# NENA Data Standards for the Provisioning and Maintenance of MSAG Files to VDBs and ERDBs



NENA Data Standards for the Provisioning and Maintenance of MSAG Files
to VDBs and ERDBs
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VDB/MSAG Working Group

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## NENA STANDARD

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# 1 Executive Overview

Voice over Internet Protocol (VoIP) is poised to become the predominant technology used in the telecommunications industry. As the public adopts VoIP, E9-1-1 calls will increasingly originate from VoIP users. Some VoIP telecommunications service provider networks, however, are not natively compatible with the existing E9-1-1 infrastructure. NENA is developing a view of migratory (i2) and long-term (i3) solutions that will continue to support location-based routing of E9-1-1 calls and delivery of location-related information to PSAPs. The migratory i2 solution (refer to NENA-08-001) makes use of a Validation Database (VDB) to ensure that civic location information representing VoIP end user locations is Master Street Address Guide (MSAG) valid, and includes an Emergency Service Zone Routing Database (ERDB) function used for real-time routing of E9-1-1 calls. The i3 solution is expected to have similar needs. The data in the VDB and ERDB are expected to be derived from the MSAG data used by conventional E9-1-1 System Service Providers (9-1-1SSP) to validate location information entered into the Automatic Location Identification (ALI) Databases.

## 1.1 Purpose and Scope of Document

This document provides general system and process requirements for the VDB, ERDB, and 9-1-1 Administrator to maintain the MSAG and the alternate address records required to perform their prescribed functions in the i2 architecture. This document also provides related technical and operational policy information from NENA to facilitate implementation of the i2 architecture.

This document is *not* a complete set of requirements, but instead provides insight to industry needs. It is expected that VDB and ERDB Operators will work in conjunction with their customers and 9-1-1 Administrators to further clarify additional requirements prior to development and/or implementation for local applications.

***Due to fundamental differences in the operational and regulatory frameworks found in the U.S., this document does not currently apply in Canada.***

## 1.2 Reasons to Implement

The following identify primary reasons to implement:

- Industry i2 architectural standards require VDBs and ERDBs to rely on MSAGs for properly validating civic addresses and routing emergency calls to the appropriate end-points (e.g., Public Safety Answering Points (PSAPs), Emergency Control Centers (ECC), etc.).
- Related users and systems require methods by which the MSAG and the alternate address records are communicated and maintained in a synchronous fashion so as not to impact proper routing of emergency calls.

## 1.3 Benefits

Compliance with the included requirements will:

- Assist in defining roles and responsibilities related to communication and maintenance of the

MSAG and alternate address records.

- Assist in ensuring correct translations from civic addresses to MSAG valid addresses.
- Assist in maintaining synchronicity between systems (e.g., VDB, ERDB, 9-1-1 Administrator).
- Ensure VDBs and ERDBs provide MSAG valid addresses for selective routing and ALI display at the PSAP.

## 1.4 Operational Impacts Summary

Operational impacts include, but are not limited to:

- **MSAG Syncronicity between Systems:** Due to the lack of a specified interface between the as defined VDB and ERDB elements, syncronicity issues for MSAG data distribution to diverse VDB and ERDB elements, and varying location matching algorithms within VDBs and ERDBs, it is strongly suggested that for a given geographical area, both the VDB and ERDB elements be provided by the same operator and that each county, 9-1-1 region or state contract with only one VDB/ERDB Operator.

  ***Example of Why:*** The LIS (Location Information Server[1]) may query via the V7 interface to the VDB whether 123 Main St. is a routable, MSAG valid address. The VDB, upon checking its database of aliases, determines that 123 Main St. is the same at 123 Route 66, which is an MSAG valid and routable address. The VDB provides a YES response to the V7 query. Subsequently, the ERDB would receive this same address (123 Main) for routing purposes. The ERDB, however, has no interface to the VDB and may lack the same alias database as the VDB, especially if the ERDB and VDB are operated by different entities. The ERDB may then fail to route the call, causing a default situation.

- **MSAG Delivery:** 9-1-1 MSAG Administrators need to determine if they will contract directly with VDB and ERDB Operators to provide initial MSAGs and daily updates, or if they will authorize their DBMSP/9-1-1SSP to provide initial MSAGs and daily updates.

- **Geospatial Data:** In addition to a tabular MSAG, geospatial data may be helpful to VDB and ERDB Operators. VDB and ERDB Operators should coordinate access to geospatial data with the 9-1-1 Administrator, where applicable.

- **Translation Tables and Business Rules:** The 9-1-1 Administrator may choose to review translations data or rules for accuracy. Should they choose to, they must obtain the necessary resources and develop appropriate procedures with the VDB and ERDB Operators.

- **9-1-1 Administrator Interoperation:** The 9-1-1 Administrator is expected to work with multiple entities (DBMSP, VDB, ERDB, VPC, VSP, etc.) to resolve addressing errors. Additionally, each of these multiple entities are expected to also work with the 9-1-1 Administrator to resolve these same addressing errors.

[1] See section 1.13 or NENA Master Glossary (once this document is approved) for a complete definition of the LIS and V7 interface.

- **MSAG Source** (may be MSAG Administrator or MSAG Operator)**:** The MSAG Source will be required to develop a process for providing selective router information for each ESZ (Emergency Service Zone) in order to make it available to ERDB Operators.
- **MSAG Administrator** is responsible for notifying VPC, ERDB and ESGW[2] Operators when ESN modifications or additions are made to MSAG entries and geospatial data to ensure those Operators appropriately update their databases.

### 1.5 Document Terminology

The terms "shall ", "must" and "required" are used throughout this document to indicate required parameters and to differentiate from those parameters that are recommendations. Recommendations are identified by the words "desirable" or "preferably."

### 1.6 Reason for Issue

Compliance with the provided requirements will help ensure valid MSAG and alternate address records are available to VDBs and ERDBs to use in handling static and nomadic VoIP originated emergency calls.

### 1.7 Reason for Reissue

NENA reserves the right to modify this document. Upon revision, the reason(s) will be provided in the table below.

| Version | Date | Reason For Changes |
|---|---|---|
| Original | 01/09/2007 | Original Document |
| 2 | 11/26/2007 | Updated Section 4.3 General Maintenance. Added Sections 5, 6 and 7 - V7 Requirements, Discrepancy Reports, Statistical Reports. |

### 1.8 Date Compliance

All systems that are associated with the 9-1-1 process shall be designed and engineered to ensure that no detrimental, or other noticeable impact of any kind, will occur as a result of a date/time change up to 30 years subsequent to the manufacture of the system. This shall include embedded application, computer-based or any other type application.

To ensure true compliance the manufacturer shall upon request provide verifiable test results to an industry acceptable test plan such as Telcordia GR-2945-CORE or equivalent.

[2] See NENA Master Glossary for definitions of VPC, ERDB and ESGW.

### 1.9 Anticipated Timeline

This document includes "fast track/short term" options as well as long term requirements. It is expected that VDB and ERDB Operators and 9-1-1 Administrators will comply with these requirements upon completion and approval by NENA.

### 1.10 Cost Factors

The MSAG Source will be required to develop a process for creating initial load MSAG files and subsequent daily updates. MSAG Source is also required to create and maintain a relationship between ESZ and Selective Routers in format used for implementation of VDBs and ERDBs. This also requires the development of supporting interfaces and processes to ensure MSAG Source, VDB, and ERDB remain synchronized and consistent in content. These processes may result in additional costs to the 9-1-1 Administrator, VoIP carriers and their Service Providers.

### 1.11 Cost Recovery Considerations

Traditionally, much of the cost of the existing 9-1-1 Service Provider infrastructure has been supported through the collection of fees and surcharges on wireline and wireless telephone service. New network elements in the IP Domain will need to be paid for in some manner. As VoIP service replaces traditional voice services that currently support the E9-1-1 Service Provider infrastructure, existing fee collections will decline and must be replaced.

### 1.12 Acronyms/Abbreviations

This is not a glossary. See NENA 01-002 - NENA Master Glossary of 9-1-1 Terminology located on the NENA web site for a complete listing of terms used in NENA documents.

| **The following Acronyms are used in this document:** | |
|---|---|
| ELT | English Language Translation |
| ERDB | Emergency Services Zone Routing Data Base |
| ESN | Emergency Service Number |
| ESGW | Emergency Services Gateway |
| ESQK | Emergency Services Query Key |
| ESRN | Emergency Services Routing Number/Name |
| ESZ | Emergency Services Zone |
| FOC | Function of Change |
| FTP | File Transfer Protocol |
| LIS | Location Information Server |
| MSAG | Master Street Address Guide |
| PSAP | Public Safety Answering Point |
| RDO | Root Discovery Operator |
| SFTP | Secure Shell File Transfer Protocol |
| SSH | Secure Shell |
| SSH-2 | Secure Shell, Version 2 |

| The following Acronyms are used in this document: | |
|---|---|
| URI | Uniform Resource Identifier |
| URL | Uniform Resource Locator |
| USPS | United States Postal Service |
| VDB | Validation Data Base |
| VoIP | Voice over Internet Protocol |
| VPC | VoIP Positioning Center |
| VSP | VoIP Service Provider |
| XML | eXtensible Markup Language |

# 2 Roles and Responsibilities

## 2.1 MSAG Source

The MSAG Source represents a recognized supplier of MSAG files, which may be the MSAG Administrator, or an authorized MSAG Operator. The MSAG Source is typically, but not always, the E9-1-1 System Service Provider.

The MSAG Source shall make the ESZ and ESN information available to authorized ERDB Operators, VDB Operators, PSAP and SR Operators and any other concerned parties that require this fundamental information. The VDB/ERDB Operator shall be responsible for identifying themselves to the MSAG Source and for requesting MSAG for the areas they cover.

The MSAG Source shall have the necessary infrastructure to ensure the MSAG data is kept current and that updates are made available in an electronic form to authorized parties in a timely fashion.

NOTE: The entity that provides access to the civic data of the MSAG may be different from the entity that provides access to the geo-spatial ESZ boundary data for the MSAG.

The MSAG Source can be devolved into two specific organizational entities: MSAG Administrator and MSAG Operator.

### 2.1.1 MSAG Administrator

The MSAG Administrator is the component of the MSAG Source that is responsible for:

- Determining, documenting, and maintaining the MSAG data.
- Maintaining other data such as alternate street names, zip codes, postal

communities, landmarks, etc. for use by VDB/ERDB Providers.

- Coordinating and maintaining the local level activities related to ESZ boundary break downs and associated ESN lists.

- Liaising with the MSAG Operator (typically the SR Operators) in the area of coverage to assist the MSAG Operators in determining which ESN values correspond to the ESZ allocations.

- Where required, authorizing MSAG Operators to provide a Baseline MSAG and Delta MSAGs or be prepared to do it themselves using the guidelines outlined in this document.

- Where available, providing geospatial data to VDB and ERDB Operators.

- Notifying VPC, ERDB and ESGW Operators when ESN modifications or additions are made to MSAG entries and ensuring those Operators appropriately update their databases.

- Providing the data to the MSAG Operator for the actual electronic storage and distribution of the MSAG data.

- Coordinating resolution of issues or discrepancies related to routing of emergency calls as the routing relates to address data.

- Coordinating access to the data for the VDB, ERDB, and MSAG Operators for the purpose of verifying data.

- Performing an MSAG and alternate entries audit with VDB, ERDB, and MSAG Operators at least twice a year, as outlined in NENA 02-011, Section 7.6.

- Providing authorized MSAG modifications to their MSAG Operator.

    - **IMPORTANT:**

        - The system sourcing the MSAG and updates **must** be the MSAG Administrator or Operator that updates the ALI and Selective Router databases.

        - If the 9-1-1 Administrator has an on-site ALI data base and they maintain the MSAG (as the MSAG Operator) then they shall be the source of the MSAG data.

### 2.1.2 MSAG Operator

The MSAG Operator is responsible for:

- Maintaining the database equipment and infrastructure that supports the access and retrieval of the MSAG data by authorized parties.
- Providing the necessary infrastructure for the MSAG Administrator to ensure that the data can be updated.
- Ensuring the database itself remains reliable, uncorrupted, and secure from unauthorized access.
- Providing Baseline and Delta MSAGs when requested by the MSAG Administrator.

## 2.2 Validation Database (VDB) Operator

The VDB Operators are responsible for:

- Resolving duplicate MSAG records in order to provide only one response for a validation request.

  Example: Exact same MSAG range appears in a 9-1-1 Administrator's MSAG twice, but with different exchange code values. VDB Operator must resolve duplications with the 9-1-1 Administrator.

- Providing the service by which Location Information Server (LIS) operators and other authorized users in their area of operation can submit access network location information over the V7 interface for validation.
- Providing validation checks to ensure the location information will successfully translate into the current MSAG valid address.
- Providing an effective electronic means of performing validation and providing assistance in correcting invalid information.
- Ensuring the validation occurs against the latest available version of the MSAG.
- Ensuring an incoming address record only matches to a single VDB MSAG record.
- Ensuring the Root Discovery Operator (RDO) is informed of the availability of their service and the regional coverage it provides to support reliable discovery by users.
- Liaising with neighboring operators and resolving areas of overlap based on regional coverage as identified in the root discovery information (see NENA 08-001 on RDO).

- Where ambiguity may arise in the root discovery data because of sub-municipality splits in VDB operator coverage, the operator is expected to make arrangements for proxy validation requests or return the identity of the alternate for these areas of overlap.

### 2.3 Emergency Services Zone Routing Database (ERDB) Operator

The ERDB operators are responsible for:

- Ensuring that reliable infrastructure with the necessary performance to support real time routing queries over the V8 interface is available to authorized VPC operators.
- Supporting routing queries of pre-validated civic address and geo-spatial information.
- Returning the correct MSAG valid format to the VPC in the V8 interface routing response.
- Working with SR operators, 9-1-1 Administrator and other parties as necessary to ensure that ESZ boundaries are associated with correct ESN values used to ensure proper response to a routing request.
- Ensuring all URI or other system-related changes are announced and that old URIs are maintained for an overlap period and the RDO is informed of the associated expiry and activation times.
- Liaising with neighboring operators and resolving areas of overlap based on regional coverage as identified in the root discovery information (see NENA 08-001 on RDO).
    - Where ambiguity may arise in the root discovery data because of sub-municipality splits in ERDB operator coverage, the operator is expected to make arrangements for proxy routing requests, or return the identity of the alternate for these areas of overlap, or return an error.
- Maintaining records of all routing requests including responses, status, time stamp and the identity of the requesting VPC entity.

### 2.4 Root Discovery Operator (RDO)

Refer to NENA 08-001.

## 3 Sourcing of MSAG Data for VDBs and ERDBs

### 3.1 Pre-i2 Fast Track

This section outlines the processes to be used for provisioning of services using a VPC prior to

establishing and using VDBs and ERDBs as conceptualized in a true i2 architecture.

3.1.1 MSAG Source shall create a baseline extract of the existing MSAG data, including ESN.

3.1.2 The MSAG Source shall provide Delta MSAG extracts, including ESNs, using existing formats.

3.1.2.1 Until Delta MSAGs can be developed; complete MSAG baseline extracts must be made available on a regular basis and as often as possible.

3.1.2.2 If the MSAG Source is supplying Delta MSAGs, they still must supply a full MSAG baseline extract no less than quarterly.

3.1.3 When providing Delta MSAGs, the MSAG Source shall provide a technical description (data layout, field description, cycle numbers, record count, etc.) of what the file looks like and the order in which the records should be processed by the VDB and ERDB Operators. (See Appendix F for sample.)

3.1.3.1 Electronic transmission of this information with each Delta MSAG is preferred.

3.1.3.2 Any changes to the file format must be coordinated with a minimum of 90 days advance notice with VDB and ERDB Operators.

3.1.4 Where available the MSAG Source should provide ESN and Selective Router information for each MSAG record to the ERDB Operator.

3.1.5 When the MSAG Source is unable to provide the ESN and Selective Router data to the ERDB operator, the ERDB operator shall have mechanisms in place to determine the appropriate Selective Router that calls should be directed to.

3.1.6 ESZ boundaries must be provided to the ERDB Operator by the MSAG Administrator in an agreed upon format (drawings, maps, etc.).

3.1.6.1 Where geospatial data (polygon) is available, it shall be provided by the MSAG Administrator to the ERDB Operator.

3.1.7 Because English Language Translations (ELTs) will be provided to the PSAP by the ALI system based on the Administrative (MSAG) ESN in the ESQK shell record or V-E2 response (see NENA 08-001), ELTs are not part of the MSAG and will not be supplied in VPC, VDB, and/or ERDB data bases.

## 3.2 Implementing and Maintaining Location Validation Data (NENA i2)

### 3.2.1 MSAG Distribution

This section outlines the processes to be used for provisioning of services for nomadic VoIP using VDBs and ERDBs.

3.2.1.1 When requested by the MSAG Administrator, the MSAG Source shall make available an initial Baseline MSAG extract (same as applied to wireline MSAG content).

3.2.1.1.1 Administrative ESN, Routing ESN and identification of the appropriate Selective Router must also be provided in some manner.

3.2.1.2 MSAG Source shall provide subsequent updates (Delta) to the MSAG for retrieval at least once a business day to requesting VSP, VPC, VDB, and/or ERDB Operators.

3.2.1.2.1 The MSAG Administrator shall maintain the MSAG data using existing processes. Updates to the MSAG data will be made available by the MSAG Source via an electronic file format. (See Appendix E for specifications.)

3.2.1.2.2 The MSAG data file format (including Baseline and Delta) shall be provided in a NENA data exchange format. Formats have been defined for MSAG exchange. Refer to NENA Standard Formats & Protocols for ALI Data Exchange, ALI Response & GIS Mapping, NENA-02-010. http://www.nena.org/media/files/NENA02-010Standardupdated02-25-06_BOARDAPPROVED.pdf.

3.2.1.2.3 The MSAG Source shall provide a Delta MSAG file containing only a header and trailer record when no changes have been made.

3.2.1.3 The MSAG Source shall provide all available MSAG data elements to the VDB/ERDB Operators. (Refer to NENA 02-010 for standard data elements.)

3.2.1.4 VDB/ERDB Operators shall translate County Name from various fields (i.e., TAR code, PSAP ID, County ID abbreviation or the USPS County Name) when necessary.

3.2.1.5 VDB/ERDB Operators are cautioned that the county-related fields

in the MSAG data or the USPS database may not represent the county name where the street is physically located. (See Appendix D – County Name/County ID for sample discrepancies.)

3.2.1.6 For the purpose of auditing, the VDB and ERDB Operators shall provide the MSAG Administrator an electronic copy of the Civic to MSAG translations data at a minimum of semi-annually.

3.2.1.6.1 The MSAG Administrator shall review and coordinate discrepancies with VDB and ERDB Operators and approve Civic to MSAG translations.

3.2.1.7 The VDB and ERDB shall be able to generate extract data in an agreed upon NENA standard format.

3.2.2 Interface

3.2.2.1 Initial Baseline MSAG extracts and daily Delta updates shall be made available via secure (login/password), open standard protocols (e.g., SFTP) to certified authorities. (See Appendix E)

# 4 Provisioning and Maintenance of data in VDB and ERDB

## 4.1 Provisioning Data

4.1.1 Civic to MSAG translations (see Appendix D) shall be maintained and kept synchronized by the VDB and ERDB Operators with the assistance of the MSAG Administrator.

4.1.2 Common data elements in the VDB, ERDB and MSAG must be synchronized except during times of maintenance or when updates are being applied. (Refer to Appendix B and D)

4.1.3 The VDB and ERDB Operators shall be able to accept the MSAG data in multiple NENA Standard formats.

4.1.3.1 VDB and ERDB Operators shall be able to accept MSAG input data in parsed or concatenated fields.

4.1.3.1.1 For querying of the VDB and ERDB, and returning of alternatives for routing (from the VDB), the database shall have the capability of processing the STREET NAME field and separating the Prefix

Directional, Street Name, Street Suffix and Post Directional data elements into individual data fields stored within the database.

4.1.4 VDB and ERDB Operators shall use the following USPS products for building alternates and aliases:

4.1.4.1 Carrier Route Product and City State Product

**Detailed specifics and file formats can be found at:**
**http://ribbs.usps.gov/files/Addressing/PUBS/AIS.pdf**

NOTE: When using data from the USPS data bases the ERDB and VDB Operators will only include the street name data. PO boxes, APO/FPO and rural route addresses will not be loaded from the USPS databases, but only from an authorized MSAG.

4.1.5 VDB and ERDB Operators shall obtain address updates as made available by the USPS.

4.1.6 VDB and ERDB Operators shall use as reference USPS Publication 28 and the Federal Geographic Data Committee emerging document, Working Title: Street Address Data Standard.

4.1.7 VDB and ERDB Operators shall build initial databases with MSAG addresses and then add alternates as necessary.

4.1.8 The VDB and ERDB Operator shall track and log all database changes made, including but not limited to the following:

4.1.8.1 New data entries

4.1.8.2 Change to data

4.1.8.3 Deletion of data

4.1.8.4 New alternate address record

4.1.8.5 Change to alternate address record

4.1.8.6 Deletion of alternate address record

4.1.8.7 The identification of source (e.g., person or system) making entries or changes

4.1.8.8 Date and time the change was made

4.1.9 Logs shall be archived in a viable format for a minimum of 3 years in accordance with NENA Standard 02-011, Section 2.26.

4.1.10 The VDB and ERDB shall provide the ability to identify an address entry as an alternate for another VDB/ERDB entry and its associated MSAG content.

4.1.11 The ERDB shall maintain logs of all queries and responses.

4.1.12 The VDB may maintain logs of all queries and responses.

## 4.2 User Interface

4.2.1 VDB and ERDB shall provide a user interface to access a history of record changes for a user's authorized data:

4.2.1.1 Electronic access to the change history shall be available for a period of 6 months.

4.2.1.2 The ERDB logs shall be archived in a viable medium for a minimum of 3 years in accordance with NENA Standard 02-011, Section 2.26 with the availability to produce history reports.

4.2.1.3 The ERDB operator shall provide an electronic search of all ERDB logs.

4.2.1.4 The VDB logs shall be archived in a viable medium for a minimum of 3 years in accordance with NENA Standard 02-011, Section 2.26 with the availability to produce history reports.

4.2.1.5 The VDB operator shall provide an electronic search of all VDB logs.

4.2.2 The VDB/ERDB Operator shall provide the ability for 9-1-1 Administrators to review their own MSAG and alternate address records.

4.2.3 The VDB Operator shall provide the ability for 9-1-1 Administrators to submit requests for alternative address record translations to support updates to MSAG, Civic, and alternative address data.

4.2.4 The VDB Operator shall provide a secured user interface.

4.2.4.1 The VDB's user interface shall require users to access information using secured login and password combinations.

4.2.4.2 The VDB interface shall allow users to submit requests to change information that is specifically related to their jurisdiction.

## 4.3 General Maintenance

4.3.1 Any given MSAG record may have one or more alternate record(s).

4.3.2 MSAG Administrators and VDB/ERDB Operators shall abide by these business rules:

4.3.2.1 If an MSAG street is renamed, the previous name shall automatically be added as an alternate (as long as there is no duplicate MSAG record) until such time the street name is reused within the same community name. All existing relationships must be maintained.

4.3.2.1.1 When a street is renamed and an alternate is created with the old name, the old street name alternate should be deleted from the VDB once the USPS does not recognize the old street name, usually after 1 year. This process requires approval by the 9-1-1 Authority.

4.3.2.1.2 When an alternate is removed from the VDB, the alternate shall remain in the ERDB for at least an additional 6 months before it is deleted. This process is necessary because of the potential that alternates have been removed from the VDB since the last validation occurred.

4.3.2.2 New alternates must not duplicate existing MSAG records. In the case of duplicates, the VDB/ERDB Operator shall contact the 9-1-1 Administrator for resolution.

4.3.2.3 An alternate address record must be removed before it can be used as a primary MSAG record.

4.3.2.4 Approved alternates shall not be deleted from VDB/ERDB databases without the approval of the 9-1-1 Administrator.

4.3.2.5 During an MSAG audit, the 9-1-1 Administrator shall review and request deletion of alternates as necessary.

4.3.2.6 If the location entered will not MSAG validate, the VDB shall return no more than ten (10) potential alternative suggestions to the submitter of the request.

4.3.2.7 Only special characters which are allowed in USPS Publication 28 (Appendix

B and C) shall be accepted in any interface that contains location information.

4.3.2.8 Data submitted for validation in the V7 and the V8 queries shall submit only street names in the street name field. Directionals, street suffixes, and apartment, suite, room, lot, unit, etc. data shall not appear in the street name field.

### 4.4 Discrepancy Handling

4.4.1 The VDB Operator shall provide a mechanism to report and track discrepancies.

4.4.2 The mechanism shall include the ability to identify the entity reporting the discrepancy.

4.4.3 Discrepancy submissions and responses shall be exchanged electronically.

4.4.4 The VDB Operator shall coordinate any necessary changes with the 9-1-1 Administrator as a result of the reported discrepancy within one business day.

## 5 V7 Requirements

### 5.1 House Number/Range Variations

5.1.1 If no house number is provided in the query interface, omit the house number XML element on the V7 request. (Note: This applies for all fields that are blank.)

5.1.2 If there is a query to the VDB that omits the house number XML element, it can only be an exact match to an MSAG record that supports no house numbers. It must not be an exact match to an MSAG record with low and high house numbers.

EXAMPLES OF NO HOUSE NUMBERS: VDB Operator must confirm with the 9-1-1 Authority that these are in fact valid.

| Low | High |
|---|---|
| 0 | 0 |
| (space/blank) | (space/blank) |
| (space/blank) | 789 |
| 500 | (space/blank) |

5.1.3 All house number formats and range validation of those formats must be

coordinated with the 9-1-1 Authority. For more examples refer to Appendix D.

# 6 Discrepancy Reports

## 6.1 V7 Discrepancy Report

VDB Operators shall create a web page for discrepancy submissions.

When a user of the V7 interface receives an error on a query that they believe is accurate and valid, they need a method for submitting information to the VDB Operator via a V7 Discrepancy Report.

6.1.1 The V7 Discrepancy Report submission shall contain the following information:

- Reporting party's name, email, and contact telephone number
- Identifier of VDB query was sent to
- Customer ID from V7 query
- Date/Time of query to VDB
- Complete copy of the location information submitted
- Full validation request message (optional)
- Result Code
- Message ID
- Valid (true/false)
- Alternate URI
- Full response received from V7 query to VDB (optional)
- Problem description or desired results
- Additional Comments, optional

6.1.2 Discrepancy submissions and responses shall be exchanged electronically.

- **VDB Operator shall resolve the submission or refer it to the 9-1-1 Authority and** return a response (initial or final) to the originator within one (1) business day.
- VDB Operators will only refer discrepancy submissions to 9-1-1 authorities after researching the issue and determining that the discrepancy can only be resolved by action on the part of the 9-1-1 authority (i.e. update of the MSAG for new street addresses).
- 9-1-1 Authority shall respond within one (1) business day to discrepancies referred to them from the VDB Operator.
- VDB Operator shall provide response(s) back to the originator within one (1) business day.
- If an MSAG update is required to resolve the discrepancy, the 9-1-1 Authority shall make the MSAG update to the MSAG Source and allow the

MSAG Source to provide the update to the VDB Operator using the Delta MSAG process.

- If the discrepancy can not be resolved for any reason (if the Addressing Authority will not make the change, for example) the discrepancy may be closed with no resolution. In this case the Additional Comments should include an explanation of why the problem can't be resolved.

6.1.3 V7 Discrepancy Report results shall contain the following information:

- All information received from originator and resolution (resolution may be: referred to 9-1-1 Authority)
- Date/Time when resolution returned to originator
- Additional Comments; i.e., The correct address is "123 Main St, Anytown, US." – or – The MSAG has been updated. Address now valid. Resubmit record for address validation.

6.1.4 The originator should attempt to validate the address every 24 hours until the record validates. It is not necessary for the originator to wait on the resolution of the discrepancy from the VDB Operator to attempt revalidation.

6.1.5 Records in the LIS database should be revalidated at least every three (3) months from the last validation date.



# 7 Statistical Reports

7.1 As there are not yet any working VDBs, there is no experience or past history to determine what statistics will be most useful; however, VDB Providers will maintain all raw data from V7 queries and responses for a minimum of 3 years for use by authorized parties. This data may be available online or offline. Report modifications will be based on future experience or learned methods. Requirements will evolve and may require developing specific standard report format(s).

Initially it is recommended that the following statistics be maintained by VDB Providers:

- # of Queries by Jurisdiction, by requestor (Customer ID)
- # of Successful Queries (Return Codes 200 and 210) by Jurisdiction, by requestor (Customer ID)
- # of Unsuccessful Queries by Jurisdiction, by requestor (Customer ID)

NOTE: Currently, there is no method to determine if a query is a new query or a re-validation query (refer to Section 6.1.6) to ensure a record will still map to a valid MSAG. This issue has been referred to the VoIP Technical Committee for discussion and resolution.

7.2 As there are not yet any working ERDBs, there is no experience or past history to determine what statistics will be most useful; however, ERDB Providers will maintain all raw data from V8 queries and responses for a minimum of 3 years for use by authorized parties. This data may be available online or offline. Report modifications will be based on future experience or learned methods. Requirements will evolve and may require developing specific standard report format(s).

Initially it is recommended that the following statistics be maintained by ERDB Providers:

- # of Queries by Jurisdiction, by requestor (Customer ID)
- # of Successful Queries (Return Codes 200 and 201) by Jurisdiction, by requestor (Customer ID)
- # of Unsuccessful Queries by Jurisdiction, by requestor (Customer ID)

7.3 Mismatch Report

VDB and ERDB Providers shall create a Mismatch Report that reflects differences between alternate addresses (AKAs), postal and MSAG entries. Examples of discrepancies:

- Entry in MSAG with no AKAs.
- Postal entry that can not be matched to a valid MSAG entry. Matching shall be performed on House Number Ranges (*), Street Name, Community, County, and State.

  * House number range errors should be in the report; however, there are a variety of legitimate reasons why postal and MSAG ranges do not match.

# 99 Recommended Reading and References

[1] This document **shall** be used in conjunction with the following NENA documents:

- NENA 08-001, Interim VoIP Architecture for Enhanced 9-1-1 Services (i2)
- NENA 02-010, NENA Recommended Formats & Protocols for ALI Data Exchange, ALI Response & GIS Mapping
- NENA 02-011, NENA Data Standards for Local Exchange Carriers, ALI Service Providers & 9-1-1 Administrators

[2] USPS Publication 28: http://pe.usps.gov/cpim/ftp/pubs/Pub28/Pub28.pdf

[3] Federal Geographic Data Committee, Address Data Standard emerging document: http://www.urisa.org/about/initiatives/addressstandard

# Appendix A – DBMS MSAG Source Changes

**Purpose**
Provide list of potential system changes that may be required for implementing i2 solution.

**Potential Changes Required to Support VDB/ERDB/VSP Platforms**
The VDB/ERDB Operators and VSP Providers **should** consult with the MSAG Source to determine when the standards documented above will be implemented. Potential required changes for DBMSPs/MSAG Source for implementing i2 solution are shown below:

- FTP interface for retrieving Baseline MSAG and Delta MSAG (See Appendix E)
- Identification of Selective Router for MSAG record and information needed to determine the correct ESRN
- Creation of Delta MSAG process
- In the future, the VDBs may be the source for MSAG maintenance and all entities who want to validate addresses will connect to a VDB
    - If the MSAG maintenance is performed in the VDB it will only be done with the express approval of the MSAG's owner. The actual work on the database may be done directly by the MSAG Authority (via a web-based interface) – or the Authority may choose to have the VDB Operator perform this function.
- Provision of alternate address record translation to VDB and ERDB Operators, if available

# Appendix B - Rules for Address Abbreviation

**Purpose**

Queries to the MSAG have many alternative formats to the fields and contents. The VDB **shall** comply with the USPS format for converting to standardized response to queries.

**Resources for Abbreviation Matching:**
USPS Publication 28 can be found at the following link:
http://pe.usps.gov/cpim/ftp/pubs/Pub28/pub28.pdf

Federal Geographic Data Committee, Address Data Standard emerging document:
http://www.urisa.org/address_data_standard.htm

The following table is extracted from USPS Publication 28 to show variations in Street Suffix Abbreviations. The suffix name of AVENUE was picked for illustration purposes only.

| Primary Street Suffix Name | Commonly Used Street Suffix or Abbreviation | Postal Service Suffix Abbreviation |
|---|---|---|
| AVENUE | AV<br>AVE<br>AVEN<br>AVENU<br>AVENUE<br>AVN<br>ANVUE | AVE |

Table 1: Street Suffix Abbreviation (taken from USPS Pub 28, Appendix C for illustration purposes)

The VDB MUST be able to translate AV, AVE, AVEN, AVENU, AVENUE, AVN and ANVUE to the USPS accepted abbreviation of AVE.

| **Address received over the V7** | **Result Code** | **Address contained in the MSAG and returned over V-E2** | **Address returned over the V7** |
|---|---|---|---|
| OAK AVE | 100 (Success) | OAK AVN | OAK AVE |
| OAK AV | 102 (Alt returned) | OAK AVN | OAK AVE |
| Oak Ave | 102 (Alt returned) | OAK AVN | OAK AVE |
| OAK AVE. | 102 (Alt returned) | OAK AVN | OAK AVE |

Table 2: Examples of Street and Street Suffix Names as input/outputs over V7

### Additional Validation Functionality

The VDB may optionally do more than matching based on a standardized list. For example, if a VDB receives "AVINU", it could decide to associate and return AVE in the V7 response. The limit of this VDB functionality should be incumbent on the specific implementation.

# Appendix C – VDB and ERDB Data Exchange Fields

**The following Function of Change (FOC) codes must be added to NENA 2.1:**

a. Insert a range:
FOC=I defines the current image to be inserted (no FOC=X used)

b. Change a range:
FOC=X comes first to define the current (before) image
FOC=C comes second to define the after image

c. Delete a range:
FOC=D defines the current image to be deleted (no FOC=X used)

d. Split one range:
FOC=X comes first to define the current (before) image
FOC=S comes next (two or more FOC=S records) to define two or more ranges after the split

e. Join two or more ranges:
FOC=X comes first to define two or more before images
FOC=J follows to define the single after image for the join

**The following fields must be added to the XML definition:**

| NENA Data Exchange Fields | VDB Field (ref WSDL) | ERDB Field (ref WSDL) | Notes |
|---|---|---|---|
| **tns:Street** | | | |
| CountyName | CountyName | CountyName | Will currently need to be derived from the County ID and/or TAR Code as sent from the MSAG. See Section 3.2.1.4 |
| FIPS | n/a | n/a | The V7 and V8 interface will need to be updated to include this. Currently it is documented that County ID may be provided as the FIPS code. |
| Country | Country | Country | Will currently need to be derived by the VDB and ERDB. |
| **tns:Range** | | | |
| ESRN | n/a | esrn | This is relevant only to the ERDB. It identifies the ESGW and Trunk Group to the appropriate Selective Router. |
| ContingencyRoutingNumber | n/a | crn | This is relevant only to the ERDB. This is the 24x7 10 digit number for the PSAP that can be used in case of network failure. |
| AdminESN | n/a | AdminESN | This is an optional field. This is |

| | | | |
|---|---|---|---|
| | | | the ESN that is used to determine the correct English Language Translations (ELT) and may be used by CPE to transfer calls to the correct responder. (Refer to Routing ESN) |
| RoutingESN | n/a | RoutingESN | This is a required field. Used by a selective router to selectively route a 9-1-1 call and for switch-based selective transfer features. In cases where Routing ESNs are not used, the routing ESN is the same as the Administrative ESN. *Note: ESN will be removed from the MSAG schema when these two fields (Admin and Routing ESN) are added.* |
| **tns:Alternates** | | The schema definition for Alternates will be similar to the Range definition in that a single MSAG street may have 0 to n alternates associated with it. An Alternate may be the Postal equivalent to the MSAG or it may be any other alternate required (i.e. an alias street name – John Carpenter Freeway vs. Highway 121). See additional commentary on alternates, below. | |
| Prefix Directional | PrefixDirectional | PrefixDirectional | |
| Street Name | StreetName | StreetName | |
| Street Suffix | StreetSuffix | StreetSuffix | |
| Post Directional | PostDirectional | PostDirectional | |
| Community Name | Community | Community | |
| State | StateProvince | StateProvince | |
| County Name | CountyName | CountyName | |
| County ID | CountyID | CountyID | |
| Country | Country | Country | |
| Low Range | | | The group indicated that alternates needed the capability of having ranges assigned for them. We will need to have technical input from more groups in order to determine the best way to represent this in XML This data must be optional. |
| High Range | | | |

**Fields determined by the VDB/ERDB (they do not need to be transmitted from the MSAG Source to the VDB/ERDB or be returned to the MSAG source):**

| NENA Data Exchange Fields | VDB Field (ref WSDL) | ERDB Field (ref WSDL) | Notes |
|---|---|---|---|
| N/A | PostalZipCode | PostalZipCode | |

**Maintenance of Alternate to MSAG translations**

The MSAG Administrator or Operator may be able to provide an initial set of Alternate to MSAG 'translation' data. The VDB operator may also generate additional 'translation' data based on other sources (i.e., USPS). In either case, MSAG Administrators should review the data for accuracy in accordance with Section 4.14 of this document. MSAG Administrators will ensure the alternate translation data are maintained in a consistent manner at the VDB and ERDB.

Going forward there are multiple options for simplifying the maintenance of Alternate to MSAG translations:

1. The 9-1-1 Administrator may choose to keep a database of alternate translations and make them available to VDB/ERDB Operators. The VDB/ERDB operator will be responsible for keeping the translations and MSAG data synchronized (assuming that it comes from two different sources). This choice places the 9-1-1 Administrator in total control of the translations.

2. The 9-1-1 Administrator may contract with the MSAG Operator to manage and maintain Alternate to MSAG translations as an integral part of managing the MSAG itself. Current business practices between the MSAG Operator and the 9-1-1 Administrator could be expanded to include Alternate to MSAG translation data management as part of the existing work flow. The 9-1-1 Administrator would be in total control over the translation data since the MSAG process itself (which they control) would be extended to manage translation data.

3. The VDB/ERDB Operator may choose to create and maintain Alternate to MSAG translations independent from the MSAG source system. The VDB/ERDB Operator would create a baseline Alternate translation database and link it to the MSAG baseline. Sophisticated software would be used to maintain the links between the Alternate to MSAG translation database and new MSAG baselines and deltas. An interface would be provided to the 9-1-1 Administrator to allow them to approve or reject translations.

4. The VDB/ERDB Operator may become the sole data source for Alternate and MSAG data. Jurisdictions would interface with the VDB/ERDB Operator to create and maintain all Alternate and MSAG entries. Any 9-1-1 data providers needing to MSAG validate their customer records would interface with the appropriate VDB/ERDB Operator to do so. If this scenario occurs the VDB/ERDB Operator will become the MSAG Source and therefore must make available initial loads and subsequent delta updates to all other Service Providers. This data must contain selective router and ESN information.

5. Existing DBMSPs may choose to become VDB/ERDB Operators (this would require them to take on all of the functions specified in option 4).

## Appendix D – MSAG Addresses, Postal Addresses and Address Translations

This appendix is provided for informational purposes and is intended to illustrate the differences between MSAG addresses, Postal addresses and the need for Address Translations. While postal addresses assist the USPS with delivery of mail, MSAG addresses are used by public safety for dispatching emergency services.

NENA recommends that MSAGs be updated to conform with NENA Standards and USPS Pub 28 to avoid the types of problems illustrated below. However, NENA understands that all of these problems may not be corrected before VDB/ERDBs are deployed. This Appendix serves as an illustration for VDB/ERDB vendors of the types of problems they can expect as they import existing MSAG data sets.



## 1. MSAG Addresses

An MSAG address is created by the MSAG Administrator and is what PSAPs expect to see for dispatching emergency services. The MSAG consists of addresses known to the PSAP and to first responders. The following are examples of MSAG addresses and some of the idiosyncrasies with MSAG addresses.

- **DUPLICATE MSAGs with the exception of exchange or ESN**

| PD | STREET | SS | PD | LOW | HIGH | COMMUNITY | STATE | O/E | ESN | Date | PSAP ID | County ID | EXCH | Entity | TAR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | EXAMPLES OF SAME STREET WITH OVERLAPPING RANGES WITH DIFFERENT ESN | | | | | | | | | | | | | | |
| | BUCHANAN DR | | | 901 | 928 | BURNET CO | TX | | 00392 | 101605 | | | 5131 | GEO | 053CAP |
| | BUCHANAN DR | | | 1402 | 1604 | BURNET CO | TX | E | 00388 | 101605 | | | 6230 | GEO | 053CAP |
| | BUCHANAN DR | | | 401 | 1400 | BURNET | TX | | 00399 | 101605 | | | 6230 | GEO | 053CAP |
| | BUCHANAN DR | | | 1401 | 1603 | BURNET | TX | O | 00399 | 101605 | | | 6230 | GEO | 053CAP |
| | GREAT OAKS DR | | | 100 | 106 | BURNET CO | TX | | 00408 | 101605 | | | 5142 | GEO | 053CAP |
| | GREAT OAKS DR | | | 101 | 105 | BURNET CO | TX | | 00392 | 101605 | | | 5131 | GEO | 053CAP |
| E | HWY 71 | | | 100 | 4199 | BASTROP | TX | | 00023 | 081602 | | Bastrop | BAS | AU1 | 021CAP |
| E | HWY 71 | | | 584 | 1171 | BASTROP | TX | | 00020 | 081602 | | Bastrop | BAS | AU1 | 021CAP |

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | LAKEVIEW DR | | 100 | 239 | MARBLE FALLS | TX | | 388 | 91602 | | Burnet | 6230 | GEO | 053CAP |
| | LAKEVIEW DR | | 3700 | 4199 | MARBLE FALLS | TX | | 394 | 91602 | | Burnet | 5151 | GEO | 053CAP |
| | LAKEVIEW DR | | 100 | 150 | MARBLE FALLS | TX | | 658 | 91602 | | Llano | 5168 | GEO | 299CAP |
| | LAKEVIEW DR | | 100 | 511 | MARBLE FALLS | TX | | 413 | 91602 | | Llano | 5131 | GEO | 299CAP |

| PD | STREET | SS | PD | LOW | HIGH | COMMUNITY | STATE | O/E | ESN | Date | PSAP ID | County ID | EXCH | Entity | TAR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **EXAMPLES OF SAME STREET WITH OVERLAPPING RANGES WITH DIFFERENT EXCHANGES** | | | | | | | | | | | | | | |
| | DEVILS LAKE HWY | | | 8230 | 8585 | ADDISON | MI | B | 00101 | 010199 | LENA | | ONST | | |
| | DEVILS LAKE HWY | | | 8230 | 8585 | ADDISON | MI | B | 00101 | 010199 | LENA | | 7820 | | |
| | ROME RD | | | 13128 | 18672 | ADDISON | MI | B | 00101 | 010199 | LENA | | ONST | | |
| | ROME RD | | | 13128 | 18672 | ADDISON | MI | B | 00101 | 010199 | LENA | | 7820 | | |
| | ROUND LAKE HWY | | | 8711 | 9613 | ADDISON | MI | B | 00101 | 010199 | LENA | | ONST | | |
| | ROUND LAKE HWY | | | 8711 | 9613 | ADDISON | MI | B | 00101 | 010199 | LENA | | 7820 | | |
| | SANFORD RD | | | 14862 | 16647 | ADDISON | MI | B | 00101 | 010199 | LENA | | ONST | | |
| | SANFORD RD | | | 14862 | 16647 | ADDISON | MI | B | 00101 | 010199 | LENA | | 7820 | | |
| N | ADRIAN HWY | | | 3266 | 6908 | ADRIAN | MI | E | 00101 | 010199 | LENA | | ONST | | |
| N | ADRIAN HWY | | | 3266 | 6908 | ADRIAN | MI | E | 00101 | 010199 | LENA | | 1310 | | |
| | BENNER HWY | | | 2781 | 3410 | ADRIAN | MI | B | 00135 | 010199 | LENA | | CLAY | | |
| | BENNER HWY | | | 2781 | 3410 | ADRIAN | MI | B | 00135 | 010199 | LENA | | 1310 | | |

9-1-1 Administrator, MSAG Operator and VDB/ERDB Operators will have to communicate to resolve these issues. There may be changes required to source MSAGs.

**If there are duplicate MSAG records that differ only in the value of the Exchange/ESN field, this may result in the assignment of different ESRNs (related to different respective Selective Routers). This means that more than one ESRN might be mapped to a given ESQK pool. ERDB Operator shall ensure that the correct ESRN is provided to the VPC during data base query.**

- **House Number Variances:** Alpha Numeric, Hyphenated, Numeric Alpha, Leading Zeros
  Refer to USPS Publication 28, Appendix D and E
  Examples: N35W10, 1543-10, 4563NE, 05463

**Additional Examples:**

In this example the "W0319" is carried in the last 5 digits of the street name field of the MSAG but is actually the first 4 characters of the house number. Note that leading zeros after the Alpha are dropped.
Street Name: Northwoods La W0319
Low HNO: N07700
High HNO: N07799 **Actual Address is: "W319N7755 Northwoods La"**

In this example, the Street Directional is "N", but the customer will append the Street Directional to the house number (no space between).
Street Name: Mequon Rd 23W
Direction: N
Low HNO: 1000
High HNO: 1999 **Actual Address is "1000N Mequon Rd 23W"**

In this example, the low range is N05000. The customer's actual address is N5000 Main Street. Again the leading zero after the alpha character is dropped.
Street Name: Main St
Low HNO: N05000
High HNO: N05199 **Actual Address is "N5000 Main St"**

Example from California. The post-directional appears at the end of the House Number field.
Street Name: Ashby Rd
Post Direction: N
Low HNO: 1800N
High HNO: 3400N **Actual Address is "1800N Ashby Rd"**

- **County Name/County ID:** There is no County Name in the existing MSAGs. There MAY be other fields that MAY translate to the County Name. However, there are situations where the County abbreviation reflects the abbreviation for the County answering 9-1-1 and not the County where the street is physically located. It MAY be possible to use TAR/Tax Code to determine county name. Examples are shown below:
  - A 3 character MSAG-ID is assigned to the MSAG jurisdiction, which may be a city or county. The MSAG-ID is the "key" to identify all address ranges for the jurisdiction
  - An MSAG record may have a 4-character County ID associated with it
  - An MSAG record may have a 4-character County/PSAP ID associated with it
  - A 3 character numeric may be populated in the County ID field in the MSAG to identify the county. e.g. Los Angeles 019, Monterey 027 (these are **not** FIPS county codes)
  - The Exchange Field may be populated in the MSAG with a 4 character County Identifier.
  - The 3 character FIPS County code may be populated within the County ID field in the MSAG
  - The FIPS Code may be populated in the County ID field at the 9-1-1 jurisdiction's request
  - Some companies do not use County ID or any field that designates county

**EXAMPLES OF WHY THE COUNTY NAME MAY BE INCORRECT:**

- County A, B and C share a 9-1-1 system with County A taking all calls. Usually, if there is a county id in the DBMS, all MSAG records for the three counties will reflect County A's ID.
- There are also reported cases of the USPS database reflecting an incorrect county name.

- **Military Bases address very unique**
  Street Name: Castle AFB
  Low HNO: 0
  High HNO: 0
  **Actual Address is "0 Castle AFB"**

| PD | STREET | LOW | HIGH | COMMUNITY | STATE | O/E | ESN | Date | County ID | EXC H |
|---|---|---|---|---|---|---|---|---|---|---|
| | NAVAL STATION HOME PORT PIER | | | STATEN ISLAND | NY | B | 0010 0 | 03240 0 | STI1 | 400G |
| | SIJAN RD (NASA) | 237 | 256 | LANGLEY AIR FORCE BASE | VA | B | 0001 3 | 06189 9 | HAMP | |
| | WYOMING | 402 | 402 | PLATTSBURGH CITY-AIR FORCE BASE | NY | B | 0037 4 | 12089 8 | CLI1 | |
| | ALABAMA AV | 2708 | 2749 | PLATTSBURGH-AIR FORCE BASE | NY | B | 0037 0 | 12089 8 | CLI1 | |
| | NAVAL WEAPONS STATION | | | YORKTOWN | VA | B | 0000 8 | 08300 1 | YORK | |
| | NAVAL AIR STA | | | NAVAL AIR STATION | VA | B | 0023 3 | 09200 0 | NORF | |
| | Chestnut St | 3118 6 | 3118 6 | W P A F B | OH | | | | | |
| | 3 St | 2001 2 | 2001 2 | W P A F B | OH | | | | | |

- Differences in street thoroughfare abbreviations
  Refer to USPS Publication 28, Appendix C
  Example: AV vs. AVE; BL vs. BLVD; PL vs. PLC

- In some DBMS systems, the thoroughfare abbreviation "ST" MAY be assumed and not stored in the MSAG.
- Directionals (Pre/Post) are not always in directional fields, but may be included in the street name field.

- Street Suffixes are not always in the street suffix field, but may be included in the street name field.

- **DUPLICATE MSAG entries between DBMSPs**

The TELCO ABC data contains MSAG entries for exchanges that route to TELCO ABC's Selective Router for St Joseph County, IN. These exchanges overlap into counties served by TELCO XYZ (mostly Elkhart County). The 920 ESN in the TELCO ABC MSAG indicates that TNs with these ESNs will be routed from the TELCO ABC Selective Router to the TELCO XYZ Selective Router.

**So, TELCO ABC has 4 entries for ASH RD (these are in two different exchanges - OSCL and 3330 - and in our MSAG with 4 different community names).**

| DIR | STREET | LOW | HIGH | COMMUNITY | ESN | O/E | EXCH |
|---|---|---|---|---|---|---|---|
| | ASH RD | 62500 | 69998 | WYATT | 920 | E | 3330 |
| | ASH RD | 50000 | 53998 | GRANGER | 920 | E | OSCL |
| | ASH RD | 54000 | 69998 | OSCEOLA | 920 | E | OSCL |
| | ASH RD | 50000 | 62932 | ELKHART | 920 | E | 3330 |

**TELCO XYZ also has 4 entries for ASH RD**

| DIR | STREET | LOW | HIGH | COMMUNITY | ESN | O/E | EXCH |
|---|---|---|---|---|---|---|---|
| | ASH RD | 50000 | 56000 | ELKHART | 601 | E | 3101 |
| | ASH RD | 56002 | 59998 | ELKHART | 615 | E | 3102 |
| | ASH RD | 56800 | 56849 | ELKHART | 611 | B | |
| | ASH RD | 60000 | 60998 | ELKHART | 615 | E | |

**TELCO ABC has 2 entries for COBUS OAKS DR (OSCL exchange and Elkhart as the community).**

| DIR | STREET | LOW | HIGH | COMMUNITY | ESN | O/E | EXCH |
|---|---|---|---|---|---|---|---|
| | COBUS OAKS DR | 30400 | 30599 | ELKHART | 920 | | OSCL |
| | COBUS OAKS DR | 53000 | 53199 | ELKHART | 920 | | OSCL |

**TELCO XYZ also has 2 entries but the community and exchange are different.**

| DIR | STREET | LOW | HIGH | COMMUNITY | ESN | O/E | EXCH |
|---|---|---|---|---|---|---|---|
| | COBUS OAKS DR | 30500 | 53125 | ELKHART | 601 | B | |
| | COBUS OAKS DR | 30400 | 53150 | OSCL | 601 | B | OSCL |

In all of the examples, there is no easy 1 to 1 relationship. And, in these examples, it is the TELCO XYZ data that supports identification of the proper ESN and MSAG valid addressing for the Public Safety Answering Point. The TELCO ABC data simply facilitates routing the call to the TELCO XYZ SR from landline exchanges trunked to TELCO ABC's SR.

**Street Name Examples from Atlanta GA**

Peachtree Street
Peachtree Circle
Peachtree Battle
Peachtree Place
Peachtree Corners
Peachtree Lane
New Peachtree
Peachtree Road
Old Peachtree
Peachtree Parkway
West Peachtree
Peachtree Run
Peachtree-Dunwoody
Peachtree Terrace
Peachtree-Chamblee
Peachtree Avenue
Peachtree Industrial Boulevard
Peachtree Commons

Street named simply, "Boulevard." Also, within ½ mile there is a “Boulevard Drive” and the number ranges overlap with "Boulevard." The zip codes are different.

If you're told to go to Bankhead Highway and can't find it, it’s because the name is Veterans Memorial but the locals still call it Bankhead.

## 2. MSAG to Postal Address Comparison

The intent of this section is to illustrate the fact that postal addresses and MSAG addresses are very often different. While the USPS uses postal addresses for delivering mail, Public Safety uses MSAG addresses for dispatching emergency services.

VoIP end users will be required to register their current location until such time technology can automatically determine their location. End users will not be familiar with MSAG addresses and will register their location in the form of a civic or postal address. Validating a user provided address to an MSAG valid address often will require a multi-step process. The first part of the process would be the comparison of the MSAG information to the USPS information (cite reference in text body to the USPS products). The next part of the process would be "matching" a user entered address to the MSAG, which may include matching the user supplied information to the MSAG through using information in the US Postal Service address data.

Information for VDB Developers:

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Example using actual MSAG data; postal addresses were looked up at http://www.satorisoftware.com/US/addresscheck/AddressCheck.asp.

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These examples are customer address examples pulled at random from MSAG's around the country (no searches were done to find examples likely to not match to Postal addresses). Based on this small sample it appears that conformity to US Postal Service address data will vary widely from MSAG to MSAG. In most cases, the MSAG differs considerably from the US Postal Service address data.

Most MSAG's do not carry US Postal Service Zip Code information[3], but some MSAG's may carry both the Postal Community and the MSAG Community. (This applies only to NENA V3.1 and above.) MSAG's that do have county information may have the county name completely spelled out, or it may be abbreviated.

The MSAG Community name may not, and often does not, match the US Postal Service Community name. Variations of Andover in MSAG (each of these variations will have a different set of valid streets and addresses associated with them):

[3] Even if an MSAG contains zip code the NENA standard file formats do not have a standard Zip Code field that would allow that data to be exchanged.

| | USPS Address | MSAG | Comment | Possible Resolution |
|---|---|---|---|---|
| Address | 1463 County Road 51E | 1463 RD 51 E | Road name different | Road names would be |
| Community | Dix | DIX | | considered a match if no other |
| County | Kimball | KIM | Assumed match | similar addresses exist |
| State | NE | NE | | in the MSAG in this Community |
| Zip_Code | 69133 | | | |
| | | | | |
| Address | 18 Ambler Ln | 18 AMBLER LANE | | Referred to MSAG Source |
| Community | Matawan | ABERDEEN TWP | Communities differ | for verification of Community |
| County | Monmouth | MON | Assumed match | |
| State | NJ | NJ | | |
| Zip_Code | 07747-1225 | | | |
| | | | | |
| Address | 1 Cliffside Way | 1 CLIFFSIDE WAY | | If MSAG Community of |
| Community | Andover | ANDOVER TWP | Communities differ | ANDOVER was attempted |
| County | Sussex | SUSX | Assumed match | they would match |
| State | NJ | NJ | | |
| Zip_Code | 07747-5042 | | | |
| | | | | |
| Address | 17 Avenue A | 17 AVENUE A ST | MSAG contains ST | If MSAG Community was |
| Community | Newark | NEWARK CITY | Communities differ | NEWARK (without CITY) there |
| County | Essex | ESS | | would be a match |
| State | NJ | NJ | | |
| Zip_Code | 07114-2661 | | | |
| | | | | |
| Address | 2184 Azalea Ave | 2184 AZALEA AVE | | The MSAG has a few streets |
| Community | Barrington | WALL TWP | Communities differ | or Sea Girt, NJ – Azalea Ave |
| County | Monmouth | MON | | is not one of them |
| State | NJ | NJ | | Verify with MSAG Source |
| Zip_Code | 08007-1206 | | | |

| | | | | |
|---|---|---|---|---|
| Address | 31496 Third St | 31496 3RD ST | Road names differ | Road names would be considered a match if no other similar addresses exist in the MSAG in this Community |
| Community | Barnard | BARNARD | | |
| County | Nodaway | NOD | | |
| State | MO | MO | | |
| Zip_Code | 64423 | | | |
| | | | | |
| Address | 1720 Sciota Rd | 1720 SCIOTO RD | Road names differ | Not a match |
| Community | Elizabethton | ELIZABETHTON | Communities differ | Refer to MSAG Source for verification |
| County | Carter | UNI | | |
| State | TN | TN | | |
| Zip_Code | 37643 | | | |
| | | | | |
| Address | 901 Buchanan Ave | 901 BUCHANAN DR | Road names differ | May be considered match if no other road named BUCHANAN exist in Burnet County - should verify |
| Community | Marble Falls | BURNET CO | Communities differ | |
| County | Burnet | BURNET | | |
| State | TX | TX | | |

MSAG may, and often do, vary from local to local. Some of the typical examples include:

- In some DBMS systems, the thoroughfare abbreviation “ST” MAY be assumed and not stored in the MSAG.
- Directionals are not always in directional fields.

## 3. MSAG and Postal Address Matching Inconsistencies

There are many reasons why Postal Addresses will not match MSAG Addresses[4]:

**a. MSAG community name does not match Postal Community Name**

MSAGs vary widely in conventions used for the MSAG community name. While it is common for the name to represent the actual incorporated municipality, there are many instances where it does not. The Post Office name may have no relationship with the MSAG community name. Community names may be very similar, but not exact. The ERDB and VDB records must maintain BOTH community names for matching. Only the MSAG community name is used for the ALI data query response.

b. **There is wide variation between the postal suffix and the MSAG suffix** (ignoring the issue that in some MSAGs, the suffix is part of the street name, which must be addressed during pre-processing of MSAG records). Especially when "DR" "ST" "AVE" and "LN" are used, there is often a difference between what the Post Office believes the suffix is, and what the MSAG believes the suffix is. Of course, in most cases, one of them is right and the other is wrong, but for ERDB/VDB purposes, the MSAG version must be used for validation.

**c. Swapped Pre/Post Directional**

It is common to see N Main St in Postal and Main St N in MSAG, or vice versa. Again, the MSAG version is the one used in the ERDB/VDB.

**d. Missing Pre/Post Directional**

There are often cases where the Postal has a directional where the MSAG does not, and vice versa. The MSAG version must be used.

**e. Range differences**

These arise when postal boundaries straddle MSAG boundaries and vice versa. For example, a zip code boundary may lie within an MSAG range. Similarly, an ESN boundary may lie within a single postal range. When range differences are detected, ERDB and VDB

[4] Not all of these conditions may apply to all MSAGs. Some MSAGs compare closely to USPS; other areas are not even close.

records reflect the intersection of the ranges. Thus the number of ERDB/VDB records is larger than either MSAG records or postal records, because if either postal or sag contents change, a new record must be created in the ERDB/VDB to match. For example:

**Postal**
100-300 Main, 15101
301 – 999 Main, 15102

**MSAG**
100-199 Main, ESN100
200-500 Main, ESN101
501-999 Main, ESN102

**ERDB**
100-199 Main, 15101, ESN100
200-300 Main, 15101, ESN101
301-500 Main, 15102, ESN101
501-999 Main, 15192, ESN102

Here are examples of these differences

Variations of Andover in MSAG (each of these variations will have a different set of valid streets and addresses associated with them):

| Community | County | State |
|---|---|---|
| ANDOVER BORO | SMST | NJ |
| ANDOVER BORO | SUSX | NJ |
| ANDOVER TWP | SUSX | NJ |

| MSAG Address | Postal Address | Comment |
|---|---|---|

| | | |
|---|---|---|
| 18 AMBLER LANE<br>ABERDEEN TWP, NJ | 18 Ambler Ln<br>Matawan NJ 07747-1225<br>County name: Monmouth | MSAG has LANE spelled out<br>MSAG Community <> Postal |
| 1 CLIFFSIDE WAY<br>ANDOVER TWP NJ | 1 Cliffside Way<br>Andover NJ 07821-5042<br>County name: Sussex | MSAG Community <> Postal<br>. |
| 400 US HWY NO 206<br>ANDOVER NJ | 400 US Highway 206 S<br>Newton, NJ 07860-6002<br>County Name: Sussex | MSAG street name does not follow USPS naming conventions (“NO”)<br>No Suffix in MSAG |
| 301 W 1ST AVE<br>BARRINGTON BORO NJ | 301 W 1st Ave<br>Barrington NJ 08007-1206<br>County name: Camden | MSAG Community <> Postal |
| 17 AVENUE A ST<br>NEWARK CITY NJ | 17 Avenue A<br>Newark NJ 07114-2661<br>County name: Essex | MSAG Community <> Postal |
| 2184 AZALEA AVE<br>WALL TWP NJ | 2184 Azalea Ave<br>Sea Girt NJ 08750-2401<br>County name: Monmouth | MSAG Community <> Postal |
| 10 ACADEMY DR E<br>HANOVER TWP NJ | 10 Academy Dr E<br>Whippany NJ 07981-1801<br>County name: Morris | MSAG Community <> Postal |
| 2948 HIGHWAY 72 E<br>ABBEVILLE, ABB, SC | 2948 Highway 72 E<br>Abbeville SC 29620-5258<br>County name: Abbeville | County Name Abbreviated |
| 4216 TAYLOR CREEK RD<br>AFTON, ALB, VA | 4216 Taylor Creek Rd<br>Afton VA 22920-2159<br>County name: Albemarle | County Name Abbreviated |
| 105 E HOLLAND<br>ARCHBOLD, FUL, OH | 105 E Holland St<br>Archbold OH 43502-1210<br>County name: Fulton | No suffix in MSAG<br>County Name abbreviated |

| | | |
|---|---|---|
| 921 LIGHTHOUSE CHURCH RD<br>BAKER, OKA, FL | 921 Lighthouse Church Rd<br>Holt FL 32564-9343<br>County Name: Santa Rosa | Probably the same street, but should be verified. MSAG Community Name <> Postal, Different County. Possible that the town of Holt is in Santa Rosa, but this part of the street is in Oka. |
| 132 BANDERA CIR<br>BANDERA BAY, HEN, TX | 132 Bandera Cir<br>Mabank TX 75156-8920<br>County name: Henderson | MSAG Community <> Postal |
| 31496 330TH ST<br>BARNARD, NOD, MO | 31496 330th St<br>Barnard MO 64423-8240<br>County name: Nodaway | County Name abbreviated |
| 139 SAWYERS CREEK RD<br>CAMDEN, CAM, NC | 139 Sawyers Creek Rd<br>Camden NC 27921-7507<br>County name: Camden | County Name abbreviated |
| 32995 TERRACE VIEW RD<br>CAPE KIWANDA, TIL, OR | Lookup failed with or without zip | Postal City for Cape Kiwanda is Pacific City, but USPS does not recognize Terrace View Rd. Either Terrace View is an obsolete street name, or not a USPS recognized street. |
| 493 SIMCOE MTN RD<br>CENTERVILLE, KLI, WA | 493 Simcoe Mountain Rd<br>Centerville WA 98613-2906<br>County name: Klickitat | Inconsistent abbreviation of "Mountain"<br>County name abbreviated |
| 8620 N CR 800 E<br>DECATUR, WLS, IN | 8620 N 800 E-90<br>Decatur IN 46733-9202<br>County Name: Wells | Inconsistent Street Name conventions<br>County name abbreviated |
| 34 DUNKARD CHURCH RD<br>DELAWARE TWP, HUNT, NJ | 34 Dunkard Church Rd<br>Stockton NJ 08559-1405<br>County name: Hunterdon | Note that Postal City does not match MSAG City. |

| | | |
|---|---|---|
| 1463 RD 51 E<br>DIX, KIM, NE | 1463 Road 51 E<br>Dix NE 69133-8920<br>County name: Kimball | Inconsistent Abbreviation of "Road"<br>County Name Abbreviated |
| 1720 SCIOTO RD<br>ELIZABETHTON, UNI, TN | 1720 Sciota Rd<br>Elizabethton TN 37643-1904<br>County name: Carter | Possibly the same street, but should be verified<br>County Name is different, which could be an indication that this is not the same street |
| 2261 COMERS ROCK RD<br>ELK CREEK, GRA, VA | | This is a range problem. USPS has range 2101 – 2199 O and 2301 – 2399 O |
| 13228 US 24<br>EMERALD TWP, PAU, OH | 13228 US 24<br>Cecil OH 45821-9401<br>County name: Paulding | MSAG Community <> Postal<br>County Name Abbreviated |

## 4. Address Translations

Format for civic and postal information differs from country to country. Basically if you need to mail something, you use the Postal Address, but if you need to locate something you use the civic address. While postal and civic addresses are often very similar, they may not be interchangeable. VoIP end user addresses will often be civic/postal addresses that are known to the end user. These addresses must be validated to ensure they equate to an MSAG address used by the PSAP for dispatching emergency services. These civic/postal addresses may need to be translated to the appropriate MSAG address during validation.

***Postal addresses*** are used to deliver mail to specific individuals or organizations. Postal addresses can include city style addresses (number, street name) as well as Military Addressing, Rural Route Delivery, Star Routes, General Delivery, Post Office Box Delivery, and Private Mail Box Delivery.

***Civic addresses*** are city styled addresses with a street number and a street name. For example, the White House is a landmark address, but 1600 Pennsylvania Avenue is a civic address.

***MSAG addresses*** are civic addresses with a higher degree of specificity. For example, 1600 Pennsylvania Avenue is a civic address, but 1600 Pennsylvania Ave may be the correct MSAG valid address.

MSAG valid addresses may have different addressing schema that are less flexible than postal and civic addresses. For example, the MSAG valid address may be 1600 Pennsylvania **Av**, rather than 1600 Pennsylvania **Ave** or 1600 Pennsylvania **Avenue**.

All of the aforementioned types of addresses generally include a community name. Often times the community name of one address type can differ for another, even if the number and street name are the same. This is true for urban, suburban, and rural areas.

For example, 123 Cherry Avenue may have a postal community name (based on zip code) of Anytown, but the civic address of 123 Cherry Avenue is located within the township limits of Smallville, and the PSAP has the address in the MSAG as 123 Cherry Ave, Smallville.

The following are examples of translations based on the above example:

Going from 123 Cherry Avenue, **Anytown** to 123 Cherry Avenue, **Smallville** is an example of postal address to civic address “translation”.

Going from 123 Cherry **Avenue, Anytown**
to 123 Cherry **Ave, Smallville**
is an example of going from postal address to MSAG address translation.

Lastly, going from 123 Cherry **Avenue**, Smallville to 123 Cherry **Ave**, Smallville is an example for going from civic address to MSAG address translation.

There can be large variances in Postal and MSAG addresses due to house numbering, abbreviations, community names, spelling, street types (e.g. Dr vs. Ln), leading and trailing directionals (e.g. N Main St vs. Main St N), and other discrepancies.

Examples:
In this example there is non-numeric (numeric alpha) house addressing.
LIS Provided Address: 402B Smith
MSAG Street Name: Smith Rd
Low House Number Range: 400
High House Number Range: 499
MSAG Valid Address is: 402 Smith Rd, (This can be accomplished by two methods: (1) move the B to the house suffix field or (2) create a range of 400B to 499B.)

In this example there is hyphenated house addressing.
LIS Provided Address: 402-3 Smith Rd
MSAG Street Name: Smith Rd
Low House Number Range: 400
High House Number Range: 499
MSAG Valid Address is: 402 Smith Rd, (This can be accomplished by two methods: (1) move the 3 to the house suffix field and drop the hyphen or (2) create a range of 402-1 to 402-100.)

In this example there is fractional addressing.
LIS Provided Address: 402 ½ Smith
MSAG Street Name: Smith Rd
Low House Number Range: 400
High House Number Range: 499
MSAG Valid Address is: 402 Smith Rd

In this example the customer's actual address is N5000 Main Street. The leading zero after the alpha character is dropped.
LIS Provided Address: N5000 Main Street
MSAG Street Name: Main St
Low House Number Range: N05000
High House Number Range: N05199
MSAG Valid Address is: N5000 Main St

In this example the "W0319" is carried in the last 5 digits of the street name field of the MSAG but is actually the first 4 characters of the house

number. Note that leading zeros (after the Alpha are dropped).
LIS Provided Address: W319N7755 Northwoods Lane
MSAG Street Name: Northwoods Ln W0319
Low House Number Range: N07700
High House Number Range: N07799
MSAG Valid Address is: W319N7755 Northwoods Ln

In this example, the Street Directional is "N", but the customer will append the Street Directional to the house number (no space between).
LIS Provided Address: 1000N Mequon Road 23W
MSAG Street Name: Mequon Rd 23W
MSAG Pre_Direction: N
Low House Number Range: 1000
High House Number Range: 1999
MSAG Valid Address is: 1000 N Mequon Rd 23W

In this example, the Street Directional is "N", but the customer will append the Street Directional after the street name.
LIS Provided Address: 503 Main Street North
MSAG Street Name: Main St
MSAG Pre_Direction: N
Low House Number Range: 500
High House Number Range: 519
MSAG Valid Address is: 503 N Main St

In this example, the Street Directional is "S", but the MSAG carries the directional in the street name field.
LIS Provided Address: 503 S Main Street
MSAG Street Name: Main St S
MSAG Pre_ Direction: None
Low House Number Range: 500
High House Number Range: 519
MSAG Valid Address is: 503 Main St S
Example from California. The post-directional appears at the end of the House Number field.
LIS Provided Address is: 1800N Ashby Rd

MSAG Street Name: Ashby Rd
MSAG Pre_ Direction: N
Low House Number Range: 1800
High House Number Range: 3400
MSAG Valid Address is: 1800N Ashby Rd

## 5. Valid Alias/Alternate address record

The following are examples of valid Alias or Alternate street addresses that may be built within the VDB and ERDB to ensure addresses provided by VoIP end users can be translated into an MSAG valid address:

- **STREET KNOWN BY MORE THAN ONE (1) NAME**
  - Example: John Carpenter Freeway vs. Highway 121
- **COMMUNITY NAME DIFFERENCES**
  - MSAG COMMUNITY NAME VS POSTAL and Vice Versa
    - Hillsborough County vs. Tampa
    - Tampa vs. Hillsborough County
  - POSTAL FULL SPELLING VS MSAG ABBREV COMMUNITY NAME
    - Chicago vs. CHI
- **DIRECTIONALS AT END OF ST NAME VS BEGINNING and Vice Versa**
  - Main St N vs. N Main St
  - N Main St vs. Main St N
- **DIRECTIONALS ABBREVIATED VS SPELLED OUT**
  - N Main St vs. North Main St

- Main St N vs. Main St North

- **VARIOUS SPELLINGS OF HIGHWAYS AND ROUTES**
  Refer to USPS Publication 28, Appendix F
  - County Hwy vs. County Highway vs. Cnty Hwy vs. County Rd
  - Interstate 75 vs. I75 vs. Interstate Highway 75 vs. Interstate Hwy 75

- **LANDMARK ADDRESSES (possible new feature of VDB/ERDB)**
  - Empire State Building – 350 5th Avenue, New York, NY 10118
  - Radio City Music Hall – 1260 6th Avenue, New York, NY 10020

# Appendix E – FTP Interface Specification for MSAG Files

## 1.4 Purpose

The purpose of this document is to provide a recommended MSAG file transfer specification for transferring MSAG data files between available suppliers of MSAG data and those entities which need this MSAG data to conform to NENA i2 standards for implementation of VoIP E9-1-1 emergency services.

## 1.5 Terminology

DELTA MSAG: The Delta MSAG is a file of incremental changes to the MSAG. The changes are applied in the order that they are presented, to either the last updated version of the MSAG or a current Baseline of the MSAG, whichever is more recent.

Baseline MSAG: MSAG file that is a snapshot image which represents a complete, up-to-date set of MSAG data at the point in time it was created.

FTP (File Transfer Protocol) – is a widely accepted, and readily available, means of communication, designed specifically to move data files between computer systems over an IP network.

SFTP (SSH File Transfer Protocol) - is a network protocol that provides file transfer and manipulation functionality over any reliable data stream. It is typically used with the SSH-2 protocol to provide secure file transfer.

MSAG FTP Interface - utilizes the SFTP protocol which has been implemented on one or more managed file servers, which enable the transfer of MSAG data files to authorized MSAG consumers.

MSAG FTP Server - The system that the MSAG Source organization uses for distributing MSAG data files to necessary recipients. MSAG data files may be distributed on several servers with each server responsible for enforcing user authentication processes for any MSAG FTP Client system. Throughout this document the MSAG FTP Server will referred to as the “FTP server”.

MSAG FTP Client - describes the system which connects to the MSAG FTP Server in order to retrieve MSAG data files. Throughout this document the MSAG FTP Client will referred to as the “FTP client”.

## 2. System Overview

This document discusses the following aspects of an MSAG FTP Interface:

· An overview of the MSAG FTP Interface
· A list of requirements met by implementation of an MSAG FTP Interface

· Arrangement of MSAG file system for FTP access
· MSAG FTP login procedure
· MSAG file retrieval

It is assumed that the reader has a good working knowledge of FTP.

MSAG FTP allows a user or (MSAG consumer) client to retrieve one or more MSAG data files, to their own host network for formatting and use within the VDB and ERDB functions. An FTP client exchanges files with one or more FTP server(s). Each MSAG file maintained on the FTP server will have a specific file format which will be identified within an informational file placed in the associated file directory. It should be noted that for these MSAG data files, there is no requirement within this document for any specific file format to be defined. However, for each file format to be used, it will require documentation in order to be useful. Files retrieved by an FTP client are read in and used internally, based on individual and proprietary methods. FTP Server processes create audit logs, which are stored within the FTP server for retrieval by authorized FTP clients, as needed.

## 2.1. Requirements

The MSAG FTP Service interface, which described in this document, is designed to satisfy the following baseline requirements:

R1. Complete MSAG datasets: Complete MSAG data files, referred to as Baseline MSAG files, MUST be supplied on a periodic basis.

R2. Partial MSAG datasets: Partial MSAG data files referred to as Delta MSAG files MUST be provided between releases of baseline MSAGs.

R3. The mechanism for supplying Delta MSAG files must be capable of supporting relatively rapid releases, for example, hourly.

R4. Delta MSAG files MUST associate an MSAG FOC (Function Of Change) code for each entry using supported Function of Change codes as described in the NENA 02-010 document.

R5. Records in the Delta MSAG must be ordered such that the functions of change codes achieve the desired effect.

Example:

a. Insert a range:
FOC=I defines the current image to be inserted (no FOC=X used)

b. Change a range:
FOC=X comes first to define the current (before) image
FOC=C comes second to define the after image

c. Delete a range:
FOC=D defines the current image to be deleted (no FOC=X used)

d. Split one range:
FOC=X comes first to define the current (before) image
FOC=S comes next (two or more FOC=S records) to define two or more ranges after the split

e. Join two or more ranges:
FOC=X comes first to define two or more before images
FOC=J follows to define the single after image for the join

f. NOTE: If a system does not process FOCs of S or J, only options a, b, and c will apply. (SEE APPENDIX F FOR EXAMPLES)

Note: There may be some delta MSAGs where the following descriptions will be used in lieu of FOCs: INSERT, DELETE, BEFORE, AFTER

**IT IS CRITICAL THAT ALL FILES BE PROCESSED IN THE ORDER RECEIVED AND RECORDS IN THE FILE NOT SORTED.**

R6. MSAG files MUST conform to a standardized naming system to: a.) differentiate MSAG baseline files from MSAG delta files, b.) indicate MSAG source name, and c.) to document the file creation date.

Example: MSAG baseline file from "service provider 1": <msag_ssp1_1_0_102105>; and MSAG delta files, <msag_ssp1_1_1_102205> and <msag_ssp1_1_2_102205>.

R7. Files MUST be organized according to a documented and published directory structure, made available to authorized MSAG FTP consumers.

R8. The directory structure should allow automated data retrieval from a wide range of sources.

R9. Circumstances frequently occur within the wireline MSAG that result in duplicate MSAG ranges that differ only by exchange (see Appendix H). (move up in document)

R10. Duplicate MSAG files MUST NOT exist from a single MSAG source.

Example: MSAG files which get concatenated MUST NOT coexist with the files they replace.

a. MSAG ranges from two different sources may overlap exactly (see Appendix D, Duplicate MSAG entries example).

R11. The method of client access to files MAY be automated or be done manually.

R12. MSAG file format defined SHOULD be the NENA 02-010, formats 2.1 (or higher) for Baseline MSAG files, and 3.1 (or higher) for Delta MSAG files.

R13. SFTP client accounts used to download MSAG files MUST have READ ONLY permissions as they apply to the MSAG data files.

R14. SFTP client accounts MUST only be allowed to access MSAG file directories which they are authorized for.

3. FTP Connection Details

3.1. MSAG FTP Server identification (the assumption is that there may be several MSAG FTP Servers). The following is the minimum set of information that needs to be shared between MSAG sources and MSAG consumers.

MSAG FTP Server System Identification: TBD
System Type: TBD
Hostname: TBD (e.g. www.msag.server.com) or (www.msag.psap.com)

3.2. File Transmission Mechanism

All files must be transferred from the MSAG FTP Server using SFTP (SSH File Transfer Protocol). Other protocols can be used in addition to FTP, but must be coordinated between parties.

3.3. File Encryption

File transfer will be encrypted. An SFTP implementation using SSH-2 must be used. Key algorithm selection is installation specific and needs to be coordinated.

3.4. FTP Server Administration

Each MSAG FTP Server (i.e. designated administrative point of contact) will provide the MSAG FTP Client (admin point of contact) with user access details (username and password) to connect to the MSAG FTP Server.

3.5. FTP Client Connection

Each MSAG FTP Client will have a unique username/password to connect to the MSAG FTP Server system mentioned above. Using the SFTP protocol, clients shall be able to retrieve the files from FTP server to their local host.

4. Interface Details

4.1 Client username/password conventions to be established by MSAG Source's internal Security requirements..

EXAMPLE: An MSAG consumer's FTP username will be "<service-provider>_MSAG_<consumer's NENA_ID>". (Example is "sspA_MSAG_12345".)

4.2 FTP directory structure will be established by MSAG Source's internal Security requirements..

EXAMPLE: Within each MSAG consumer's FTP home directory an 'outgoing' sub-directory will be created. Each MSAG consumer will, upon connecting to the FTP server, be placed to its dedicated home directory. The MSAG consumer's access permissions shall restrict him to specify read/write file privileges to it are the 'outgoing' directory.

4.3. File format

These data files may be deposited in variety of file formats, including, NENA-02 (v.2.1), NENA-03 (v.3.1), or XML (current version). Each file format made available is required to have an accompanying format specification for use by any authorized MSAG consumer.

4.4. User interface

The MSAG data files will be downloaded by the MSAG consumer.
.

5. System Availability

5.1 Availability

The FTP/SFTP server SHOULD be available on a 24x7 basis, with a 99.9% availability minimum.

5.2 Exceptions to Availability

Systems MAY become unavailable due to scheduled maintenance outages. Any scheduled outage for maintenance reasons should be announced ahead of time.

6. General Information on SSH FTP

(from Wikipedia: (search Secure FTP)

SFTP is a network protocol that provides file transfer and manipulation functionality over any reliable data stream. It is typically used with the SSH-2 protocol to provide secure file transfer.

Compared to the earlier SCP protocol, which allows only file transfers, the SFTP protocol allows for a range of operations on remote files—it is more like a remote file system protocol. An SFTP client's extra capabilities compared to an SCP client include resuming interrupted transfers, directory listings, and remote file removal. For the same reason it is reasonable to implement a GUI SFTP client, but not a GUI SCP client.

SFTP attempts to be more platform-independent than SCP; for instance, with SCP, the expansion of wildcards specified by the client was up to the server, whereas SFTP's design avoids this problem. While SCP was mostly implemented on Unix platforms only, there now exist SFTP servers for most

platforms.

A common misconception is that SFTP is simply FTP run over SSH (for which see FTP over SSH); in fact it is a new protocol designed from the ground up by the IETF SECSH working group. The protocol itself does not provide authentication and security; it expects the underlying protocol to secure this. SFTP is most often used as subsystem of SSH protocol version 2 implementations, having been designed by the same working group. However, it is possible to run it over SSH-1 (and some implementations support this) or other data streams. Running SFTP server over SSH-1 is not platform independent as SSH-1 does not support concept of subsystems. SFTP client willing to connect to SSH-1 server needs to know path to the SFTP server binary on the server side.

7. FTP Command Syntax Example

Use the following (command line) syntax to transfer files from a MSAG source's host file server to a MSAG consumer's local host. ("CR" represents "carriage return")

% FTP www.msag.server.com [CR]
Name: <username> [CR]
password: <password> [CR]
FTP> cd <directoryname > [CR]
FTP> get <filename> [CR]
(to get one file at a time)

OR

FTP> get <filename> <new filename> [CR]
(renames file to the new filename)

OR

FTP> mget * [CR]
(using an mget command will retrieve all files at once)

8. Filename and Directory Structure Examples

```
FILE NAMING CONVENTION:

The file naming convention follows a repeatable structure of the following:

<Type_Content_Major-version_Minor-version_Creation-date>


i.) Filenames for baseline (complete image) MSAG and informational files,

Example of a baseline MSAG filename:
baseline_msag_2_0_101105

Example of an associated informational file:
baseline_info_2_0_101105
```

ii.) Delta (incremental) MSAG and informational files

Examples of delta MSAG filenames:
delta_msag_2_1_101105
WA_delta_msag_2_1_101105
WA_King-County_delta_msag_2_1_101105

(Any of the above incremental MSAG files would be applied to msag_baseline_2_0 file.)

Examples of associated informational file:
delta_info_2_1_101105
WA_delta_info_2_1_101105
WA_King-County_delta_info_2_1_101105

DIRECTORY STRUCTURE:

/{home_directory}/outgoing/

...the term "community-level" is a better term than "county", since some other boundaries exist, such as township, census-area, borough, etc...

/{home_directory}/outgoing/AK (State Level)
/{home_directory}/outgoing/AK/Aleutians-East-Borough/ (Community Level)
/{home_directory}/outgoing/AK/Aleutians-West-census-area/ (Community Level)
/{home_directory}/outgoing/AK/Anchorage-Borough/ (Community Level)

# Appendix F – Delta MSAG Examples for Pre-i2

## TELCO A

UHL 100305 000276 0000

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| *N GODDARD CREEK WAY | 4800 | 5599 | BEANTOWN | IDB00262100305 | | INSERT | 20051003 |
| *N PRISM RIDGE LN | 5700 | 5899 | MOON | IDB00263100305 | | INSERT | 20051003 |
| *W LILLYWOOD DR | | 9100 | 9799 DOWNTOWN | IDB00049100305 | | INSERT | 20051003 |
| *S LOGANBERRY WY | 6900 | 7099 | DOWNTOWN | IDB00049100305 | | INSERT | 20051003 |
| *S DEWBERRY AV | 6900 | 6999 | DOWNTOWN | IDB00049100305 | | INSERT | 20051003 |
| * 6 ST S | 10102 | 10599 | MIDTOWN | NDB00319100305 | | BEFORE | 20051003 |
| * 6 ST S | 10002 | 10599 | MIDTOWN | NDB00319100305 | | AFTER | 20051003 |
| * BERGIS RD | 560 | 560 | ANYTOWN | ORB00060100305 | LOS | BEFORE | 20051003 |
| * BERGIS RD | 590 | 599 | ANYTOWN | ORB00060100305 | LOS | AFTER | 20051003 |
| * BERGIS RD | 590 | 599 | ANYTOWN | ORB00060100305 | LOS | DELETE | 20051003 |
| *S BERGIS RD | 590 | 599 | ANYTOWN | ORB00060100305 | LOS | INSERT | 20051003 |
| *SWBERGIS RD | 300 | 559 | ANYTOWN | ORB00009100305 | LOS | BEFORE | 20051003 |
| *SWBERGIS RD | 300 | 589 | ANYTOWN | ORB00009100305 | LOS | AFTER | 20051003 |
| *SWBERGIS RD | 561 | 699 | ANYTOWN | ORB00009100305 | LOS | BEFORE | 20051003 |
| *SWBERGIS RD | 600 | 699 | ANYTOWN | ORB00009100305 | LOS | AFTER | 20051003 |
| *SWBERGIS RD | 300 | 589 | ANYTOWN | ORB00009100305 | LOS | DELETE | 20051003 |
| *SWBERGIS RD | 600 | 699 | ANYTOWN | ORB00009100305 | LOS | DELETE | 20051003 |
| *S BERGIS RD | 300 | 589 | ANYTOWN | ORB00009100305 | LOS | INSERT | 20051003 |
| *S BERGIS RD | 600 | 699 | ANYTOWN | ORB00009100305 | LOS | INSERT | 20051003 |
| * RIDGEVIEW CT | 17300 | 17399 | ANYTOWN | ORB00060100305 | | INSERT | 20051003 |
| * OAK MEADOW DR | | 500 | 699 ANYTOWN | ORB00060100305 | | INSERT | 20051003 |
| * RIDGEVIEW LN | 17400 | 17599 | ANYTOWN | ORB00060100305 | | INSERT | 20051003 |

***SNIP***

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| * BROOKLYN AVE NE | 3704 | 3928 | UPTOWN | WAE00103100305 | SEA | BEFORE | 20051003 |
| * BROOKLYN AVE NE | 3704 | 4012 | UPTOWN | WAE00103100305 | SEA | AFTER | 20051003 |
| * BROOKLYN AVE NE | 3930 | 3930 | UPTOWN | WAE00217100305 | SEA | DELETE | 20051003 |
| * BROOKLYN AVE NE | 3932 | 4012 | UPTOWN | WAE00103100305 | SEA | DELETE | 20051003 |
| * GROVER PARK COUNTY RD 172 | 0 | 400 | GROVELAND | WYB00261100305 | | BEFORE | 20051003 |
| * GROVER PARK COUNTY RD 172 | 0 | 550 | GROVELAND | WYB00261100305 | | AFTER | 20051003 |
| *E SCORPIO PL | 4010 | 4221 | HANDLER | AZB00150100305 | | BEFORE | 20051003 |
| *E SCORPIO PL | 4010 | 4243 | HANDLER | AZB00150100305 | | AFTER | 20051003 |
| *N SANDRA LN | 14000 | 14500 | TALKING TOWN | AZB00021100305 | | DELETE | 20051003 |
| *N SANDRA LN | 14000 | 14500 | MASCOTT | AZB00021100305 | | INSERT | 20051003 |

*UTL 100305 000000598

## TELCO B

| | | | | |
|---|---|---|---|---|
| X PENROSE AV | 6100 | 6299 | TOONTOWN | AKB250 DLS 121887 |
| C PENROSE AVE | 6100 | 6299 | TOONTOWN | AKB250 DLS 101905 |
| X PEORIA AV | 3000 | 4099 | TOONTOWN | AKB250 DLS 121887 |
| C PEORIA AVE | 3000 | 4099 | TOONTOWN | AKB250 DLS 101905 |
| XE R L THORNTON FRWY | 9500 | 9699 | TOONTOWN | AKB250 DLS 121887 |
| CE R L THORNTON FWY | 9500 | 9699 | TOONTOWN | AKB250 DLS 101905 |
| X PETAIN AV | 6100 | 6799 | TOONTOWN | AKB250 DLS 121887 |
| C PETAIN AVE | 6100 | 6799 | TOONTOWN | AKB250 DLS 101905 |
| X PETERBILT AV | 8500 | 8899 | TOONTOWN | AKB250 DAN 121887 |
| C PETERBILT AVE | 8500 | 8899 | TOONTOWN | AKB250 DAN 101905 |
| X PHILIP AV | 4500 | 5799 | TOONTOWN | AKB250 DLS 121887 |
| C PHILIP AVE | 4500 | 5799 | TOONTOWN | AKB250 DLS 101905 |
| X PHINNEY AV | 1100 | 1288 | TOONTOWN | AKE250 DLS 012389 |
| X PHINNEY AV | 1290 | 1299 | TOONTOWN | AKB250 DLS 012389 |
| J PHINNEY AV | 1100 | 1299 | TOONTOWN | AKB250 DLS 101905 |
| X PHINNEY AV | 1100 | 1299 | TOONTOWN | AKB250 DLS 101905 |
| C PHINNEY AVE | 1100 | 1299 | TOONTOWN | AKB250 DLS 101905 |
| D PINDAR AV | 900 | 1099 | TOONTOWN | AKB250 DLS 121887 |
| I PLOWMAN AVE | 1300 | 1499 | TOONTOWN | AKB250 DLS 101905 |
| X PLOWMAN AV | 1600 | 1899 | TOONTOWN | AKB250 DLS 121887 |
| C PLOWMAN AVE | 1600 | 1899 | TOONTOWN | AKB250 DLS 101905 |
| X POE AV | 3700 | 3899 | TOONTOWN | AKB250 DLS 121887 |
| C POE AVE | 3700 | 3899 | TOONTOWN | AKB250 DLS 101905 |
| X PONTIAC AV | 400 | 1099 | TOONTOWN | AKB250 DLS 121887 |
| C PONTIAC AVE | 400 | 1099 | TOONTOWN | AKB250 DLS 101905 |
| X PORTER AV | 9700 | 9799 | TOONTOWN | AKB250 DLS 121887 |
| C PORTER AVE | 9700 | 9799 | TOONTOWN | AKB250 DLS 101905 |
| XN PRAIRIE AV | 100 | 699 | TOONTOWN | AKB250 DLS 121887 |
| CN PRAIRIE AVE | 100 | 699 | TOONTOWN | AKB250 DLS 101905 |
| XN PRAIRIE AV | 1200 | 2499 | TOONTOWN | AKB250 DLS 121887 |
| CN PRAIRIE AVE | 1200 | 2499 | TOONTOWN | AKB250 DLS 101905 |
| XS PRAIRIE AV | 100 | 199 | TOONTOWN | AKB250 DLS 121887 |
| CS PRAIRIE AVE | 100 | 199 | TOONTOWN | AKB250 DLS 101905 |
| X PROSPECT AV | 5700 | 6099 | TOONTOWN | AKB250 DLS 121887 |
| C PROSPECT AVE | 5700 | 6099 | TOONTOWN | AKB250 DLS 101905 |
| X PROSPECT AV | 6100 | 6399 | TOONTOWN | AKB250 DLS 121887 |
| C PROSPECT AVE | 6100 | 6399 | TOONTOWN | AKB250 DLS 101905 |
| X PROSPERITY AV | 2700 | 3199 | TOONTOWN | AKB250 DLS 121887 |
| C PROSPERITY AVE | 2700 | 3199 | TOONTOWN | AKB250 DLS 101905 |
| X PROSPERITY AV | 3600 | 3799 | TOONTOWN | AKB250 DLS 121887 |
| C PROSPERITY AVE | 3600 | 3799 | TOONTOWN | AKB250 DLS 101905 |
| X PRUITT AV | 3000 | 3899 | TOONTOWN | AKB250 DLS 121887 |
| C PRUITT AVE | 3000 | 3899 | TOONTOWN | AKB251 DLS 101905 |

## Appendix G – Issues under Investigation

This Appendix provides a list of issues that are still under consideration in the VDB/ERDB/MSAG Work Group. The resolution of these issues may result in revisions to this document. The issues that are currently on the Work Group agenda as potential topics for further investigation are as follows –

- Modify NENA 2.1 MSAG format to include Function of Change codes.
- VoIP ALI and MSAG discrepancy procedures.
- Review existing quality measurements and audits to determine what is applicable for VDB/ERDB Operators.
- Reports
    - Statistical reports
    - Log of queries
    - Activity by hour
    - ERDB Queries that fail
    - Report of MSAG and Alternates
    - Mismatch report between alternates, postal and MSAG.