graphic
MSAG
impacts a call center's bottom line

by jerry w. merlick, president, contact one, inc.

When maintaining data, saving time and money is important, but the biggest payoff of graphic MSAG is the creation and maintenance of highly accurate GIS and 9-1-1 data.

A S IF WE NEED ADDITIONAL ACRONYMS OR catchy terminology for defining the latest and greatest that technology has to offer, hence a new buzzword in the 9-1-1 field. Recent 9-1-1-related documentation out of California and Texas has referred to it. Marketing material makes occasional mention of it. Public safety conferences will have more and more presentations on the topic as well. This term is *graphic master street address guide*, also known as graphic MSAG.

As with most new technology or software solutions, there tends to be a wide range of opinions regarding what a definition may actually be. The true meaning can vary from the oversimplified to the uninformed. While wireless 9-1-1 has been the focus of much attention in 9-1-1 for the last few years, the MSAG database remains a vital piece to the 9-1-1 puzzle. The purpose of this article is to provide a clear definition and meaning of graphic MSAG.

Breaking It Down

In order to articulate a valuable definition, some groundwork must be laid. This groundwork involves understanding the definition of the words that compose the phrase graphic MSAG. Because the term to be defined has a word, which relates to location, i.e. *graphic*, mapping is certainly related to the definition of the term. For this reason, the graphic, or mapping portion of graphic MSAG refers to the use of geographic information systems (also known as GIS). As defined by GIS.com:

> **"A GIS combines layers of information about a place to give you a better understanding of that place."**

As most in the field of 9-1-1 know, GIS also is referred to as mapping, and has become a critical piece of the 9-1-1 puzzle. While the word *graphic* implies mapping, one must remember that GIS is a powerful and complex system that allows one to store, manage and maintain geographically-related information in relational databases. This information also can be displayed as a map. Without GIS, telecommunicators would have a difficult time identifying the locations of wireless callers or performing other critical real-time PSAP tasks.

Another piece of the puzzle is MSAG, also known as the master street address guide, defined by *NENA 01-002 Master Glossary 02-03* as:

> **"[The MSAG is] a database of street names and house number ranges within their associated communities defining emergency service zones (ESZs) and their associated emergency service numbers (ESNs) to enable proper routing of 9-1-1 calls."**

The MSAG database is completely based on locations and addresses. As a computer file, the MSAG is similar to an electronic spreadsheet since this database has no picture to go with it—such as a map. This is where the power of the GIS is applied. Since streets, addresses, ESNs and many other aspects of the typical E9-1-1 operations are based on geography, using GIS to provide analysis of the MSAG makes sense.

Through the combination of mapping (GIS) and one of the 9-1-1 databases used by the telephone companies (MSAG), there is the convergence of the two databases into a single usable system. While the initial synchronization of the GIS and MSAG is critical, the continued and integrated maintenance of these two databases is

the ultimate purpose of the graphic MSAG. This concept is one of the most important for readers to grasp—that two independent databases, properly managed, can now essentially continue to remain as one.

Traditional MSAG/GIS Data Model

Traditionally, the MSAG and GIS have both resided, and have been maintained, independent of each other. This approach is unnecessarily time-consuming because the MSAG and GIS databases are redundantly managed. Also, this model has potential for errors being made between the two databases. For most 9-1-1 agencies, the MSAG essentially drives the maintenance process. Addresses for new telephone service may be requested that fall outside a range in the MSAG, at which point the MSAG coordinator is notified. He or she researches the problem and decides whether to update the MSAG to accommodate the new address, or to tell the telco that the address cannot be accepted. Outside of what is occurring with the MSAG, the GIS editor may be adding streets and updating addresses as changes are relayed from planning agencies and/or addressing authorities.

This model would be fine if the MSAG were the end-all source for new address assignment. However, in jurisdictions, new addresses are assigned at a city or county agency such as the planning department, assessor's office or addressing enumerator. Such changes to street names and addressing are sometimes not transmitted to the MSAG coordinator, resulting in the MSAG disagreeing with the legal addressing in a jurisdiction. Sometimes, the MSAG coordinator has limited contact with the GIS editor. In most cases, the MSAG coordinator does not make the GIS editor aware of the MSAG changes in a timely manner, if at all. When these two do communicate, the very nature of the MSAG is so different from the
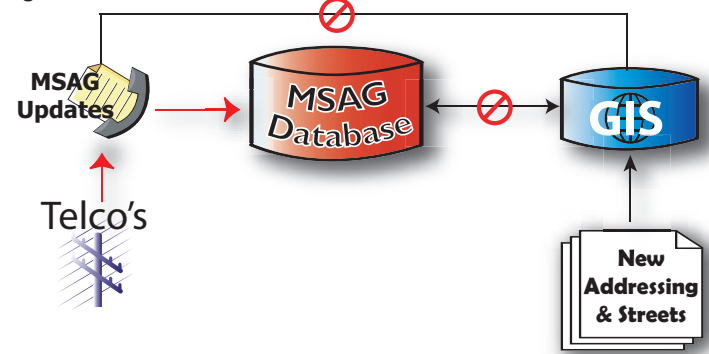
Figure 1: Traditional MSAG/GIS Data Model

Figure courtesy of Contact One, Inc.

Common Deficiencies
OF THE TRADITIONAL MSAG/GIS DATA MODEL

- Address ranges of existing MSAG records are routinely expanded in order to accommodate inaccurate house addresses (ALI records) that are submitted by the telco.
- New misspellings of existing names are entered into the MSAG, thus creating similar but different MSAG/GIS database records.
- Nonexistent street names are added to the MSAG.
- MSAG additions may be assigned an incorrect ESN.
- Addresses that fall into missing blocks of street ranges may only be discovered when someone places a 9-1-1 call from one of those addresses.
- No-record-found instances are more frequent.

GIS that full synchronization of the two seldom occurs in a continuous manner. These deficiencies can cause chronic erroneous data in the automatic location information (ALI) database. **Figure 1** (page 22) is considered the traditional MSAG/GIS data model.

In real-time use, when ALI mapping is implemented at the PSAP(s), calls are occasionally not located on the map because the MSAG and ALI don't correspond to the addressing that actually exists in the community and disagrees with the GIS data utilized at the PSAP.

In practical terms, the MSAG ends up determining the addressing that is used for ALI and locating callers. The MSAG should not be used to determine addressing. Instead, the MSAG should be a reflection of addressing as it actually and potentially exists. The unfortunate fate is that the MSAG almost never conforms to this idealized goal, thus confirming the need for a new model for maintaining MSAG and GIS data.

Innovative MSAG/GIS Data Model

Moving away from the traditional data model to the innovative data model, the flow of addressing information used for GIS and MSAG becomes fashioned after how addressing data that is used for 9-1-1 purposes should actually be processed. This process inverts the existing MSAG update process by allowing the GIS to now be the catalyst for all MSAG updates. All new addressing and street revisions originate at the GIS and therefore the innovative MSAG/GIS data model illustrated in **Figure 2** becomes more logical in terms of maintaining the GIS and MSAG data.
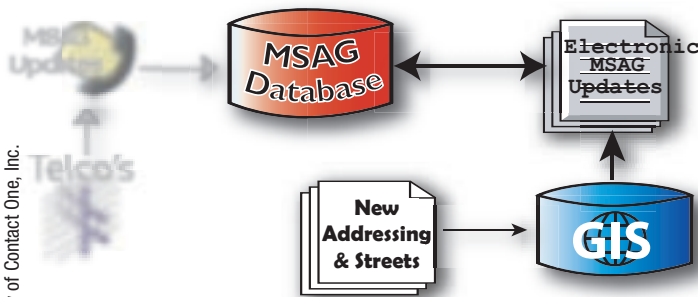
Figure 2: Innovative MSAG/GIS Data Model

Figure courtesy of Contact One, Inc.

Automatic MSAG Updates

The concept of allowing the GIS to perform MSAG edits is quite simple. Essentially, a user makes a change in the GIS and the GIS generates an electronic change request to the MSAG database. The change request is automatically generated when one or more edits to the GIS data are completed, and the user submits these edits to the MSAG database. Examples of MSAG change requests may be an address range change on an MSAG record, a completely new street record entry with corresponding address ranges and ESNs, or an ESN change on a selected set of streets. The use of a GIS to perform these edits allows for users to visually adjust the streets and ESN boundaries, or create new streets while accurately updating the MSAG database. In addition to updating the MSAG automatically, the GIS can perform spatial or location data analysis and correction, which cannot be performed without the use of GIS. A few examples of these GIS spatial processes include:
- Street directions are incorrect.
- Address ranges have inconsistencies.
- ESN boundaries have problems.
- Parity errors regarding odd and even address values exist.

Through use of GIS to maintain the mapping data as well as the MSAG, considerable resource savings are immediately recognized, including:
- Making edits for two databases from one entry point—update the map and update the MSAG.
- Performing the work of both an MSAG coordinator and a GIS analyst through one computer software interface.
- Reducing the amount of time required to maintain the 9-1-1 database.

The Bottom Line

While saving time and money is always important for the maintenance of the data, the absolute biggest payoff of a true graphic MSAG is the creation and maintenance of highly accurate GIS and 9-1-1 data. More accurate data is directly related to more quickly locating 9-1-1 callers and reducing response time to those callers. The most important and critical benefits of using a graphic MSAG are:
- Faster response time to 9-1-1 callers
- More accurate mapping data
- More accurate 9-1-1 data: MSAG and ALI
- Real-time and up-to-date MSAG changes
- Substantial return on investment through
- Cost savings
- Time savings
- Better use of personnel
- The processing of one or more records at one time
- A true graphic MSAG

BENEFITS OF GRAPHIC MSAG

Marc Berryman, director of GIS for Greater Harris County 9-1-1 Emergency Network located in Houston, Texas agrees with the benefits of a graphic MSAG. By implementing a graphic MSAG in his department he believes the benefits will be realized immediately and across the public safety enterprise. During a recent discussion on the subject, Berryman stated:

"By employing the model of a graphic MSAG, also referred to as a spatial MSAG, it reduces possible errors, and ensures the MSAG and GIS data are always synchronized. When this happens, 9-1-1 telecommunicators can work more efficiently, no-record-found errors are reduced, and the needs of public safety are better met."

The bottom line is to meet the public safety needs in order to save life and property. Joining the two previously independent databases guarantees a positive advantage because there is a greater purpose not only to each database, but to the public safety institution as well. Each piece contributes to the other in order to create a database checks-and-balances system. Since locations and street address information is central to the GIS and the MSAG databases, the two can leverage one another's information and the results are more accurate data and better response to emergencies. In addition, the addressing and location information originates at the GIS, which is precisely where the point of origin lies. For these and the many reasons provided, a graphic MSAG is a critical and needed solution to the 9-1-1 database puzzle. If the solution was not ultimately about responding to 9-1-1 callers more quickly, the benefits would be far less effective and the justification limited. **ENPM**

Jerry W. Merlick is the president of Contact One, Inc. (Austin, TX). He can be reached at (512) 459-4636 or via e-mail at jmerlick@contactone.com.

STREAMLINING WITH GRAPHIC MSAG

According to Susan MacFarlane, 9-1-1 coordinator of Maricopa County Region 9-1-1, the benefit of using a graphic MSAG is substantial. This is due to the size of the Maricopa County Region 9-1-1 and the corresponding large amount of data to manage. The county 9-1-1 jurisdictional area includes well-known cities such as Phoenix, Scottsdale, Tempe and Mesa.

"The Phoenix Metro area is one of the fastest growing areas of the country. Like many governmental agencies, we face limited resources to do the constant maintenance needed for the MSAG and GIS. The ability to streamline the process so that we can make the best use of personnel means a better MSAG, a better GIS, and the ability to provide better service to the citizens in our community."