LOCATION DATA MANAGEMENT:
THE ESSENTIAL GUIDE TO
ALI MANAGEMENT BEST PRACTICES

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Selecting a Service Provider
In every public safety answering point (PSAP) across the country, the single most important priority is to dispatch emergency help at the time of a 9-1-1 call as quickly as possible. In order to do this, it is essential to know the exact location of the 9-1-1 caller. For decades after 9-1-1’s 1968 introduction, location identification depended upon the caller’s ability to verbally communicate where they were to the 9-1-1 call taker. With the introduction of enhanced 9-1-1 (E9-1-1) in the early 1990s, location information began to be delivered to the call taker with the call using a database of automatic location information (ALI) and its associated master street address guide (MSAG). Today, the ALI database is a key element of emergency communications, and the provisioning and management of that data is a complex process that must be precisely handled to ensure the accuracy as well as the timely delivery of the data at the time of an emergency request for assistance.
Traditionally, the incumbent local exchange carrier (ILEC) has been responsible for the management and delivery of ALI data to the PSAP. However, as the emergency communications industry diversifies, various other entities within the industry are beginning to include ALI data management as part of their service offering, giving PSAPs a choice about where to go for this valuable information. With this new landscape, it becomes more important for emergency communications professionals to explore some of the complexities behind ALI data in order to make an informed decision about whom your ALI data service provider is going to be.

This guide is designed to help you understand the complexity of ALI data management, how the database is created and what your options are for managing that data. The information in this guide focuses primarily on wireline location information as it pertains to the current legacy analog 9-1-1 network. ALI data for wireless and Voice over Internet Protocol (VoIP) calls is handled a bit differently; however, by enhancing your understanding of wireline ALI data management best practices you are laying a foundation on which to build your understanding of wireless and VoIP location information. Next-generation location information will be an entirely new process that will include new network elements, an altered path from caller to PSAP and a fresh delineation of responsibilities. This information is not covered in this guide, but will be released in a future Essential Guide as the nationwide roll out of Next-Generation 9-1-1 calls for the transition to next-generation location information.
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Precise location information plays an invaluable role in public safety communications. PSAPs rely on the information provided by ALI databases and the associated MSAG to dispatch the appropriate responding agencies to the correct address at the time of an emergency. Understanding what ALI and MSAG are, how they are created and the role of each in the delivery of life-saving location information is key to choosing the best ALI data management service provider for your emergency communications operations.

1.1 STANDARD 9-1-1 CALL ROUTING
ALI Data Provisioning

In the current analog emergency communications network, the established data flow for collecting, validating, cleansing, verifying and staging accurate caller information is known as provisioning; and it involves various entities, responsibilities, databases and protocols.

Individual telecommunication service providers (TSPs) deliver basic information relative to their wireline customers via a service order interface (SOI) file in a strictly defined format to a 9-1-1 service provider. This data includes the name and service address associated with individual phone numbers. Once the information is received, the 9-1-1 service provider utilizes an E9-1-1 database management system (DBMS) to cleanse the data in a process known as address validation. The validation process runs the data through a set of rules based on MSAG. This repository of all valid public-safety address combinations plays a key role in preparing the address data to function effectively within the ALI and selective routing databases. The MSAG looks for a specific syntax of an address to ensure it meets all established 9-1-1 standards for elements such as street abbreviations. The MSAG establishes a strict set of naming and street conventions for every address in order to establish recognizable address data that is easily dispatched by a PSAP.

Once the data is cleansed and verified, the telephone number is tagged with the appropriate 9-1-1 attributes called the emergency service number (ESN) and the English language translation (ELT). The ESN identifies the appropriate PSAP to receive the call while the ELT defines the correct responding police department, fire department and emergency medical service (EMS) based on the physical address of the telephone number. Once the 9-1-1 service provider has comprehensively validated a telephone number, it is placed in the ALI database and selective routing database (SRDB), if separate, and redundant backup systems so that it is available to PSAPs at the time of an emergency call. It is important to note that the 9-1-1 service provider maintains the MSAG and ALI database, and the ESN is predetermined. It is prescribed as soon as the phone number is made operational, prior to any 9-1-1 call. While this protocol works well, the predetermined ESN carries significant challenges. According to data standards defined by the National Emergency Number Association (NENA), if the call routing for a given wireline area needs to be altered for any reason, each service order record in that area must be changed and the ALI and selective router databases must be updated to ensure accurate emergency service responses. Not only is this process labor intensive, but every data touch-point increases the possibility of error.
9-1-1 Call Flow and ALI Delivery

When a wireline 9-1-1 call is made, the telephone network delivers the call plus the 10-digit telephone number, known as the automatic number identification (ANI), to the appropriate PSAP. As soon as the PSAP receives the call, the customer premises equipment (CPE) identifies the ANI and uses it to query, or bid, the ALI database. The ALI database uses the ANI to identify the correct ESN and ELT and then delivers subscriber and responder information back to the PSAP call taker. The PSAP call taker uses this valuable information to dispatch the appropriate responders to the location of the emergency.

If the phone number is not found in the ALI database, it is referred to as a “no record found” (NRF) condition. When this happens, the call is routed to a default PSAP that is appointed to handle these types of calls. The default PSAP call taker must then ask the caller for their location and redirect the call to the appropriate PSAP. While the protocol for an NRF simply requires the 9-1-1 service provider to update the database accordingly, the human consequences can be severe. The extra time required to reroute the call and the possibility that the caller is unable to communicate location for any number of reasons can result in a significantly delayed response time, which may put lives at risk.
Due to the essential nature of location information at the time of an emergency response request, as well as the risk to life if the information is unavailable or incorrect, it is imperative that PSAPs carefully consider their ALI management options. PSAPs have three options for ALI data management: the telephone service provider, a 9-1-1 service provider, or a stand-alone ALI that is provisioned and managed by the PSAP itself.
TELEPHONE SERVICE PROVIDER

As stated earlier, TSPs are the primary source for ALI data management. It is important to understand that ALI data management services are typically only offered by ILECs and not competitive local exchange carriers (CLECs). If a PSAP’s telecommunication service is provided by a CLEC then it is most likely not an option for ALI services and one of the other two options will have to be considered.

When considering the TSP for ALI services, it is helpful to know if the ILEC handles the database management in-house or outsources it to a 9-1-1 service provider. If the service is outsourced, it may be more cost effective to work directly with the 9-1-1 service provider to get the same service. However, some PSAPs find it convenient to use the ILEC as a one-stop-shop for ALI services, selective routing, PSAP links to the ALI database as well as all the other metrics necessary for effective emergency communications.

9-1-1 SERVICE PROVIDER

In today’s emergency communication environment, ALI data management services can often be provided directly from the 9-1-1 service provider. Regardless of where a PSAP goes for ALI service, it is typically the 9-1-1 service provider that ensures the ALI data complies with the MSAG validation rules, including all service order changes. If a PSAP opts to receive service directly from a 9-1-1 service provider, that provider will utilize proprietary data links between the PSAP and the ALI database. Trunking and selective routing may also be included with the service, though it will most likely come from a third-party source, such as a TSP.

STAND-ALONE ALI

It is possible for a PSAP to create and maintain an independent stand-alone ALI; however, this decision should not be made lightly. There are a number of things that should be carefully considered. It is imperative to understand that ALI data management is a labor-intensive task that requires a dedicated staff. MSAG and TSP data change daily. In any given year, as much as 40 percent of all telephone numbers in a database will change in some way. Each of these changes must be made accurately and in a timely manner, and there are significant risks associated with incorrect data.
Before deciding upon your ALI data management service provider, there are a number of essential service elements you should consider to ensure the best possible provider for your operations. Understanding how each of these functions is handled will allow you to make an informed choice.

3.1 INFORMATION AND DATA FLOW
ADDRESS VALIDATION
At the most basic level, address validation involves taking the subscriber record provided by the TSP and comparing it to the MSAG rules to check for accuracy. For this process to be successful, the MSAG must reflect all geographical changes as they take place, such as the creation or extension of a street, the development of a new community or the annexation of additional land by a municipality. If the service provider does not dynamically update the MSAG then the address validation will not be accurate. What is more, the service provider must also verify that the standards of the service order provided by the TSP match those of the MSAG. For example, the TSP may use the abbreviation BLVD for boulevard or ST for street while the MSAG may require the full spelling of the words. To ensure an accurate address validation, the service provider must translate the service order information to match the MSAG standard prior to posting the address to the ALI database.

ERROR CORRECTION
Address error correction is closely related to the translation of service order information to ensure it matches the established MSAG standard. PSAPs should verify with a potential service provider who is responsible for this task. For example, if a subscriber calls 9-1-1 and the PSAP queries the ALI and finds there is no record for that ANI, the PSAP will receive an NRF. The PSAP must then report the NRF back to the service provider. The question is, who is responsible to work with the TSP to correct this error? Some service providers will take ownership of this while some will put the onus on the PSAP. This is an important concept to clarify. This situation is one of the reasons why a stand-alone ALI requires a dedicated staff, because the responsibility of correcting every NRF would fall directly on the PSAP.

DATABASE MANAGEMENT SYSTEM ACCESS
The ability to access the database management system is an important consideration when choosing an ALI service provider. In order to achieve the greatest visibility to data and minimize database errors, PSAPs may want to seek a provider that manages their MSAG electronically and can provide a clear audit trail for the submission of change orders. This allows a PSAP to easily track when a change order was made and whether it was acted upon correctly and in the appropriate amount of time.
REPORTING

Most ALI data management systems are capable of generating a wide variety of reports based on the type of data collections that can be done. Reports can include such things as the number of service orders processed, the number and types of errors that fall out and the number of calls in a given time frame. These reports can be useful to a PSAP in determining staffing needs or budgets, among other things. When considering a potential ALI service provider, it is beneficial to understand the types of reports that the provider can deliver as part of their service agreement.

CONNECTIVITY

When choosing an ALI service provider you should determine what type of links are used to connect the PSAP to the ALI database. Connectivity will vary from provider to provider and can range from an IP connection, which provides greater flexibility in information access for the PSAP, to something as basic as point-to-point service, which is typically a wired connection between the PSAP and the database.

CUSTOMER SUPPORT

One of the most important things to determine when choosing an ALI service provider is the type of customer support included in the service agreement. When contacting the service provider for help, will you have access to a dedicated customer support person who understands your jurisdiction and can offer immediate insight to any challenges you are facing, or will you be calling a general help desk that may not be familiar with your unique operations? This distinction will have a direct impact on the time required to rectify issues you are facing with your ALI data management service.
The importance of accurate location information for 9-1-1 communication cannot be overstated. In today’s public safety landscape, PSAPs have new options for ALI data management services. In order to make the best decision for your operations, it is important that you understand how essential aspects of that service are provided. When considering ALI data management options, public safety professionals should seek out comprehensive data services that include accurate address validation, defined error correction protocols, management system access, broad reporting capabilities, sound database connectivity and highly trained customer service. What is more, as the industry moves closer to a nationwide Next-Generation 9-1-1 architecture, PSAPs may benefit from choosing an ALI service provider who is capable of transitioning their legacy 9-1-1 service offering to a next-generation solution as that need arises.
QUESTIONS TO ASK POTENTIAL ALI SERVICE PROVIDERS

Choosing an ALI Service Provider is an important decision that must consider both the needs of the PSAP as well as the capabilities of the Service Provider. The following questions will help you identify the best ALI Service Provider for your operations.

1. Can the ALI Service Provider describe the nuances of your MSAG, such as unusual streets or numbering systems? How do they plan to manage these nuances?

2. What is the ALI Service Provider’s tactical resource plan when special readdressing projects occur? Can they specify skill sets, hours of availability, personnel experience, etc.?

3. What MSAG update intervals are guaranteed by the ALI Service Provider? Is this specified in a service level agreement (SLA)?

4. Can the ALI Service Provider describe the responding agencies in your area? Should the wrong agency be identified for response, how is this corrected and in what time frame?

5. How does the ALI Service Provider handle address validation and error correction when working with the Telephone Service Provider (TSP) so that each telephone record is “MSAG-valid?”
   a) What is their experience in managing TSP data?
   b) What is their schedule for database reconciliation with your TSPs?

6. What is the service order interface (SOI) process used by the ALI Service Provider for all the TSPs (wireline, wireless, VoIP, etc.)?
   a) What is the frequency?
   b) How experienced is their staff in working with SOI?

7. How does the ALI Service Provider provide electronic access to view and correct TNs?
   a) Which PSAPs in your state or surrounding states utilize the ALI Provider’s system?
   b) What are the training requirements?
   c) Describe the available detailed training documents and processes for PSAPs and TSPs.

8. Will your MSAG undergo any adjustments based on the SOI processing used by your ALI Service Provider?
   a) What tools are provided for you to view your MSAGs?
   b) How will you make MSAG changes?
   c) What tools are provided for the TSPs to view your MSAG?

9. What tools does the ALI Service Provider offer to electronically report and track NRFs and ANI/ALI discrepancies? How does the ALI Service Provider process and refer NRFs out to the TSPs?
10. How does the ALI Service Provider perform requested emergency ALI database queries?

11. Can the ALI Service Provider document a detailed network architecture showing redundant circuits with automated failover between your PSAPs and the ALI database?
   a) Are these circuits from different providers?
   b) Is there a single point of failure?

12. Can the ALI Service Provider describe in detail their 24/7 monitoring process?
   a) How are you alerted when there is an issue?
   b) What is their incident command process?

13. Can the ALI Service Provider give a detailed summary of their experience, understanding and management of wireless data?

14. How are VoIP call routing and response boundaries integrated with your ALI? How long has the ALI Service Provider been managing VoIP boundaries; or do they outsource this?

15. What is the ALI Service Provider’s GIS support strategy?
   a) Do they have a proven track record, experience and references from their GIS clients?
   b) Can the ALI Service Provider describe the tools they will provide so you can validate your MSAG against your GIS?

16. Has the ALI Service Provider delivered a demonstrated i3-compliant path to Next-Generation 9-1-1?
   a) Did they develop, implement and manage the end-to-end solution; or was it outsourced or resold from other providers?
   b) How many systems have they implemented and how long have they been running?
   c) Do they have reference clients you can contact?

17. In your state or surrounding states, has the ALI Service Provider successfully migrated from one ALI database management system to another?
   a) What was the initial error fallout?
   b) What was the training timetable?
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