issues that should be considered in making decisions about wireless 9-1-1 access and performance standards.

_ It is incumbent upon the County to meet with wireline and wireless providers and come up with a plan of action to resolve the problems listed above. Any options for wireless access should be regarded as a change or addition to the existing 9-1-1 system.

General Discussion:

_ CALL-VOLUME DATA - This would offer some projections for growth, availability of circuits (P01 or equivalent) and possibly lend itself to the same type of formula used by the landline carriers to measure central office trunking, network reliability, etc. Wireless companies often consider 9-1-1 as a service provided to their customers and they do not keep track of the number of calls routed to 9-1-1. Nor do they monitor associated data such as tower origination, tower face, time of day, etc. "Call Reporting" software programs are becoming a necessity so that PSAP's are afforded the ability to monitor each trunk activation. This monitoring is needed so that proper usage data is collected before implementation of Phase II wireless.

_ AVERAGE BUSY HOUR - There is no average busy hour of 9-1-1 calls for wireless 9-1-1. By definition wireless 9-1-1 call volumes are episodic in nature and every episode has the potential to overload the 9-1-1 system.

_ CALL SET-UP TIME - Wireless call set-up time does not work the same as landline. There can be vast differences that can impact our systems. Some solutions require a call set-up time as long as 20 seconds. Some carriers and some 9-1-1 systems choose to insert a false ring during the set-up process to assure the caller that the call is being processed. If the time is too long the caller will hang up and call again. If interim ringing tones are inserted to cover a long set-up time, the PSAP may be criticized because they let a 9-1-1 call ring too long.

- CHOKE POINTS - Every 9-1-1 system must identify a point or points where a finite number of 9-1-1 calls can be accepted and processed. This may be an equipment limitation or an arbitrary decision. But it should be and informed decision, whether the point is at the tower, the MTSO, the router/tandem or the PSAP. The option to overflow or alternate route calls to separate standalone wireless trunks or a separate 7/10 digit number should also be considered early in the decision phase.
- INTERCONNECT DOCUMENTATION - The County should be provided with a copy of the pertinent wireless interconnect documentation provided by the serving LEC(s) to the wireless carriers within the county. This will assure that all parties are utilizing the same terminology and working from the same methodology.

- Wireless call handling options for 9-1-1

- INCLUSIVE CONNECTIVE METHOD

  - Integrate with existing 9-1-1 system CAMA architecture – Trunking from the wireless carrier to the 9-1-1 service provider tandem or router for call delivery to the Designated PSAP.
    - Advantages:
      - Consistent with most operating 9-1-1 systems
    - Disadvantages:
      - Permits wireless calls to access the existing 9-1-1 system with no choke mechanism. A single incident can overload the 9-1-1 trunks and preclude wireline access to the PSAP
      - No useful location information provided
      - This may still require additional CPE costs

- EXCLUSIVE CONNECTIVE METHOD
  - Separate 9-1-1 trunk groups for wireless and wireline
    - Advantages:
      - Segregates the trunk groups to prevent a single incident from blocking all incoming lines
      - Permits better call management - handling and tracking
      - Allows utilization of a separate in-house database for geo-spatial information to identify call location

- PSAP call takers are aware that they are answering a wireless call and can prepare accordingly
- Anticipated minimal recurring costs
- Choke point control is PSAP directed to PSTN circuits

- Disadvantages:
  - Increases the potential number of calls presented to the PSAPs on the wireless trunks with the same number of call takers responsible for larger volume of calls
  - New technology, may require additional hardware and software to initiate
  - May require larger telephone sets to accommodate additional lines
  - Some PSAP equipment may not permit the use of 2 trunk groups
  - Depending on the PSAP CPE capabilities, they may be forced to choose which information they prefer to receive, such as tower location or call-back number.

- DIRECT WIRELESS CALLS TO A 7 DIGIT NUMBER
  - Advantages:
    - Segregates the trunk groups to prevent a single incident from blocking all incoming lines
    - Permits better call management - handling and tracking
    - PSAP call takers are aware that they are answering a wireless call and can prepare accordingly
    - With Caller ID can display the MIN

  - Disadvantages:
    - Increases the potential number of calls presented to the PSAPs - same number of call takers responsible for larger volume of calls
    - May require larger telephone set to accommodate additional lines
    - Reduces Call Taker urgency when answering an administration line verses 911 trunks
    - Could cause PSTN lines to be blocked out so PSAP is limited on attempting outgoing lines
    - Unless a Caller ID function is initiated in the CPE, no ALI location data will be available and neither will ANI data
    - The 10 digit Call Back Number may not be available when using PSTN lines

- REGIONAL WIRELESS (COUNTY WIDE) PSAP
  - Advantages:

- Routing of wireless calls is not an exact science - establish a separate PSAP - presumably the Sheriff's Office - with regional jurisdiction for answering and transferring or relaying wireless calls. Economy of scale and technology.
- Segregates the trunk groups to prevent a single incident from blocking all incoming lines
- Allows utilization of a separate in-house database for Geo-Spatial information to identify call location.
- PSAP call takers are aware that they are answering a wireless call and can prepare accordingly.

- Disadvantages:
  - Increases the potential number of calls presented to the PSAP - same number of call takers responsible for larger volume of calls
  - May require larger telephone sets to accommodate additional lines
  - Some PSAP equipment may not permit 2 trunk groups
  - By utilizing CAMA trunks - the PSAP is limited to the data and solution chosen by the LEC
  - Digital Trunks will be required. This is a direct CPE cost.
  - PSAP forced to choose between tower location and MIN or call-back number

- TOTAL SEPARATION OF INDUSTRIES TECHNOLOGIES
  - Wireless Calls directed to a separate wireless answering/Call Taking position
    - Advantages:
      - Segregates the trunk groups to prevent a single incident from blocking all incoming lines
      - Permits better call management - handling and tracking
      - Allows utilization of a separate in-house database for Geo-Spatial information to identify location
      - PSAP call takers are aware that they are answering only wireless calls and can prepare accordingly
      - In theory, eliminates the wireline completely from the process
      - Cost effectiveness - utilize technologies available to wireless technology - which are not practicable in the current landline environment
    - Disadvantages:
      - Increases the potential number of calls presented to the PSAPs - this makes the same number of call takers responsible for larger volume of calls
      - May require additional telephone sets to accommodate wireless lines

- Extreme Peaks and Valleys for call loading, therefore generating a high stress potential during the peaks
- New concept, new technology, new database network and affiliation cooperation
- Interconnection with existing PSAP equipment, generators, recorders, etc and it will be a new budget/financial decision.

DATA COLLECTION AND DATA BASE MANAGEMENT

- Data collection is the first significant deployment activity and, along with contract negotiation, is one of the most critical, and often time-consuming process components. Data collection can either facilitate the deployment process or cause the deployment process to be delayed far beyond the target 6-month window.

a) PSAP boundaries verified with PSAP authorities
b) PSAP call traffic statistics for wireless and wireline calls collected
c) PSAP network characteristics (trunking, selective routers) collected
d) PSAP CPE equipment display format collected

- The data collection process is initiated by collecting critical data elements from the 911 entity. It is only with this information that the rest of the deployment activities (including the rest of the data collection process) can occur. The 911 entity will be asked by the wireless carrier or its agent to provide the following critical data elements:
- Responsibilities of the County:

a) PSAP's wireless E9-1-1 jurisdictional boundary information.

- The boundaries collected in this process relate only to the wireless jurisdiction - which may or may not be equivalent to the landline jurisdictional boundaries. For instance, PSAPs that are primary for landline may choose not to receive wireless E9-1-1 calls directly; thus, would be secondary to a PSAP that would directly receive the wireless E9-1-1 calls placed from their area.

b) PSAP information necessary to deploy wireless E9-1-1.

- Local LEC contact information.
- ALI database contact information.
- PSAP trunking and (or) call traffic information (as input for assessing wireless switch to SR trunking requirements)

- Responsibilities of the Wireless Carrier for the implementation of FCC Order 94-102

1) Wireless Carrier Identification and Information requirements:

During the data collection process, the wireless carrier or its agent will be the primary collectors of data. The data elements collected are required by the carrier or its agent for input to various wireless E9-1-1 deployment activities. Information collected includes:

- PSAP's wireless E9-1-1 jurisdictional boundary information
    - Local LEC contact information
    - ALI database contact information
    - PSAP Database Manager interaction
    - PSAP trunking and/or call traffic information (as input for assessing wireless switch to SR trunking requirements
- Data messaging capabilities and restrictions for the wireless switch to SR messaging and the trunk type implemented for the carrier's wireless E9-1-1 implementation
- Carrier technical market (cell site/sector and MSC) data for the PSAP area is collected from the local carrier market
- CPE format specifications
    - PSAP display format details (for example, field lengths and positioning)
    - wireless display information (which fields contain cell sector detail in accordance with LEC & PSAP requirements
- Routing digits which will be used for carrier deployment (either non-dialable range assignment, or dialable range from the LEC or carrier)

b) Carrier Information Template:

- NENA Carrier ID
- Carrier Name
- Contact Name
- Contact Title
- Street Address
- City, State & ZIP
- Voice Phone
- Fax Phone
- 24X7 Phone
- Mapping Contact Person
- Type of Carrier: (PCS, AMPS, ALL, CELLULAR, CLEC, etc)

c) Information for each tower:

- _ Latitude/Longitude in decimal degrees (DD), or degrees and decimal minutes (DDM), or degrees, minutes and decimal seconds (DMS)
- _ Company Tower ID
- _ Type (AMPS-analog 900mHz, TDMA, CDMA etc.)
- _ Street address of tower
- _ Town of tower
- _ State of tower
- _ Height of tower above ground
- _ Units of height (feet or meters)
- _ Number of antennae faces
- _ Orientation of each face
- _ Default range of each face in miles
- _ If P-ANI's have been assigned, include the P-ANI assigned to each antennae
- _ A coverage map for each tower displaying the coverage area for each sector. These maps
- _ If possible, the following tower information should also be provided in ESRI or MAPINFO file formats:

  - _ *ChangeNew, Longitude, Latitude, CarrierID, TowerID, Type,*

    StreetAdd, Town, ST, Elev, Eunits, NoFaces, Range, Runits, AntOrientation, PANIList In OrderOf Faces

    - _ **ChangeNew** - "N"if a new tower listing, "C" if a change for an existing tower.
    - _ **Longitude** and **Latitude** should be entered as follows:
      - _ For Decimal Degrees (DD) enter: QDDD.DDDDD or DDD.DDDDD, No spaces
      - _ For Degrees, Dec. Minutes (DDM) enter: QDDD. MM.MMMM or DDD MM.MMMM, One space
      - _ For Degrees, Minutes, Seconds (DMS) enter: QDDD MM SS or DDD MM SS, Two spaces
    - _ **Carrier ID** is the NENA registered ID
    - _ **Tower ID** is the ID the Cellular Provider uses for a tower
    - _ **Type** is AMPS, TDMA, etc.
    - _ **StreetAdd, Town, State** is the address of the tower
    - _ **Elev** is the elevation of the Antennae over the ground.
    - _ **EUnits** are the units of elevation - enter F or M
    - _ **NoFaces** is the number of antennae on this tower (Omni=1)

- **Range** is expected maximum range of this tower in miles/km
- **Runits** are the units of range - M=miles, K=kilometers
- **AntOrientation** is the orientation of each face of the antenna in degrees

- **P-ANI List In Order Of Faces** the “Pseudo-ANI” assigned to each face in the order of the orientation entry or in clock-wise order

- Responsibilities of the LEC

a) The LEC's role in the data collection process is to provide information required for deployment to the wireless carrier or its agent. This information includes:

- Selective Router(s) supporting the PSAP(s) being deployed: number and types of SRs, location(s), name(s), technical contacts, CLLI code(s) and Point Codes (when SS7 signaling is used)
- Data messaging capabilities and restrictions for the wireless switch to SR messaging and the trunk type implemented for the carrier's wireless E9-1-1 implementation
- Point Codes when SS7 signaling is used between the MSC and S/R
- ESN(s) to be utilized and associated English Language Translation (ELT) which should be displayed for the ESN
- A “Solution Base”at the Tandem: CAS, NCAS or HYBRID

- Responsibilities of the ALI Database Provider

a) The following information comes from the ALI database provider (understandably, this is often the LEC). The information is used by the wireless carrier to establishing data records, or specifying the data that needs to be loaded into the wireless 911 systems:

- Information, from the ALI database provider, about the ALI database(s) supporting the PSAP(s) being deployed
- Support of Real Time links, for example, dynamic ALI update or "steering" to a third party ALI database (this includes information about the appropriate technical personnel to be contacted to coordinate system configuration, testing, turn-up to production status, and production support)
- CPE format specifications:

    - Wireless display information:

        1) Which fields contain dynamic information which is modified for each

cell sector and/or each call (typically the street name field and optionally also the community field contain location descriptions, and call back number is placed in location field)

2) Which fields contain static information (typically customer name field contains wireless carrier name, state is populated, etc.)

_ MSAG, File Transfer Specifications and Procedures (such as, Service Order Interface (SOI) processing). Interim database procedures for consistency in MSAG entries for tower locations or other data must be established. This could be part of the Interconnect Documentation

_ Responsibilities of the PSAP Database Manager

a) The baseline responsibility of the PSAP manager is to ensure that the MSAG is properly aligned to accept "Wireless Configured" data that is normally foreign to our process of database management. This does not matter if it is for either a CAS or NCAS solution.

_ Actions Required

_ Specific address assigned to each tower (omni facing requirements)

_ Specific addresses assigned for each tower face (120 deg sector facing)

_ Specific addresses assigned for each tower face (180 deg semi-sector facing)

_ Amplifying data depicting tower specific information for the Locator Field

NETWORK IMPLEMENTATION

_ After the basic data elements are collected, the wireless carrier works with the PSAP and the LEC collectively to reach an agreement on the solution that will be used for the wireless carrier's E9-1-1 deployment. Typically, each wireless carrier has a preferred solution that the carrier has chosen to implement based on a number of criteria. These criteria may include technical capabilities/limitations, reliability, and pathways to Phase 2.

_ When a solution is selected, the wireless carrier or its agent will work with the PSAP, LEC, host ALI database provider, and any 3rd party suppliers to create a network design to support the solution.

_ After the network design is complete, the wireless carrier (or its agent) works with the LEC and

911 ALI database provider to put the necessary hardware, trunks, and software in place to prepare for the deployment.

_ Order/Install appropriate trunk types between MSC and Selective Router

- _ Install/ verify circuits between MSC and SCP (if applicable).
- _ Install/ verify circuits between SCP and ALI (if applicable).
- _ Verify circuits for ALI steering (if applicable).
- _ Install/ verify circuits between WID and ALI (if applicable).

CALL ROUTING / CPE DISPLAY

_ In support of call routing, the wireless carrier, or its agent, typically provides a map with the carrier's cell sites plotted along with the PSAP's boundaries. This map is used in discussion with the carrier to determine the desired selective routing and specific location description for display at the PSAP for each cell sector. The process also includes decision making on alternate and default routing. Depending on the number and density of cell sectors in the PSAP area(s) to be deployed, this may be accomplished through a meeting or conference call between the wireless carrier (or its agent) and the PSAP.

- _ Call routing meeting between carrier and PSAP to determine desired routing of 9-1-1 calls for each cell sector with coverage in PSAP boundary.
- _ Provide final approval on routing of cell sectors in the PSAP jurisdictional area
- _ Determine default routing of calls with PSAP.
- _ Determine alternate routing of calls with PSAP.
- _ Verify location descriptions for each cell sector.
- _ Verify data display characteristics for call taker CPE screen.

DATA PROVISIONING

- _ Establishing the Final Verification of MSAG changes to the Wireless Base requirements
- _ Build and insert or deliver ALI database records for each cell sector.
- _ Assign ESRD/Ks for each sector or PSAP (depending on solution).
- _ Provision WID with ESRD/Ks (if WID solution).
- _ Provision SCP with location information (if applicable).
- _ Provision Selective Routing Table at LEC selective router (if not SR/ALI).
- _ Provision translations in Carrier MSC.

PRE-PRODUCTION TESTING / CUTOVER

_ Multiple WSP schedules for “Test Periods” to ensure no overlap testing periods
_ Carrier/PSAP agree on test procedure approval process.
_ Perform pre-production test calls as agreed upon between carrier and PSAP.
_ Review/approve test results (re-test as necessary).
_ Cut-over to 911 "Live".
_ Perform 911 test calls as agreed upon between carrier and PSAP.

MAINTENANCE AND ON-GOING SUPPORT

_ Monitor system performance/maintain as required.
_ Cell site add, modify, delete maintenance activities.

- _ Call routing.
- _ Translations.
- _ Testing–for each new tower, use initial testing procedures; also ensure the procedure restarts for each new tower “FACE” to ensure 100% compliance

_ Carrier MSC add, modify, delete maintenance activities.

- _ Network design changes.
- _ Trunking changes.
- _ MSC translations.
- _ Testing.

_ PSAP equipment/network/jurisdictional boundary changes.

- _ Network design modifications.
- _ Trunking modifications.
- _ CPE display/ALI format modifications.
- _ Jurisdictional boundary changes.

IMPLEMENTATION

_ Develop an implementation plan based on the output from the planning meetings.

a) Issue purchase orders or letters of intent, as appropriate. A written ALetter of Intent@ to formally implement Phase I service will need to be provided to each wireless carrier, LEC, and any other vendors involved in the project. This certified document is required to constitute an official order for service. (Note: This letter is not the final service order

required to complete service) The six-month implementation clock as outlined in the FCC Rule and Order 94-102 starts only after a valid order has been received by the wireless carrier.

b) Hold regularly scheduled project meetings. Have each player provide a status report. Proprietary details should be discussed privately. Track the progress of each player. Identify potential problems.

c) Try to hold to a firm but flexible schedule. Deadlines will be missed, but should be immediately rescheduled.

d) Stagger the cutover schedule. Don=t attempt to activate Phase I service from all carriers during the same week. Spread out the first two or three. If all goes well, the schedule may be accelerated for the remaining carriers. Do not schedule cut-overs on Monday or Friday or the day before a holiday. It is necessary that the carriers and LEC be fully staffed the first 2-3 days of operation.

e) Post-implementation items that should be included in a service agreement:

- _ Determine method for obtaining new and revised cell information from the carriers.
- _ Determine a method of notification for new carriers entering the area.
- _ Track call volumes to determine ongoing trunking requirements.
- _ Obtain usage data from carriers for MSC to tandem trunks.
- _ Obtain usage data from Sprint for tandem to PSAP trunks.

Information contained in portions of this document were obtained from the following sources:

National Emergency Number Association (NENA), Critical Issues Forum, Wireless Phase I Checklist

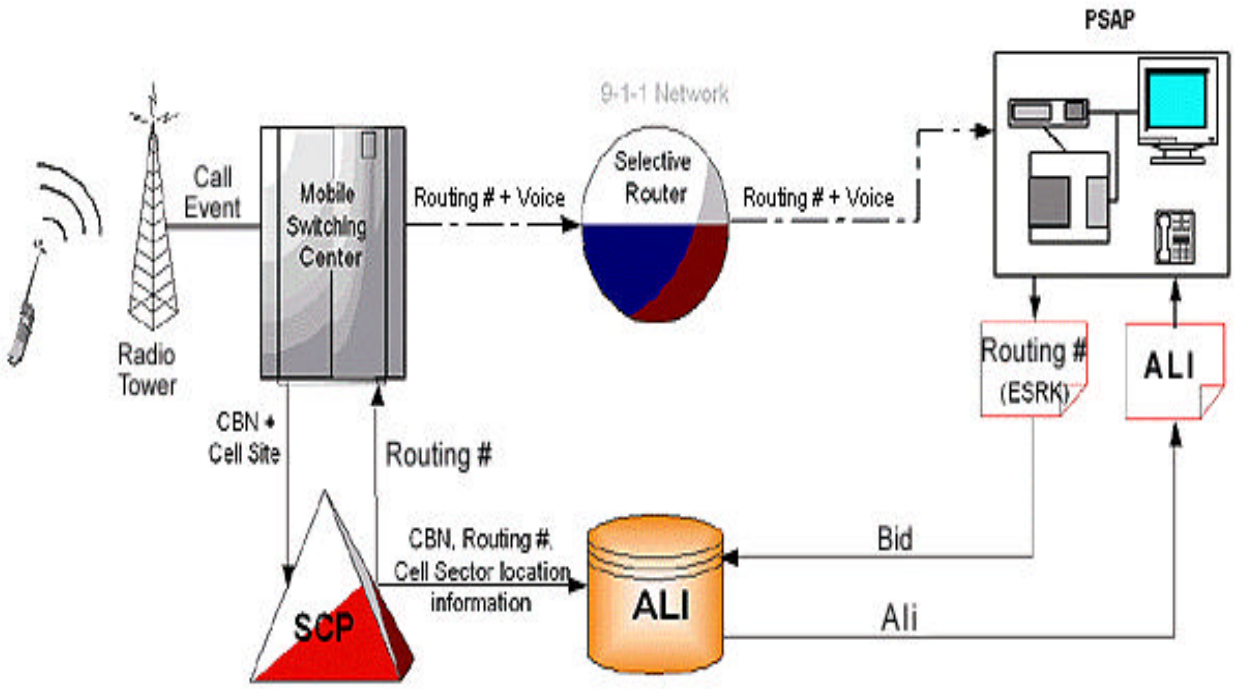
TECHNICAL OVERVIEW OF CAS AND NCAS

This section was developed by SCC Corp, with modifications by Leon and Nassau County 911 offices, to provide a high level of understanding and the basic technical solutions employed in wireless E9-1-1. Both Call Path Associated Signaling (CAS) and Non-Call Path Associated Signaling (NCAS) solutions are discussed and illustrated with appropriate diagrams to provide the reader with a basic wireless 9-1-1 education.

NCAS Solution

The NCAS solution employs a Service Control Point (SCP) that provides routing of all necessary data to both the Mobile Switching Center (MSC) and the ALI database. The voice call and routing number, called an Emergency Service Routing Key (ESRK), are delivered to the PSAP via the LEC 9-1-1 Selective Router. When the voice call is received by the PSAP, the ESRK number is used to retrieve a record containing the call back number and the cell site location data from the ALI database.
The data record created to support this solution assumes that data can be dynamically updated into multiple fields of the ALI record at the time that the call is placed.

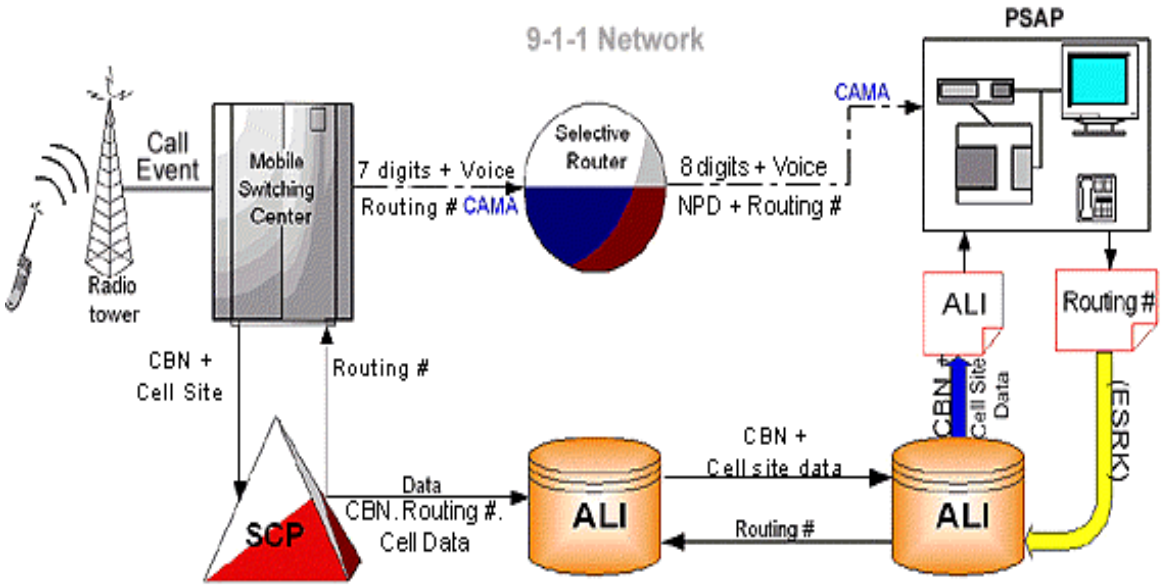
FIGURE 01



NCAS Solution with ALI Re-direct or Steering

The NCAS with ALI re-direct or steering solution is used when the primary ALI provider database is incapable of, or does not allow, dynamic updates. Steering is applied with an NCAS solution, with the exception that the SCP dynamically updates a secondary ALI database. The host database steers the bid for data to the secondary ALI database. The ESRK assigned by the SCP is passed via the SR to the PSAP, which bids the primary ALI. When the bid is received, the primary ALI determines that the bid needs to be re-directed or "steered" and steers the ANI bid to the secondary ALI. The secondary ALI responds with the ESRK record, complete with dynamic updates over networked data links that provide extremely fast delivery of data between the various network elements.

FIGURE 02



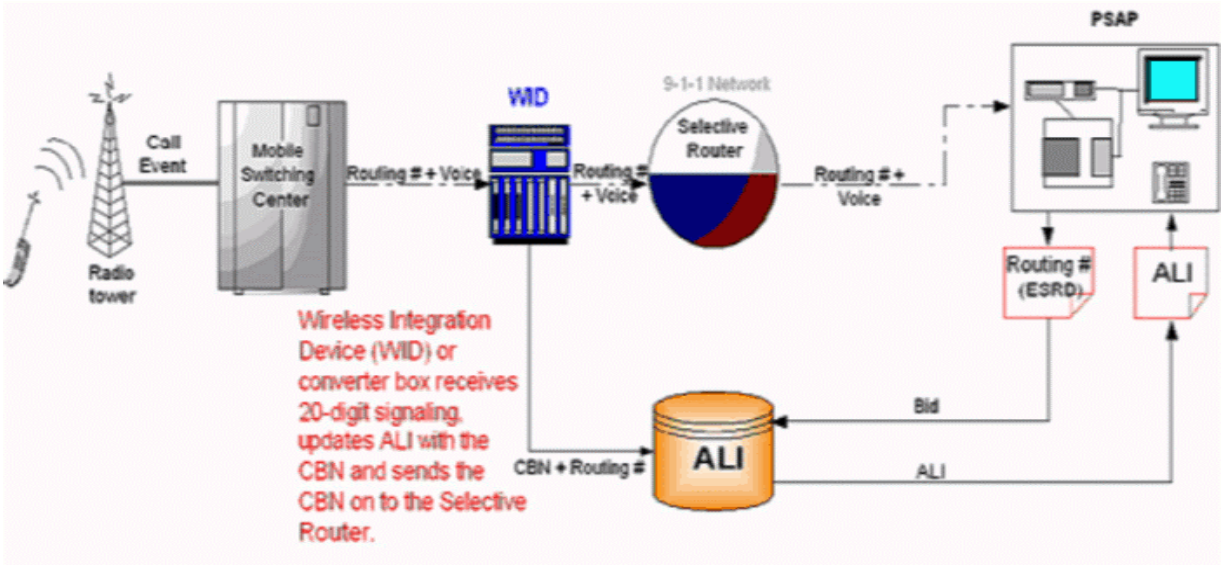
The introduction of steering adds only milliseconds to the data delivery routine and does not impede rapid data response to the PSAP bid for data. This solution allows for dynamic update to ALI records taking both time and cost effectiveness into consideration. Steering has been used successfully within the 9-1-1 environment for many years bringing multiple carrier data records to a single PSAP in the wireline 9-1-1 world. The configuration has also been successfully deployed in several situations to facilitate wireless dynamic updates for LECs that do not have the capability to dynamically update ALI records available in their existing ALI systems.

NCAS Solution with WID device

The functionality of the Selective router can be altered to accept twenty digits along the voice path, but unless the PSAP on the other end can accept the twenty digits, the router needs to strip off half of those

digits to complete the voice call to the PSAP. In some cases, Selective Router functionality has been altered through either software or hardware upgrades to perform this function. In other cases, a device generically referred to as a Wireless Integration Device (WID) is added into the network to perform this specialized function. A WID can be used to accept twenty digits conveyed from the MSC, with both the routing number and the caller's 10-digit number comprising those twenty digits. The WID converts a 10-digit SS7 ESRD to a 7-digit CAMA ESRD that is then passed with the voice call to the Selective Router. The WID device routes both the ESRD and the call back number to the ALI database where the ALI record is dynamically updated with the call back number.The ESRD is used by the PSAP to bid for the ALI record once the voice call is received by the PSAP. In some cases, mainly related to the type of mobile switch used by the carrier, wireless carriers can only use this solution to affect Phase I wireless deployment. Specific technical details must be identified very early on during deployment to insure that the appropriate equipment is available. WID's can be deployed either by wireless carriers or by LEC's to resolve technical systems interface issues if necessary.

FIGURE 03Similar to the previous NCAS solution described, provisioning the ALI record supporting this solution assumes that the caller's call back number may be dynamically inserted into the ALI record at the time of the call. Information about the



cell sector receiving the call is built into an ALI record with the appropriate ESRD number as its lookup key.

CAS Solution

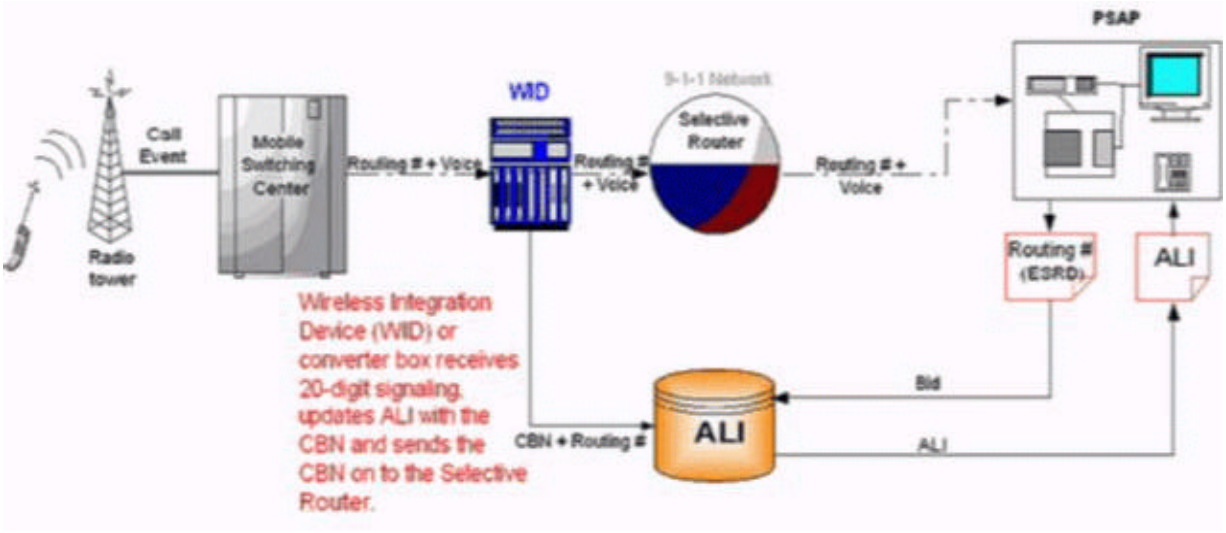
A Call Associated Signaling solution can be employed in areas where 20-digit signaling is available between the Selective Router and the PSAP, either through Enhanced Multi-Frequency (EMF) or

ISDN signaling. This solution set delivers 20 digits of information (10 digit ESRD + 10 digit call back number) directly to the 9-1-1 Entity. The routing number is then used to query the ALI database for the cell site location information that exists in the ALI database as a static record. An issue has developed in relation to the CAS solution when Feature Group D (FGD) trunking is deployed instead of SS-7. The time required to pass twenty digits to the Selective Router and then on to the PSAP is doubled from the amount of time it takes to send ten digits over each link in the traditional CAMA environment. More detail on this topic is found in the Inter-connectivity paper contained in this document. Data provisioning in support of a CAS Solution requires that one record be built for every routing record required and the relationship of records to cell sectors is basically one to one. No dynamic update occurs in the ALI record at the time of a call.

FIGURE 04

Summary

Each of the technology solutions presented represents a viable method to provide the Phase I E9-1-1 data to the PSAP taking into account the needs and capabilities of the Wireless Service Provider, the



Local Exchange Carrier (LEC) network, and the PSAP. The selection of the technological solution used to deliver the required Phase I data to the PSAP is dependent upon existing E9-1-1 infrastructure capabilities, the technological capabilities of the Wireless Service Provider, as well as the economic realities that PSAPs face. A great deal of public funding has been invested in the existing 9-1-1 infrastructure and it is not likely that this can be abandoned over a short time period. On a grander scale, plans for infrastructure updates are being addressed by multiple factions in an evolutionary mode. It is likely that twenty years from now, our E9-1-1 networks will be quite different than they are right now, given time to plan and pay for those major network upgrades. In the meantime, there are cost effective, viable solutions, using existing networks, trunking, and PSAP equipment that allow for Phase I reality.

Wireless E9-1-1 Inter-connectivity

This paper addresses the subject of inter-connectivity requirements that arise due to the various combinations of equipment encountered during the process of deploying wireless E9-1-1 service. Generalized inventories of the components found within 9-1-1 systems, including 9-1-1 selective routers, mobile switching facilities, and database capabilities are presented. Trunking methods are identified to educate you about inter-connectivity capabilities, along with average link set-up times for each signaling link to allow an estimate of call set-up times for each configuration.

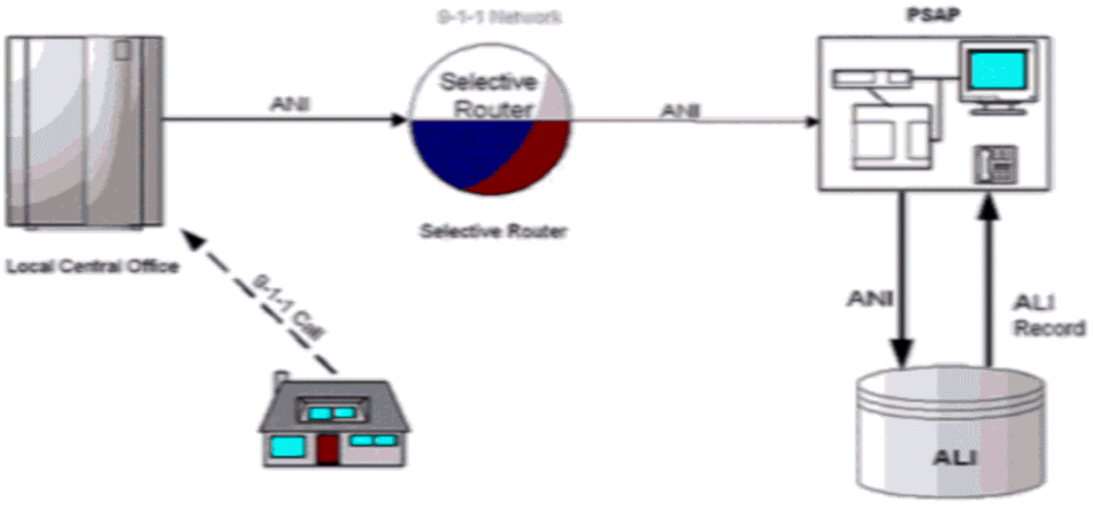
Wireless E9-1-1 Solutions in Use

Enhanced 9-1-1(E9-1-1) networks are comprised of a number of network components, that operate together in order to deliver a 9-1-1 call, along with caller data, to a Public Safety Answering Point (PSAP). Traditionally, in the wireline environment, an E9-1-1 system requires connectivity between a local central office and a specialized switch that serves to route both the call and the caller's telephone number (ANI) to a PSAP. The PSAP then determines the caller location (ALI) by querying the ALI database, which generally does not reside at the PSAP.

Figure 5 illustrates the traditional wireline E9-1-1 configuration.

Traditional E9-1-1 Network Configuration - (Wireline)

In a typical enhanced 9-1-1 (E9-1-1) environment, a 9-1-1 call is placed from a wireline telephone and



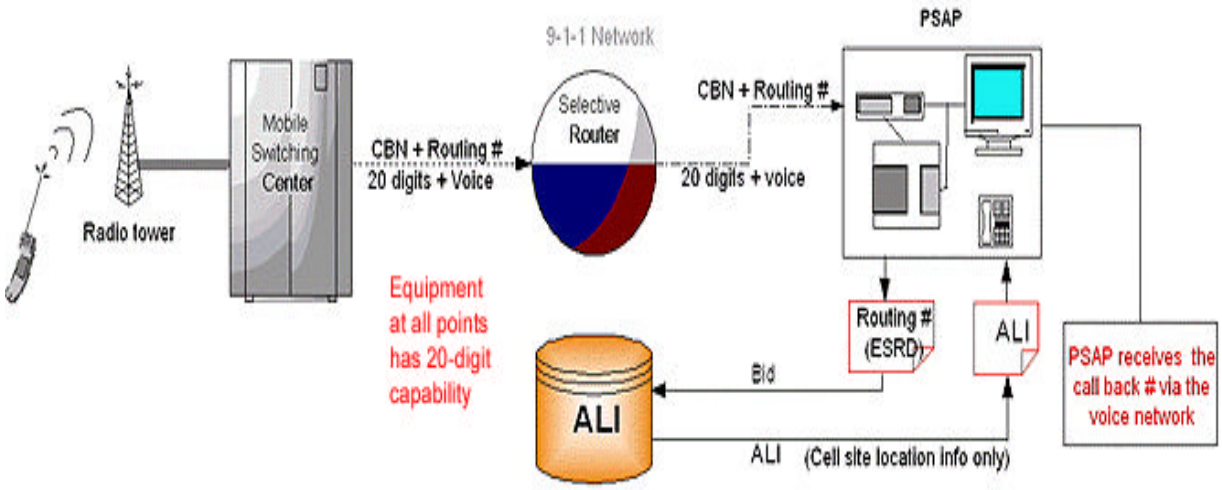
sent to the local central office for that wireline station. The central office recognizes the call as 9-1-1 by the dialed digits ("911") and forwards the call to a specialized switch, referred to as a "Selective Router" Sending the caller's telephone number (TN). Using the caller's TN as a key, the selective router checks a specialized Selective Routing Database (SRDB) for routing instructions and then forwards the call to a predetermined Public Safety Answering Point (PSAP) for voice connection. Equipment located at the PSAP receives the caller's TN (Automatic Number Identification, or ANI) and sends a query to a database to retrieve location information (Automatic Location Identification, or ALI) related to the number that generated the call.

The Wireless E9-1-1 Call Environment

To enable the PSAP to receive wireless calls and data integrated within the existing E9-1-1 infrastructure, several new network components are introduced into the E9-1-1 system. First, the wireless service provider (WSP) must connect a voice and signaling path from a mobile switching center (MSC) to the E9-1-1 selective router to enable transport of the caller's voice to the PSAP. The MSC, which serves as the entry point for wireless calls received by multiple cell tower antennas to the public switched telephone network (PSTN), performs a role that is parallel to that of the end office in the first diagram. Secondly, to meet the requirements of the 9-1-1 community under Phase I of the FCC Report & Order in Docket No. 94-102, the wireless carrier must identify the call back number of the caller as well as the antenna through which the 9-1-1 call was received. There are several Wireless E9-1-1 solutions currently deployed that provide the required voice and data to the PSAP from the Wireless Service Provider's network. These solutions can be grouped into two basic categories: Call Associated Signaling (CAS), which utilizes the normal call setup signaling path through the E9-1-1 network, and Non-Call Associated Signaling (NCAS), which utilizes digital out of band signaling over a separate data path. The CAS solution delivers the caller's voice and call back number to the PSAP via the voice portion of the network. The MSC forwards the call back number along with the voice using a routing number that mimics the ANI described previously for the purposes of 9-1-1 call routing. Basically, CAS requires that 20 digits of data be transmitted to the PSAP along with the voice. The routing number can be pre-provisioned, similarly to a traditional wireline telephone record, to appropriately route the call based on the cell sector that received it, and it also serves as a lookup key into the Location Information (ALI) database to retrieve cell sector information.

Figure 6 illustrates a straightforward CAS solution configuration.

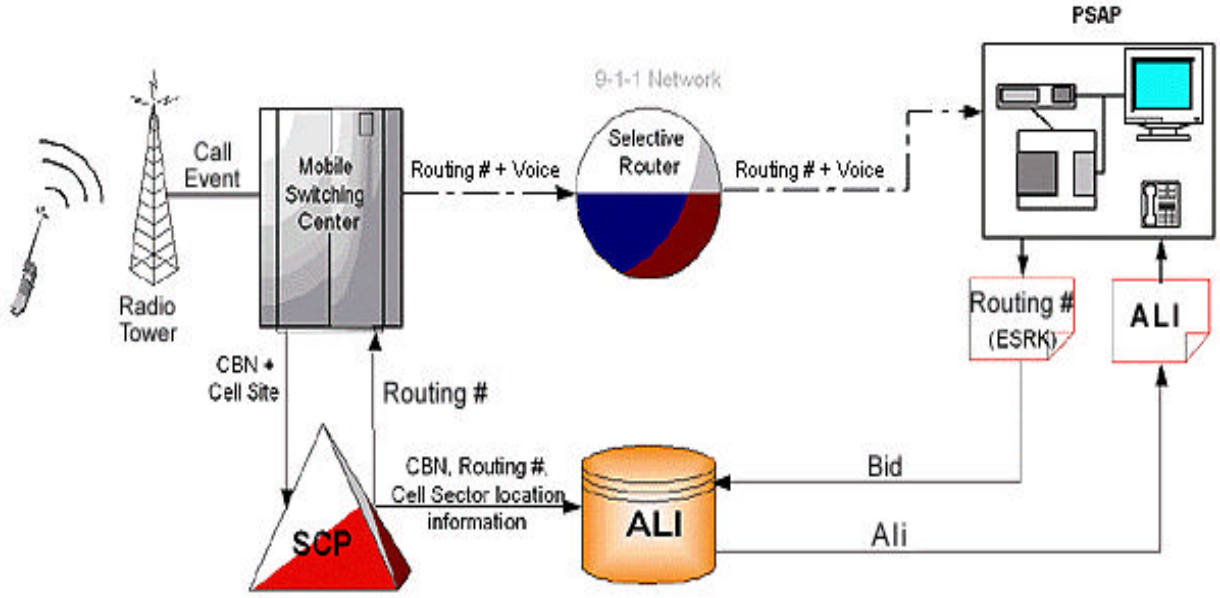
The pure NCAS solution delivers the caller's voice to the PSAP through use of routing number, but



sends the call back number and location information along a separate data path to the PSAP. This solution was first deployed by SCC Communications to alleviate the need to upgrade both selective routers and PSAP CPE for the purposes of delivering Wireless E9-1-1 calls. There are several ways that the NCAS solution can be applied to enable various types of MSCs to deliver the required information to the 9-1-1 system. This methodology also supports Phase II functionality to the PSAP, again without changes to existing selective routers or PSAP CPE.

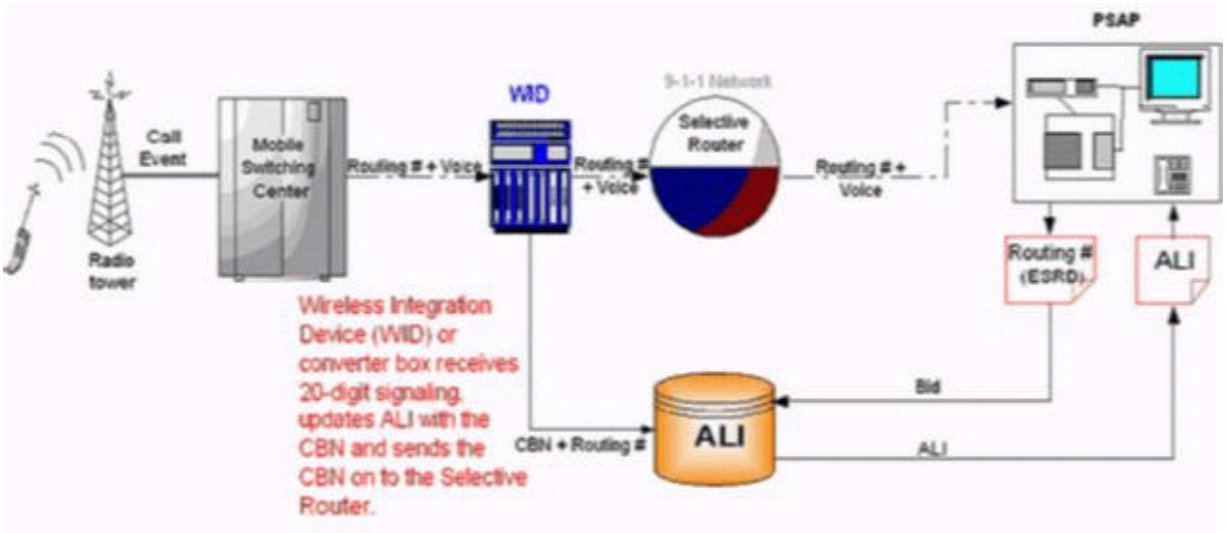
FIGURE 07: PURE "NCAS" SOLUTION

A Service Control Point (SCP) can be installed as one of the network components to provide the



required functionality for successful Wireless E9-1-1 service delivery. When an SCP is employed, it can provide a centralized routing database for the wireless carrier and can dynamically communicate call-specific information to ALI at the time the call occurs.
When neither the NCAS solution using the SCP, or the CAS solution are not available, another NCAS solution employs a wireless integration device (WID) that serves to convert the 20 digit analog in-band signaling from the MSC into two separate data paths. Introduction of a WID allows the MSC to ship out CAS-style data sent along the initial voice path toward the selective router and this to be converted to an NCAS-type of data update into the ALI data base and standard CAMA signaling into the selective router. The analog in-band path containing the routing number is sent on to the Selective Router with the ten digit TN (NPA, NXX and line
number), or the seven digit TN (NXX and line number), depending on what the router can accept, to route the call to the correct PSAP. The out-of-band data path contains all 20 digits and is used to dynamically update the call back number into the ALI record.

FIGURE 08: NCAS WID Solution

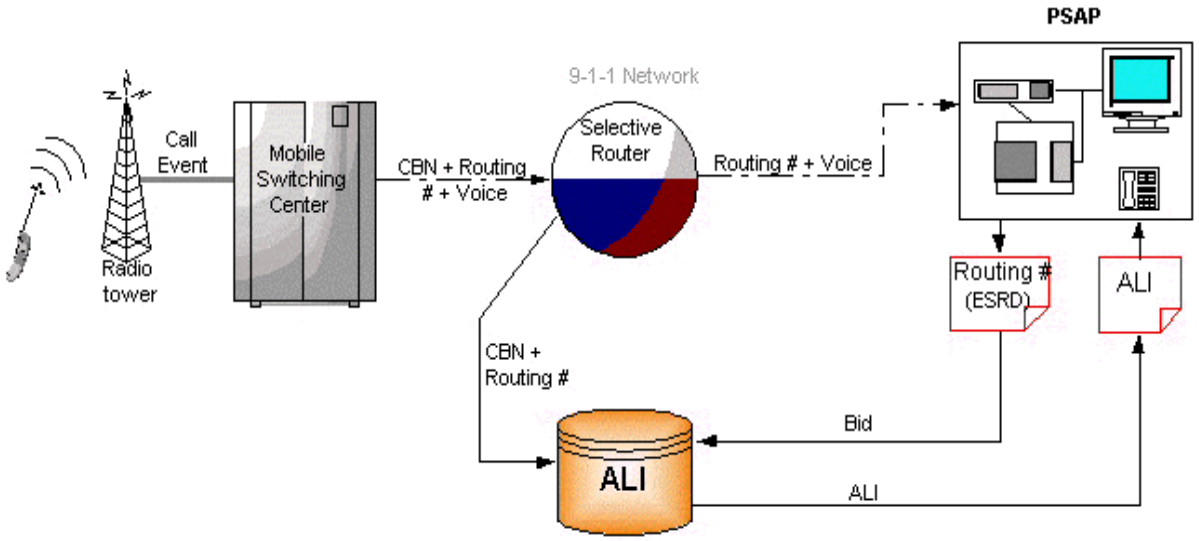


Variations on the NCAS solution have been deployed across the country. These variations include the use of additional network components that enable protocol conversion of data out of the MSC into the 9-1-1 system, redirection of ALI bids to a secondary data base, and use of SCPs as centralized routing databases for carriers with nationwide footprints. **The HYBRID SOLUTION (a CAS/NCAS merged solution):**

This solution delivers a CAS data stream along the voice path to the Selective Router. The router performs a function similar to that of a WID, but sends the call back number to the PSAP. It simultaneously sends the routing number and call back number to the ALI database, where the routing number has been pre-provisioned during data development to identify the cell site data in the ALI

record. The routing number (like a TN) in the ALI record is either overwritten by the call back number, or a new record is created. The PSAP uses the MDN to bid for ALI data and a record is returned that contains the MDN & cell site information.

FIGURE 09: HYBRID SOLUTIONS



As another variant, Nortel has devised a solution using SR-based functionality that performs protocol conversion similar to the WID. This solution passes the routing number to the PSAP, and updates the call back number into the ALI record.

SOLUTION SUMMARY:

As seen in the previous figures, there are many methods available for accomplishing Wireless E9-1-1 solutions. Although each solution employs different hardware elements and software functionality within the overall system, each solution provides the same information and look and feel to the 9-1-1 call taker. Table 1 illustrates solutions currently in use or under development, as well as the network components employed for each one.

Given the various solutions available for implementing Phase I Wireless E911 service, Table 1 below has been created to provide the reader guidance in understanding the necessary network components for each solution.

Network	CAS	Pure	NCAS	Pure NCAS	NCAS	CAS/NCAS

Component	Solution	NCASSolution	w/WIDSolution	w/Steering Solution	w/WID using SCP for Routing DB	(Hybrid)
MSC	Yes	Yes	Yes	Yes	Yes	Yes
SR	Yes	Yes	Yes	Yes	Yes	Yes
PSAP	Yes	Yes	Yes	Yes	Yes	Yes
WID	No	No	Yes	No	Yes	Yes
SCP	No	Yes	No	Yes	Yes	No
ALI #1	Yes	Yes	Yes	Yes	Yes	Yes
ALI #2	No	No	No	Yes	No	No

Table 1 -Network Components Employed in Wireless E9-1-1 Solutions:

1. **ALI #1 designation is used to indicate that there is only one ALI database required to complete data delivery.**
2. **ALI #2 designation indicates that more than one ALI database may come into play to complete data delivery;**
3. **ALI #1 serves as the primary data source to the PSAP (PSAPs host ALI), while ALI #2 is a second database to which ALI bids are directed.**

Mobile Switch Characteristics

Mobile switching centers are manufactured by many of the same switch vendors that the 9-1-1 industry has dealt with for many years. Lucent, Nortel, Ericsson, and Motorola are common names among the MSC manufacturing crowd. The majority of the switches used as wireless MSCs are digital. These switches usually communicate messages to other network elements using digital protocol, such as Signaling System 7 (SS-7). These switches send messages very quickly over digital networks, allowing for many of the features that make wireless telecommunications so attractive to the consumer. One of the challenges for the wireless industry has been to determine how to communicate with existing 9-1-1 networks, which have traditionally been analog networks. Some carriers have been able to communicate via CAMA signaling to 9-1-1 selective routers, while other Wireless switches can only send digital signaling toward the 9-1-1 network. There is almost always a workable combination for successful inter-connectivity between the MSC and the 9-1-1 selective route. The most convenient solution possible occurs when the MSC can send CAMA signaling toward the 9-1-1 router. Part of the challenge for wireless carriers is in determining how to provide voice and appropriate routing to the PSAP, given the host 9-1-1 environment, and the capabilities of the PSAP.

Switches used as Selective Routers for Enhanced 9-1-1:

Table 2 identifies the primary switches in use by E9-1-1 Host local exchange carriers as Selective Routers, or specialized 9-1-1 switching offices. The table identifies both inbound and outbound trunking capabilities of each switch. Carriers must determine the capability of the selective router to which they must connect to

send wireless calls to a specific PSAP. This information enables them to establish the type of inter-connectivity required for wireless Phase I service delivery.

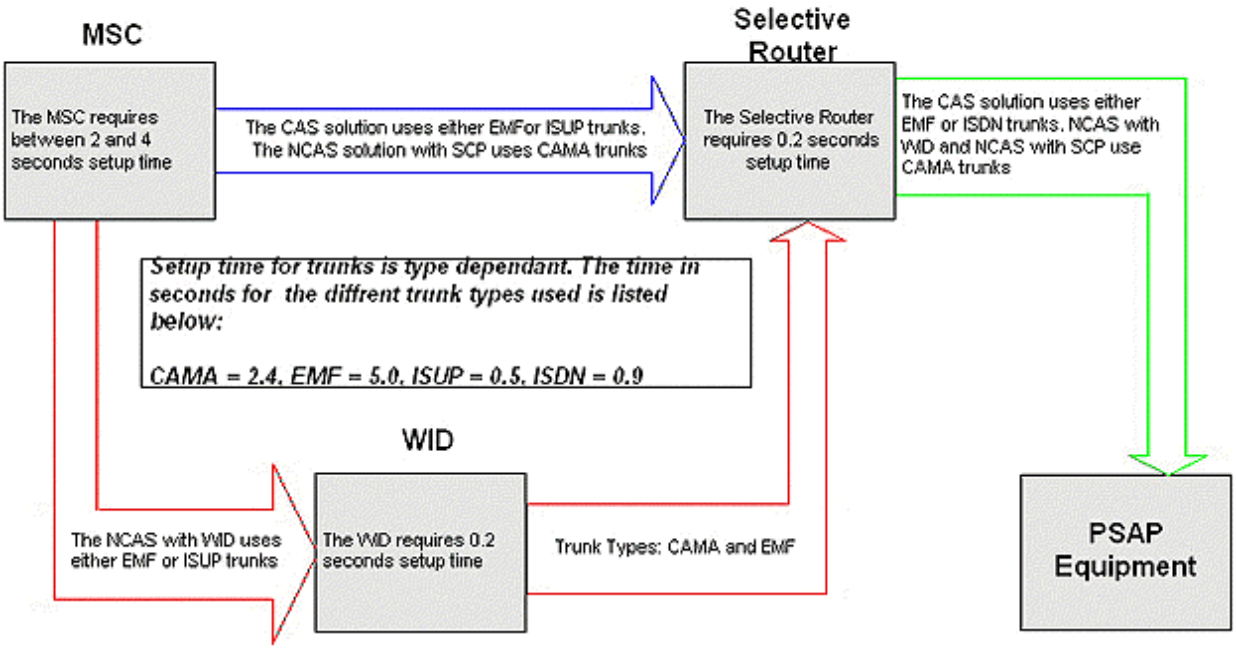
Manufacturer	Switch	Inbound TrunkCapabilities from MSC			Outbound TrunkCapabilities to PSAP		
		CAMA	FGD	ISUP	CAMA	EMF	ISDN
Lucent	1A ESS	X	X	-	X	X	-
Lucent	5ESS	X	-	X	X	X	X*
Nortel	DMS100	X	X	X	X	X	X*
Rockwell	SRX	X	X	-	X	X	X*
CML Technologies	ECS1000	X	X	-	X	X	X*

X	=	Feature available
X*	=	Feature available via vendor proprietary digital signaling protocol
-	=	Feature not available

Voice Call Setup Times

Different combinations of network elements and their associated signaling affect call setup intervals. Because of the critical nature of 9-1-1 calls, it is important to realize the effect that different types of signaling can have on overall call setup times. Table 3 contains estimated setup times for each link in the 9-1-1 network. This information will assist the reader in determining how voice call setup time will vary according to the trunk types associated with a specific Phase I solution.

Estimated Voice Path Wireless E9-1-1Call Setup Times



(Note: Net times are general averages and may vary from one system to another.)

To use the Call setup Times - Voice Path figure, execute the following steps:

1. Determine the type of solution used (CAS, NCAS with WID or NCAS with SCP). This will determine the call path out of the MSC.

2. Determine the type of trunks used between the various switched components of your E9-1-1 call. This will allow you to calculate the trunk setup times between the MSC, WID (optional), SR and PSAP.

3. Add the setup times for the switching components plus the setup times for the trunks that connect and you will have the total estimated time it should take to connect a call.

Frequently Asked Questions

Q:Will PSAPs need to spend money to upgrade their CPE for Phase I? A: No. If your PSAP is already enhanced, Phase I service does not require any changes to your CPE. This is possible if an NCAS or Hybrid solution is deployed.

Q:Can a PSAP receive Phase I if they are not enhanced? A:No. Since current Phase I technologies require ANI delivery and ALI retrieval, the PSAP must be part of an E9-1-1 wireline network. (According to the FCC's Report & Order in Docket No. 94-102, the wireless carrier is not obligated to deliver Phase I service unless the requesting PSAP is able to make use of the data elements to be provided.)

Q:Where are the MCSs located?A:The MCSs are part of the wireless network infrastructure and are located within the wireless carriers' facilities.

Q:How does the cell tower recognize the cell phone callback number and pass it on to the MSC?A:When a cell phone is used to call E-9-1-1, it sends out a radio frequency signal, which is picked up or received by an antenna on a cell tower. The cell tower is not a very intelligent component. It just receives the radio frequency signal and relays it on to the MSC, which incorporates sophisticated computing capabilities. The RF signal consists of the electronic serial number, which is coded into the wireless phone, and the call back number of the phone. (The combination of the electronic serial number and call back number uniquely identifies the account number of the wireless phone subscriber.) This information is forwarded from cell tower to MSC.

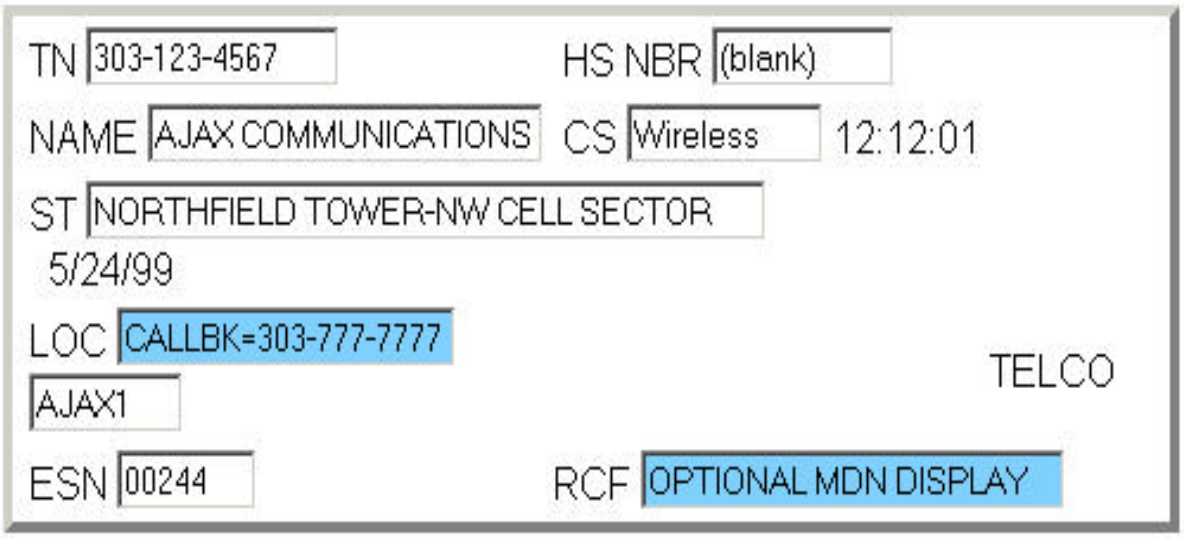
Q:What is the function of the ESRD and at what stage is it assigned?A:The Emergency Service Routing Digit (ESRD) is actually a routing number which enables the wireline network to route wireless calls to the appropriate PSAP (much like wireline TNs based upon Emergency Service numbers, or ESNs). When the ESRD reaches the PSAP, the number is used for the ALI bid, which allows the PSAP to identify the sector making the 9-1-1 call.

Q:What is the difference between an ESRD and an ESRK?

A:The ESRD is a routing number or group of numbers assigned per cell site/sector. The ALI record for an ESRD contains a static address field that defines the cell sector location to the PSAP and may be dynamically updated with the call back number at the time of the call. In a CAS environment, there is no update required in the ALI record because the call back number arrives with the voice as part of a 20 digit ANI.

ESRD Sample ALI Display
(With dynamic update of call back number)

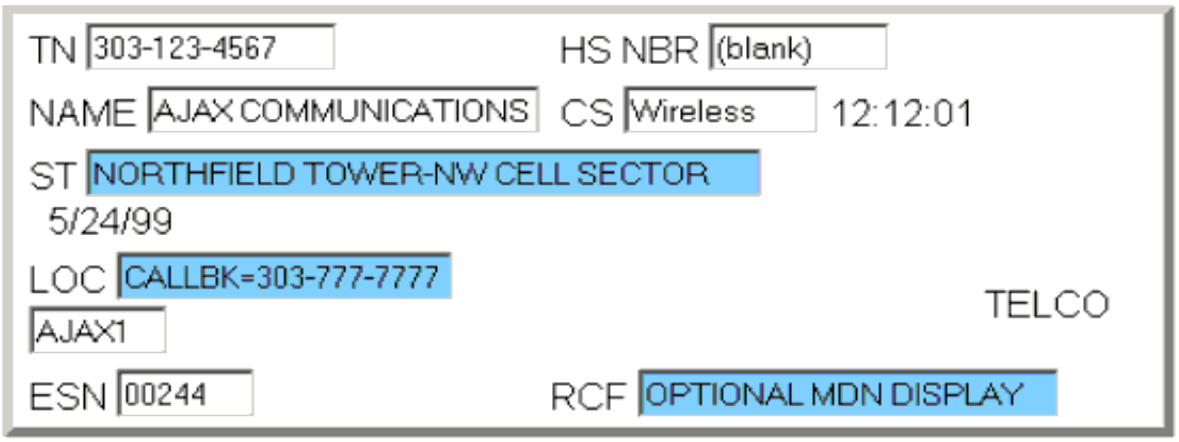
Multiple ESRDs are assigned during the implementation process to ensure that a unique ESRD will not be reused while a call is in progress. Based upon the service/ sector footprint of the cell site, the ESRD will cause all calls received by that site or sector to be



routed to a specific PSAP.

The ESRK "Emergency Service Routing Key" is also a routing number or group of numbers but are assigned on a per PSAP basis. The ALI record for an ESRK may be dynamically updated with the address field and the call back number at the time of the call. It lends itself toward additional field updates for Wireless Phase II, where location coordinates will be identified and passed into the 9-1-1 system.

Q:What is a cell sector?A:Cell Sites or Base Stations usually have one to a number of sectors or receiving antennas (1 is most common in rural areas where maximum coverage is most desired; 3, or more, in urban areas where simultaneous call volume is more of an issue). Each sector is a separate antenna, or array of antennas, that emits and retrieves RF (Radio Frequency) signals and in the case of Phase I helps to identify caller location.Q:What is the difference between static and dynamic data in ALI records?A:Static data basically refers to the data that is built into the ALI record and remains unchanged during the 9-1-1 call process. Dynamic data generally refers to the information that is inserted into ALI records at the time of a 9-1-1 call. Dynamic data is generally inserted into ALI by the means of a SCP (Service Control Point), a CAMA conversion device (i.e., Proctor, CML, WID, Cell Trace, etc.), or a selective router with added functionality.Q:If an SCP solution is chosen, who owns or pays for the SCP?A:An SCP is a wireless network element that can be shared or dedicated. Wireless carriers expect to recover the cost of SCPs applied for 9-1-1 from public safety agencies. Wireless carriers may own their own SCP's and use these for delivery of wireless calls to PSAPs all over the country, or they may contract with third party providers for SCP services. SCC currently owns and maintains 2 SCPs (allowing for redundancy). Either of these two redundant SCPs is capable of handling



wireless calls in the United States.Q:Wireless Integration Devices (WID), also known as Proctor boxes or Cell Trace(tm) boxes, are referred to CML boxes at Bell South. What does CML stand for?A:The term WID is used is this document to describe a general category of devices that handle a 20 digit signal and convert that signal to send it along two separate paths in completing the wireless 9-1-1 call. CML Technologies is one of the manufacturers who makes one of these WID devices . Proctor and Associates is another manufacturer of a WID device. U S WEST uses the product name "Cell Trace(tm)" when providing WID service for wireless 9-1-1.Q:Where will the Call-back number be displayed in the ALI record?A:The host ALI provider along with the PSAP makes placement determination. Considerations include ALI display format & capabilities and available NENA standard data fields in the ALI database. The callback number location is ultimately determined by the LEC and /or PSAP but is typically placed in the "Loc," the "RCF" field, or the TN field.

Q: Can the PSAP still use CAMA trunks in PHASE II to route all of the required digital packets that are required?

A: No, the need for BRI or PRI digital lines will be the issue for the PSAP. These digital trunks will be required along with the proper upgrade to the CPE equipment to be able to accept digital input information.

ESRD/ESRK LOGIC

The delivery of wireless 9-1-1 calls through existing 9-1-1 systems requires the use of routing numbers that simulate the functions of ANI digits for existing wireline based enhanced 9-1-1 networks for selective routing.

There is considerable on-going debate surrounding the terms Emergency Service Routing Digit (ESRD) and the Emergency Service Routing Key (ESRK). For our purposes, these terms relate to the same functionality. In use, they have specific characteristics in that the ESRD refers to a record that is build in a one to one relationship with an individual cell sector. The ESRK is used when the routing of the call is PSAP based, or not confined to one individual cell sector. When used in describing the same functionality, we use the term "ESRD/K" in this paper.
What is critical to the PSAP is that the ALI record displays useful data in an expected format. Whether a deployment involves the ESRD or the ESRK, the record provides the call taker with the same information.

ANI, or automatic number identification, digits are used for the following purposes in wireline E9-1-1 systems:

1. ANI identifies the calling party's seven or ten digit telephone number
2. ANI serves as a key to bid the ALI database to retrieve location and subscriber information\

3. ANI serves as a reference point for database inquiries that may arise
4. ANI serves as a basis for calculating performance and operating metrics

For wireless calls, given the requirements of what is referred to as Phase I Wireless E9-1-1, a similar number is required for several of the above purposes. This number has been referred to as a Pseudo ANI (pANI) or more recently as Emergency Service Routing Digits or Keys (ESRD/K). Most 9-1-1 participants in the Wireless Industry prefer the ESRD/K term, because it more clearly defines the purpose of the number as related to both wireless networks and the 9-1-1 systems to which wireless carriers are, or will soon be delivering calls.
The main difference between a wireline based 9-1-1 call and one that comes from a wireless handset (in a Phase I system architecture) is that the wireless caller is not stationary and data about the caller's location must be determined at the time of the 9-1-1 call event. The call is expected to arrive at the appropriate Public Safety Answering Point (PSAP) and to provide a generalized form of location identification in the form of the location of the cell site antenna that receives the call. The difference between the use of a number for wireless routing (ESRD/K) and for wireline call routing (ANI) is mainly:

1. The ESRD/K identifies the 9-1-1 call to the S/R for routing to the correct PSAP (it does not identify the calling party's number as described above)

2. The ESRD/K serves as a key to bid the ALI database to retrieve location and the subscriber's call back number (same as ANI above)

3. The 9-1-1 system must ensure that the ESRD/Ks are not simultaneously reused (in some cases this is accomplished by the creation of number pools)

4. The ESRD/K serves as a reference point for database inquiries that may arise (same as ANI above)

5. The ESRD/K serves as a basis for calculating performance and operating metrics

NEW DEVELOPMENTAL ISSUES TO CONSIDER “BEFORE” PHASE II:

The preceding list brings up several issues that have not been of concern prior to the application of Wireless Phase I data provisioning. These issues are discussed in the following paragraphs.

ESRD/K development and provisioning occurs as one of the normal activities required to complete deployment activities and the continuous maintenance of data in support of ongoing system operation and growth. Three scenarios for development of ESRD/K records have been identified given the technological solution sets currently available.

1. Non-call path associated signaling (NCAS) - This solution set employs a service control point (SCP) within the wireless carrier's network, which hosts a software application to provide dynamic update of several fields during the course of a 9-1-1 call event. The solution set requires that ESRD/Ks be built following the relationship of trunk capacity and call volume to each PSAP being deployed and then doubled to accommodate the mated SCP pair. The ESRD/K build must accommodate the mated pair of SCPs as well as default

It is possible for ESRKs to be assigned by PSAP, where an entire range of ESRKs represents any possible call that will be delivered by a specific carrier to a PSAP. It is also possible to establish ESRDs assigned to specific towers for routing to the PSAP. Both of these possibilities deliver the same goal, which is to route a wireless call from a tower site to a predetermined PSAP. Both of these methods also provide the tower site location information and provide a place for the call back number of the caller to be displayed.

It is likely that there will be multiple providers within any deployed market, dictating that several hundred ESRD/Ks may need to be established for a single PSAP implementation. For example, an average sized PSAP might have 20 cell sites for the first carrier (for example, 60 sectors at 3 faces per site), 10 more for a second carrier (30 sectors at 3 faces per site), and 15 more for a third (45 sectors). This would bring the total sectors to be directed to a PSAP for 3 carriers to 135. Using a Wireless Integration Device (WID) as described in scenario #3 above, the number of ESRDs required could total 135 times the number of trunks that carry calls to the PSAP carry calls between MSCs and selective routers.

While the use of the CAS solution actually requires the lowest number of ESRD assignments (one per cell sector), this solution is the least flexible in terms of migrating from Phase I to Phase II. For most E9-1-1 systems, implementing CAS would require upgrades to selective routers, trunking between S/Rs and PSAPs, as well as upgrades to PSAP CPE to accommodate extra ANI digits. In addition, it does not accommodate the additional data that will be required to identify actual caller location (Latitude and Longitude). With a CAS solution, the PSAP must be capable of receiving both the call back number and the routing number via the voice call path.
SCC technical staff does not recommend using the same numbers for multiple carriers. The reasoning here is that there must be a definitive relationship of the routing numbers to the carrier to facilitate problem tracking both by the PSAP and by the data service provider or wireless carrier. An additional concern is that ESRD/Ks duplicated by separate carriers could overwrite one another.
Default Routing

The goal of a 9-1-1 system is to route the emergency call to the correct PSAP. In any system as large as 9-1-1, both mechanical failures, and human errors may occur from time to time. While these errors constitute a small portion of the overall call delivery statistics, it is critical that they be addressed to insure the integrity and reliability of the 9-1-1 system as a whole.

Default routing is a normal part of the traditional wireline 9-1-1 environment. Decisions affecting default routing are made as part of the implementation process as 9-1-1 systems are established. Wireless networks present new challenges and the need for region wide cooperation to determine the best default routing decisions.

Wireline Default Routing

In the wireline environment, default routing occurs because of a failure of ANI to reach the Selective Router (SR) or because the calling number (ANI) is not built into the Selective Routing Database (SRDB). In most existing wireline systems, if the ANI is not received, the call is routed according to a static ESN assigned to the End Serving Central Office (ESCO) default telephone number. If the selective routing assignment for the ANI is not built in the SRDB, the call is routed according to a static ESN assigned to the NPA-NXX of the ANI for default purposes.

Wireless Default Routing

There are several instances in which a wireless E9-1-1 call may default route:

1. Selective Router unable to decipher the routing number (ESRD/K) transmitted by the wireless switch. If the Selective Router (SR) is unable to decipher the routing digits (ANI) sent by the Mobile Switching Center (MSC, or wireless switch), the SR defaults to an ESCO number. The ESCO number is routed based on the predetermined default PSAP for the MSC to SR trunk group.

2. Selective Router does not recognize, or have an ESN association for, the routing digits transmitted by the MSC. If the Selective Router (SR) does not recognize the routing digits sent by the MSC, or if the SR does not have a valid ESN association for the routing digits, the SR defaults to an ESCO number. The ESCO number is routed based on the predetermined default PSAP for the MSC to SR trunk group.

3. Wireless database does not recognize or have routing digits associated with the originating cell sector the MSC indicated the call was placed from.The routing number table is either internal to the MSC (as is usually the case for CAS wireless solutions) or external to the MSC (off-switch based, as in an SCP). This table is used for associating the correct routing for calls from Phase I enabled cell sectors toward their intended PSAPs. There are several reasons that the MSC might not recognize the cell site. For example, new cell site data may not be updated at the time the call is placed, resulting in missing routing instructions for a call from that site. The solution for this situation is to update switch data but in the meantime the call will be default routed. If the wireless database does not recognize the cell sector, then the MSC would default route the call.

It is also possible for an internal mechanical failure to occur within the MSC. This could lead to a situation where no site information is available to process correct call routing.
The following methods are currently employed by wireless carriers for default routing at the MSC. The methodology used by the wireless carrier is dependent on the capabilities of the wireless switch involved.

1. The MSC transmits a default route code through the 9-1-1 lines to the SR. The SR routes the call to the PSAP that has prearranged to receive default-routed calls for that MSC. In this instance, a static "default routed call" ALI record, containing wireless carrier identification but no specific call information, can be delivered to and displayed at the PSAP.
2. The MSC defaults to Phase 0 routing, sending the call across the public switched telephone network (PSTN) to the appropriate PSAP's 10-digit number for the cell site. In this instance, voice (but no data) is available at the PSAP to which the 10-digit number is directed.
3. All connectivity - including redundant paths - between the MSC and the external wireless database is lost.
4. Where the MSC has employed an external wireless database, such as SCP services, redundant paths are typically put in place between the MSC and redundant SCPs to ensure that an SCP is always available to the MSC. Given this architecture, the inability of at least one SCP to respond would be extremely rare. However, if all paths from the MSC to the SCP are severed, the MSC will default route as outlined above.

COMMONLY USED ACRONYMS

ACRONYM	DEFINITION
9-1-1 SSP CAN	ADVANCED COMMUNICATIONS NETWORK
ABH	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.
ACD	AUTOMATIC CALL DISTRIBUTOR
ACN	AUTOMATIC CRASH NOTIFICATION
ADA	AMERICANS WITH DISABILITIES ACT
AGPS	ASSISTED GLOBAL POSITIONING SYSTEM
AIN	ADVANCED INTELLIGENT NETWORK
ALEC	ALTERNATE LOCAL EXCHANGE CARRIER
ALI	AUTOMATIC LOCATION IDENTIFICATION
ALI-M	AUTOMATIC LOCATION IDENTIFICATION 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
ALI STEERING	ALTERNATIVE ALI DATABASE INFO REQUEST
AMPS	ADVANCED MOBILE PHONE SERVICE
ANI	AUTOMATIC NUMBER IDENTIFICATION
ANSI-41	AMERICAN NATIONAL STANDARDS INSTITUTE STANDARD FOR CELLULAR
AOA	ANGLE OF ARRIVAL
APCO	ASSOCIATION OF PUBLIC SAFETY COMMUNICATIONS OFFICIALS
ASCII	AMERICAN STANDARD CODE FOR INFORMATION EXCHANGE
AVL	AUTOMATIC VEHICLE LOCATION
BC	BAUDOT CODE – A FIVE BIT ENCODING SCHEME THAT REPRESENTS TEXT AND DIGITS. A FIVE BIT ENCODING SCHEME THAT REPRESENTS TEXT AND DIGITS. IT IS THE STANDARD TRANSMISSION SIGNALING SCHEME USED BY TTY (TDD) DEVICES.
BCD	BINARY CODED DECIMAL
BELLCORE	BELL COMMUNICATIONS RESEARCH
BID	QUERY BY PSAP FOR ALI RECORD USING ESRK OR ESRD
BRI	BASIC RATE INTERVAL (2 BEARER AND 1 DATA CHANNEL)
CAD	COMPUTER AIDED DISPATCH
CAMA	CENTRALIZED AUTOMATED MESSAGING ACCOUNTING TRUNK
CAP	COMPETITIVE ACCESS PROVIDER
CAS	CALL ASSOCIATED SIGNALING
CBN	CALL BACK NUMBER

ACRONYM	DEFINITION
CCIS	COMMON CHANNEL INTER OFFICE SIGNAL
CDMA	CODE DIVISION MULTIPLE ACCESS
CID	CALLER IDENTIFICATION

CLEC	COMPETITIVE LOCAL EXCHANGE CARRIER OR CERTIFIED LOCAL EXCHANGE CARRIER
CLLI	COMMON LANGUAGE LOCATION IDENTIFIER
CMDA	CODE DIVISION MULTIPLE ACCESS
CMRS	COMMERCIAL MOBILE RADIO SERVICE
CO	CENTRAL OFFICE
CPAS	CELLULAR PRIORITY ACCESS SERVICE
CPE	CUSTOMER PREMISES EQUIPMENT
CPN	CALLING PARTY NUMBER
CTIA	CELLULAR TELECOMMUNICATION INDUSTRY ASSOCIATION
DBMS	DATA BASE MANAGEMENT SYSTEM
DCE	DATA COMMUNICATIONS EQUIPMENT
DMS100	SELECTIVE ROUTER (NORTELL)
DN	DIGITAL NUMBER
DR	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.
DSO	DIGITAL SIGNAL, LEVEL ZERO, SINGLE VOICE CHANNEL, 64,000 BITS PER SECOND
DS1	ENHANCED 9-1-1
DTE	DATA TERMINAL EQUIPMENT
DTME	DUAL TONE MULTI-FREQUENCY
E9-1-1	ENHANCED 9-1-1
ELT	ENGLISH LANGUAGE TRANSLATION
EM	EMERGENCY MESSAGE
EMF	ENHANCE MULTI-FREQUENCY
ENP	EMERGENCY NUMBER PROFESSIONAL
ESCO	EMERGENCY SERVICE CENTRAL OFFICE
ESME	EMERGENCY SERVICE MESSAGE ENTITY
ESMR	ENHANCED SPECIALIZED MOBILE RADIO
ESN	EMERGENCY SERVICE NUMBER (9-1-1) ELECTRONIC SERIAL NUMBER (CELLULAR)
ESNE	EMERGENCY SERVICE NETWORK ENTITY
ESRD	EMERGENCY SERVICE ROUTING DIGIT
ESRK	EMERGENCY SERVICE ROUTING KEY
ESZ	EMERGENCY SERVICE ZONE (SAME AS ESN)
FCC	FEDERAL COMMUNICATION COMMISSION
FGD	FEATURE GROUP D

ACRONYM	**DEFINITION**
FTP	FOOTPRINT – THE GEOGRAPHIC AREA COVERED BY A PARTICULAR WIRELESS CELL OR SELL SECTOR.
FX	FOREIGN EXCHANGE
GEOCODE	GEOCODE – THE PROCESS OF IDENTIFYING A LOCATION BY ONE OR MORE X,Y COORDINATES FROM ANOTHER LOCATION DESCRIPTION SUCH AS AN ADDRESS.
GIS	GEOGRAPHIC INFORMATION SYSTEM
GSM	GLOBAL STANDARD FOR MOBILE COMMUNICATION
GPS	GLOBAL POSITIONING SATELLITES

HCB	HIGHWAY CALL BOX
HCO	HEARING CARRY OVER
HTML	HYPER TEXT MARKUP LANGUAGE
ILEC	INCUMBENT LOCAL EXCHANGE CARRIER
INP	INTERIM NUMBER PORTABILITY
IPM	INTERRUPTS PER MINUTE
IS801	INTERIM STANDARD FOR CELLULAR SERVICE
ISDN	INTEGRATED SERVICE DIGITAL NETWORK
ISUP	INTEGRATED SERVICES USER PROTOCOL
IT	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)
ITS	INTELLIGENT TRANSPORTATION SYSTEMS
IWS	INTELLIGENT WORK STATION
KP	KEY PULSE
KSU	KEY SERVICE UNIT
KTS	KEY TELEPHONE SYSTEM
KTU	KEY TELEPHONE UNIT
LATA	LOCAL ACCESS AND TRANSPORT AREA
LDT	LOCATION DETERMINING TECHNOLOGY
LEC	LOCAL EXCHANGE CARRIER
LERG	LOCAL EXCHANGE ROUTING GUIDE
LEOS	LOW EARTH ORBIT SATELLITE
LMR	LAND MOBILE RADIO
LMRS	LAND MOBILE RADIO SERVICES
LNP	LOCAL NUMBER PORTABILITY
LSP	LOCAL SERVICE PROVIDER
LSSGR	LATA SWITCHING SYSTEMS GENERIC REQUIREMENTS
MDN	MOBILE DIRECTORY NUMBER
MDT	MOBILE DATA TERMINAL

ACRONYM	**DEFINITION**
MF	MULTI FREQUENCY
MIN	MOBILE IDENTIFICATION NUMBER
MPC	MOBILE POSITION CENTER
MRC	MONTHLY RECURRING COST (VARIABLE)
MS	MOBILE STATION OR MILLISECOND
MSAG	MASTER STREET ADDRESSING GUIDE
MSC	MOBILE SWITCHING CENTER
MSO	MOBILE SWITCHING OFFICE
MSS	MOBILE SATELLITE SERVICE
MTSO	MOBILE TELEPHONE SWITCHING OFFICE
NASNA	NATIONAL ASSOCIATION OF STATE 9-1-1 ADMINISTRATORS
NASTD	NATIONAL ASSOCIATION OF STATE TELECOMMUNICATIONS DIRECTORS
NCAS	NON-CALL ASSOCIATED SIGNALING
NENA	NATIONAL EMERGENCY NUMBER ASSOCIATION
NHTSA	NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION, UNITED STATES DEPARTMENT OF TRANSPORTATION
NIP	NYNEX INFORMATION PUBLICATION

NIST	NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY
NPA	NUMBER PLAN AREA
NPD	NUMBER PLAN DIGIT
NRC	NON-RECOVERY COST (FIXED)
NRF	NO RECORD FOUND
NXX/NNX	NUMBER EXCHANGE
P.01	PHONE ERROR RATE GRADE OF SERVICE
P-ALI	PSEUDO AUTOMATIC LOCATION IDENTIFICATION
P-ANI	PSEUDO-ANI (AUTOMATIC NUMBER IDENTIFICATION)
PBX	PRIVATE BRANCH EXCHANGE
PCIA	PERSONAL COMMUNICATIONS INDUSTRY ASSOCIATION
PCS	PERSONAL COMMUNICATION SERVICE
PDE	POSITION DETERMINING ENTITY
PLMR	PRIVATE LAND MOBILE RADIO
PLMRS	PRIVATE LAND MOBILE RADIO SERVICE
PN	PILOT NUMBER – A TELEPHONE CUSTOMER'S MAIN ACCOUNT NUMBER, LEAD NUMBER, MAIN LISTED NUMBER, OR BILLING ACCOUNT.
PN 3890	PROPOSED STANDARD FOR PASSING LAT. – LONG. INFORMATION TO A 9-1-1 SYSTEM
PROJECT31	WIRELESS ENHANCED 9-1-1
PSALI	PRIVATE SWITCH ALI
PSAP	PUBLIC SAFETY ANSWERING POINT
PSTN	PUBLIC SWITCHED TELEPHONE NETWORK

ACRONYM	**DEFINITION**
PSWAC	PUBLIC SAFETY WIRELESS ADVISORY COMMITTEE
PSWN	PUBLIC SAFETY WIRELESS NETWORK
RN	ROUTING NUMBER
S.B.800	SENATE BILL 800 (WIRELESS ACT OF 1999)
SCC	ALI DATA BASE PROVIDER
SCP	SERVICE CONTROL POINT
SGML	STANDARD GENERALIZED MARKUP LANGUAGE
SMRS	SPECIALIZED MOBILE RADIO SERVICES
SOP	STANDARD OPERATION PROCEDURE
SR	SELECTIVE ROUTING
SR-ALI	SELECTIVE ROUTER AUTO LOCATION INFORMATION
SRDB	SELECTIVE ROUTING DATA BASE
SS7	SIGNALING SYSTEM 7, THE SAME AS COMMON CHANNEL SIGNALING 7 (CCS-7)
ST	START DIGIT
STP	SIGNAL TRANSFER POINT (START PRIME) – PACKET IN THE CCIS SYSTEM
TA	TECHNICAL ADVISORY (PUBLISHED BY BELLCORE)
TBS	TELECOMMUNICATIONS RELAY SERVICE
TC	TELECOMMUNICATIONS CARRIER
TCAP	TRANSACTION CAPABILITY APPLICATION PORT (ANSI-T1.114)
TDD	TELECOMMUNICATION DEVICE FOR THE DEAF
TDMA	TIME DIVISION MULTIPLE ACCESS
TDOA	TIME DIFFERENCE OF ARRIVAL
TELCO	TELEPHONE COMPANY
TIA	TELECOMMUNICATIONS INDUSTRY ASSOCIATION

TN	TELEPHONE NUMBER
TTY	TELETYPEWRITER (ALSO KNOWN AS TDD)
UTC	UNIVERSAL COORDINATED TIME (THE FRENCH TRANSLATION OF COORDINATED UNIVERSAL TIME)
VCO	VOICE CARRY OVER
VOIP	VOICE OVER INTERNET PROTOCOL
WEIAD	WIRELESS ENHANCED 9-1-1 IMPLEMENTATION AD HOC
WID	WIRELESS INTEGRATION DEVICE
WIN	WIRELESS INTELLIGENT NETWORK
WSP	WIRELESS SERVICE PROVIDER
XML	EXTENSIBLE STYLE SHEET LANGUAGE
XY	LATITUDE LONGITUDE
XY POINT	ALI DATA BASE PROVIDER

ACRONYM **DEFINITION**

ADDITIONAL DEFINITIONS

HANDSET BASED SOLUTIONS-ALI WILL BE PROVIDED THROUGH GPS CHIP IN WIRELESS TELEPHONE NETWORK-BASED SOLUTION-ALI WILL BE PROVIDED THROUGH COMPONENTS OF THE WIRELESS NET. 94-102-FSS REPORT & ORDER DEALING WITH ENHANCED WIRELESS 9-1-1 NENA 03-002 ENHANCED.

GLOSSARY

This section provides the definitions and explanations of the terms, acronyms, and abbreviations used within this document.

AIN

Advanced Intelligent Network. A Bellcore standard for advanced telephony systems. AIN = IN + Multipurpose SCPs + Intelligent Peripherals (i.e., voice mail) Systems that allow a wireless user to make and receive phone calls while roaming in areas outside the user's "home" network. These networks, which rely on computers and sophisticated switching techniques, also provide many Personal Communications Services features such as "one person/one phone".

ALI

Automatic Location Identification. A feature of E9-1-1 service that displays the name and address associated with the number of the phone used to dial 9-1-1. A database managed by a database provider.

ANI

Automatic Number Identification. A feature that displays, at the answering point, the number of the phone from which the 9-1-1 call was placed. In the wireless environment, ANI is the display of the Mobile Directory Number (MDN).

Bid

Used in this context, a bid is a query by the PSAP for an ALI record from the ALI database using an ESRD or ESRK as the key expecting an ALI record to be returned.

CAMA

Centralized Automatic Message accounting Trunks. Were originally developed for billing purposes to deliver the calling party number. These trunks were modified for use by wireline companies to deliver ANI for E9-1-1 calls. These trunks can be located between the MSC and the Selective Router/9-1-1 Tandem and from the Selective Router and the PSAP. It is only important to note that PSAPs with CAMA trunks can only accept 8 or 10 digits as opposed to the 20 or more digits that FGD is capable of transmitting.

CAS

Call Associated Signaling. A term that describes data transmission or signaling that occurs on the same channel as voice communication. In the 9-1-1 environment, CAS is associated with the transmission of the wireless caller's mobile directory number (MDN) along the same channel as the caller's voice.

CBN

Callback number. On a wireless E9-1-1 call this is the mobile directory Number (MDN) that the PSAP would use to re-contact or callback the caller.

Cell Site

A radio transceiver base station that acts as a point of entry for calls from wireless devices into the wireless carrier's telecommunications network.

CLLI

Common Language Location Identifier. A Bellcore Standard code used to identify a central office (CO) through the use of an 11-character code.

CMRS

Commercial Mobile Radio Service.

CPE

Customer Premise Equipment. Phone or terminal equipment located on the customer's premises. This equipment may be owned or provided by the customer or a telephone company.

ELT

English Language Translation. A database table in MS that provides the names of the emergency service agencies associated with the Administrative ESN. Both the SCC data analysts and the MSAG coordinator are responsible for maintaining and updating ELTs.

EMF

Enhanced Multi Frequency. A voice path signaling protocol that allows the transmission of up to 20 digits per call using Multi Frequency tones.

ENP

Emergency Number Professional.

ESCO

Emergency Service Central Office Number. 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 trunk group between the end office and the selective router and therefore, the end office.

ESN

Emergency Service Number. A three to five digit alphanumeric code that represents an emergency service zone. This number is used by selective router to route E9-1-1 call to a particular PSAP.

ESRD

Emergency Services Routing Digit. A 10-digit routable, but not necessarily dialable, number that is used for routing on a per origination cell sector basis.

ESRK

10 digit routable, but not necessarily dialable, number that is used not only for routing but also as a correlator, or key, for the mating of data that is provided to a PSAP by different paths, such as via the voice path and ALI data path. In daily use, the term ESRK is used to distinguish operational environments where the "routing" digits are assigned on a per destination PSAP basis as opposed to a per origination cell sector basis (which is the strict technical definition of an ESRD).

FGD

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

ISDN

Integrated Services Digital Network. A hierarchy of digital switching and transmission systems synchronized so that all digital elements speak the same language at the same speed. ISDN provides simultaneous voice and digital transmission capabilities. A digital interface providing multiple channels for simultaneous functions between the network and CPE.

ISUP

ISDN User Part. The call control part of the SS7 protocol. ISUP determines the procedures for setting up, coordinating, and taking down trunk calls on the SS7 network. ISUP is defined by ITU-T recommendations Q.761 and Q.764. ISUP also provides: Calling party number info (including privacy indicator), Call status checking (to keep trunks in consistent states at both ends), trunk management, and relates trunks and the application of tones and/or announcements in the originating switch upon encountering error blockage, or busy conditions.

MDN

Mobile Directory Number. A 10-digit directory number used to call a wireless phone.

MSC

Mobile Switching Center. A switch that provides stored program control for wireless call processing. Identifies the switching office that processes the cellular call to the Public Switch Telephone Network (PSTN). SCC uses the term MSC as per TR45.2, but "MTSO" and "MSO" also describe a mobile switching center.

NCAS

Non Call Associated Signaling. A term that describes data transmission or signaling that occurs on a separate channel than that which transmits a voice communication. In the 9-1-1 environment, NCAS refers to a wireless solution set that employs a signal control point (SCP) within a wireless carrier network. The SCP has a software application installed to provide dynamic update of several data fields during the course of a 9-1-1 call event. The NCAS solution set permits PSAPs to receive ANI and ALI information relating to a wireless voice call via separate data channels, thus permitting the continued use of CAMA lines. The solution set requires that routing numbers (ESRD/K) be built following the relationship of trunk capacity to each PSAP being deployed. The number of ESRD/Ks will be equivalent to the number of trunks that serve the PSAP for wireless call traffic multiplied by a number calculated to supply sufficient capacity for the routing of a projected level of simultaneous calls.

NPA

Number Plan Area. 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. The area code in a phone number.

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.

PSAP

Public Safety Answering Point. 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.

PSTN

Public Switched Telephone Network. The network of equipment, lines, and controls assembled to establish communication paths between calling and called parties in N. America. The phone system, including the Network.

Routing Number

A number used to facilitate the routing and delivery of a wireless 911 call. Routing numbers are assigned both in quantity and configuration, dependent upon the solution set employed. See also ESRD and ESRK.

Rehome

The process of relocating the records that serve a specific geographic area from one switch to another. Rehoming typically affects MSCs and Selective Routers.

SCP

Service Control Point. A centralized database system used for, among other things, wireless E9-1-1 service applications. It specifies the routing of 9-1-1 calls from the cell site to the PSAP. The SCP contains special software and data that includes all relevant cell site location and cell sector identifiers. SCPs contain centralized network databases for providing enhanced services. The SCP accepts queries from a STP and returns the requested information to the originator of the query. They provide the core database and call processing functions on which telecommunications services are based. A remote database within the SS7 network that supplies the translation and routing data needed to deliver advanced network services. Identifies cell sites sending 9-1-1 calls to the 9-1-1 network. Part of the SS7 network that determines where the call should be connected according to the digits dialed - usually a database with routing and control information. Also referred to as a Signal Control Point.

SR

Selective Router. A switch that provides the feature in which 9-1-1 calls from a central office area that is served by more than one PSAP are electronically routed to the proper PSAP. The combination of the Routing ESN and the customer location information accomplish this.

SR ALI

Selective Router Automatic Location Information. An SCC proprietary product that allows compatible selective routers to query the ALI database for routing instructions.

SS7

Signaling System Seven. Current standard for inter-switch common channel signaling. The backbone of the evolving intelligent network is a common channel signaling protocol.

SOI

Service Order Interface. Service order information is extracted from the telephone company's service orders using the Extract program. The information is then used to update the 9-1-1 database.

STP

Signal Transfer Point. The packet switch in the Common Channel Interoffice Signaling (CCIS) system.

TCAP

Transaction Capability Application Part. Full title: ANSI T1.114 Telecommunications Signaling System Number 7 (SS7) TCAP. The layer of the SS7 protocol that is used to obtain Routing data for certain services.

TN

Telephone Number. Unique combination of ten digits that identifies the equipment used to place and receive calls.

WID

Wireless Integration Device. A device that performs a protocol conversion function to allow for transport of wireless data into the 9-1-1 system without modifying existing selective routers or PSAP CPE.

WIN

Wireless Intelligent Network. Term used by cellular carriers in the wireless industry. SS7 based, Standardization Activity (IS-53), MIN Based value added services.

WSP

Wireless Service Provider.