NENA

Standard Data Formats For 9-1-1 Data Exchange & GIS Mapping

NENA Standard Data Formats for 9-1-1 Data Exchange & GIS Mapping
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National Emergency Number Association (NENA) Technical Committee Chairs

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NENA's Technical Committee has developed this document. Recommendations for change to this document may be submitted to:

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Acknowledgments:

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NENA recognizes the following industry experts and their companies for their contributions in development of this document.

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1 Executive Overview

1.1 Purpose and Scope of Document

This document sets forth NENA standard formats for Automatic Location Identification (ALI) data exchange between Service Providers and Data Base Management System Providers, a GIS data model, a Data Dictionary, and formats for data exchange between the ALI Database and PSAP Controller equipment.

Movement of ALI source data between Service Providers and/or Data Base Management System Providers is a necessary and common activity for the activation of E9-1-1 systems. Means of moving such data is varied and many. This document contains data exchange formats recommended for creation and transporting of 9-1-1 data.

This recommendation advocates the use of one of two common protocols (KERMIT and NDM) for use in the near term and with a move toward one common protocol (TCP/IP) in the future. The recommendation unfolded in this manner with the recognition that as a goal NENA acknowledges the advantage of one protocol, but that existing systems are in place so an evolution plan must be put in place and that no single protocol can satisfy all applications.

1.2 Reason to Implement

Industry adoption of the standard will:

- Minimize costs incurred in providing E9-1-1 data base services.
- Ensure timely activation of E9-1-1 data base systems.
- Ensure consistent provision of ALI data.
- Enable data compatibility for system integration of E9-1-1 products and services.
- Minimize set-up time
- Aid companies in future planning

When to Implement

Since many Service Providers, Data Base Management System Providers and equipment vendors are currently utilizing the original Version 1 and 2 data exchange formats defined herein, it is strongly recommended that Version 4 XML formats be implemented to provide for future data needs. Service Providers and the respective Data Base Management System Provider must jointly determine the data format most relevant to the system software being utilized.

A goal of January 1, 2000 was recommended as the date when Service Providers would be capable of sending data utilizing the revised Version 2.0 (now 2.1) format and Version 3.0 format to the Data Base Management System.

It was further understood that many in-service data flows were unable to conform to the NENA formats by the target date, but the Data Technical Committee strongly recommends that every effort be made to conform to at

least one of the NENA data exchange formats preferably the most current Generation of Version 4 as found on the NENA Internet site at http://www.nena.org/xml_schemas/nena.htm.

July 1, 1994 was established as the date when Service Providers and Data Base Management Service Providers should be capable of using the transmission protocol options. All future plans should include the ability to use these options.

Version 4 Data Exchange Format should be implemented in conjunction with wireless phase II.

1.3 Benefits

The benefits that will be realized by implementing the newly defined NENA Version 4 standard in this document may not be immediately discernable. While all NENA standards promote a consistent view of 911 data, this release of the NENA 02-010 document provides the first major departure from the previously held standard for data exchange by introducing the XML data exchange format coordinated between 911 data source technologies. This release of NENA Version 4 lays the groundwork necessary to support the ever growing and changing sources of 911 data.

Utilizing the changes outlined in this document will allow the use of industry standard tools for XML data processing. While this will not eliminate the need for future programming effort it does provide a standard approach to the identification, transmission and processing of data from many sources each with its unique data format and structure.

NENA Version 4 Data Exchange Format is an industry standard XML data format. NENA XML (Extensible Markup Language) documents have been adapted from SGML (Standard Generalized Markup Language) by the World Wide Web Consortium. Version 4 Data Exchange Format has been created to bring the NENA Data Exchange Format in line with industry standard implementation methods, to introduce versioning control and promote reusability of previous work.

In addition to the XML changes this document introduces a new field to the previous NENA version 2.1. As a result of the implementation of private switch 911 and the common use of the NENA 2.1 format, we have added a field for NENA Data Provider ID (Company ID 2) and renamed the existing Dial Tone Provider field to Access Infrastructure Provider (Company ID 1). The character space for new data field was taken from the last 5 character positions in the NENA Reserved data field. Since these character positions were reserved for NENA only use there should be no impact on operating systems. For those companies utilizing Private Switch 911, this change provides a location for both the Access Infrastructure Provider (Company ID 1) and the provider of the PBX station data provider. (Company ID 2)

2 Introduction

2.1 Operational Impacts Summary

Due to the increased volume and unique format of XML data, implementing the current changes to NENA 4 will impact all systems and network elements associated with the creation, transport and processing of 911 XML data.

Change to the NENA Reserved field should have no impact on operating systems since these character positions were reserved for NENA use and should be space filled where not being used.

2.2 Security Impacts Summary

Security is handled by the appropriate 9-1-1 Data Base Management System Provider and the appropriate 9-1-1 data providers as deemed by their internal IT security procedures and processes.

2.3 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”.

2.4 Reason for Issue

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

Version	Date	Reason For Changes
Original	06/15/1991	Initial Document defined NENA Version 1 Data Exchange Format. The original Version 1 Data Exchange format was created to provide established formats for exchange of 9-1-1 data between Service Providers and the Data Base Management System Providers. The format was created in a fixed format with 232 characters available within the record format for ALI source data.
2	06/15/1993	NENA Version 2 Data Exchange Format created.
3	06/30/1998	Version 1 has been changed to reflect current terminology in format description fields. Version 2 has been changed to Version 2.1 to reflect new fields which reflect the “year 2000” date identification and definition of the “Alt #” field for the “ALT#” associated with Interim Number Portability, to identify the Function of Change indicators of “U”nlock and “M”igrate for Local Number Portability and to reflect current terminology in format description fields. This will be the last update to

		Version 2. Version 3 Data Exchange Formats were added June 1998 due to the difficulty in modifying Version 2 standards. Version 3.0 has been created to reflect data formats utilizing a "Tag Data" concept, which creates a variable length record dependent upon the data fields being utilized between Service Providers and Data Base Management System Providers. Version 3 formats include additional fields and updated field names to better reflect industry trends.
4	05/30/1999	This standard has been created to merge and replace the original NENA 02-001 NENA Recommended Formats for Data Exchange and NENA 02-003 NENA Recommended Protocols for Data Exchange into a common document to facilitate ease of use based upon the user community. There has been no intentional change made to the existing standards. The original standards documents 02-001 and 02-003 will be removed from service.
5	01/22/2002	Version 3.0 formats were changed to Version 3.1 with the introduction of Version 4, and the need to change existing labels and add new labels due to technology changes.` This standard has been updated with a Version 4 Data Exchange that is based on Version 3.1 tags with XML formatting. Version 3.1 and Version 4 tags are meant to be mirrors of each other with the only difference being the tag versus XML formatting. This document has also been updated with Version 1.0 of the GIS Data Model Format and Version 1.0 of the Format for Data Exchange between ALI Database and PSAP Controller Equipment. Version 4 Data Exchange Format is an industry standard XML data format. NENA XML (Extensible Markup Language) documents have been adapted from SGML (Standard Generalized Markup Language) by the World Wide Web Consortium. Version 4 Data Exchange Format

		was created to bring the NENA Data Exchange Format in line with industry standard implementation methods, to introduce versioning control and promote reusability of previous work. All existing NENA 4 information has been removed from this document and moved to an easily accessible area on the NENA web site. http://www.nena.org/xml_schemas/nena.htm.
6	11/09/2004	The NENA Version 4 XML Data Exchange Format has been revised to include: • Industry standard tag naming conventions • A schema library document to define XML tag names and their respective data types • An XML schema document for use in validation of XML documents • A redesigned XML schema to promote the reusability of defined XML data structures. • A process that will allow changes to existing data definitions that will not require reprogramming of applications. • Establishment of ***Generation*** and ***Release*** control methods that promotes backward compatibility The Data Provider ID (Company ID 2) field is used to carry the NENA Company ID of a PS/911data provider or a reseller. The NENA Reserved field has been reduced by 5 bytes to accommodate the Data Provider ID (Company ID 2) field. In addition the "Company ID" field that represents the "Company ID 1" field has been renamed to Access Infrastructure Provider ID and the definition clarified.

7	02/25/2006	Established new Classes of Service for VoIP. There have been 4 types of VoIP users identified: 1. Fixed (static) - VoIP service sold as not having nomadic capability 2. Enterprise – IP/PBX, VoIP service sold as not having nomadic capability 3. Nomadic – VoIP service that has the capability to be moved 4. Mobile – example: like wireless, designed to operate from multiple locations Seven new Class of Service have been identifies for VoIP. With the understanding that most VoIP providers do not have the capability of delivering the specific Class of Service at this time, a default Class of Service has been developed. V = VoIP Services default Class of Service. (preferably with VOIP being displayed at the PSAP) The other new Class of Service one byte characters are: • C= VoIP Residential (preferably with VRES being displayed at the PSAP) • D= VoIP Business (preferably with VBUS being displayed at the PSAP) • E = VoIP Coin/Pay Phone (preferably with VPAY being displayed at the PSAP) • F = VoIP Wireless (preferably with VMBL being displayed at the PSAP) • J = VoIP Nomadic (preferably with VNOM being displayed at the PSAP) • K = VoIP Enterprise Solutions –Centrex & PBX (preferably with VENT being displayed at the PSAP) All VoIP Class of Service are for both static and nomadic services with the exception of J=VoIP Nomadic. This will be used when a customer is moving from one location to another and is unsure of the class of service they should be using at that time, as it is different than their normal/predominant class of service.

		Exhibit 22 for GIS mapping was unintentionally omitted from the last version of the 02-010 document. Exhibit 22 has been re-inserted into this version, no changes were made to Exhibit 22. New Class of Service for Wireless Phase II – added COS "I" that tells the PSAP the call is from a Phase II capable service, but only phase I information was available. Re-bid ALI for phase II information. Note, re-bid will not guarantee phase II information will be provided. XML Release 4.1 to accommodate I2 standard which was developed by NENA to handle VoIP calls in the current E9-1-1 system. The I2 directory includes schemas used by the I2 web services definitions (WSDLs) as well as the I2 WSDLs. http://www.nena.org/xml_schemas/nena.htm

8	03/30/2007	Establish Function of Change for MSAG Data Exchange Function of Change for MSAG options: Insert a range: FOC=I defines the current image to be inserted Delete a single range: FOC=D defines the current image to be deleted Place footer in document with reference to name formatting when sending in data to the DBMS. Last, First format is the recommended format for residential customer names. The document name has been changed to reflect the new NENA ALI Query Service standard; the document describes data formats and not protocols. The ALI Query Service Standard is available at http://www.nena.org/pages/Content.asp?CID=76&CTID=5. The formal document name is "04-005 NENA ALI Query Service Standard".
8.1	01/08/2008	Correction to MSAG Data exchange reserved field length. The reserved field should have been shortened 1 character due to the addition of FOC in Revision 8.
8.2	06/10/2009	Updated all urls to agree with new web pages.

9	12/16/2010	Modified Exhibit 22, GIS Data Model, Version 2. Updated to most current template by adding the following new sections: 2.2 SECURITY IMPACTS SUMMARY ..... 2.5 RECOMMENDATION FOR ADDITIONAL DEVELOPMENT WORK ..... 2.9 FUTURE PATH PLAN CRITERIA FOR TECHNICAL EVOLUTION ..... 2.11 ADDITIONAL IMPACTS (NON COST RELATED .....

2.5 Recommendation for Additional Development Work

The evolution of 9-1-1 call and data delivery from analog to IP will require additional development to meet the needs of a Next Generation 9-1-1 system. New databases, processes, architecture, and interfaces will require this document be updated to accommodate these changes.

2.6 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 or equivalent.

2.7 Anticipated Timeline

Deployment or implementation of this standard will take place as required.

2.8 Costs Factors

The implementation of the XML portion of this standard will require programming changes to all applications involved in the transport and processing of XML data and may require enhancements to the 911 network such as to support increased volumes of data.

2.9 Future Path Plan Criteria for Technical Evolution

In present and future applications of all technologies used for 9-1-1 call and data delivery, it is a requirement to maintain the same level or improve on the reliability and service characteristics inherent in present 9-1-1 system design.

New methods or solutions for current and future service needs and options should meet the criteria below. This inherently requires knowledge of current 9-1-1 system design factors and concepts, in order to evaluate new proposed methods or solutions against the Path Plan criteria.

Criteria to meet the Definition/Requirement:

1. Reliability/dependability as governed by NENA's technical standards and other generally accepted base characteristics of E9-1-1 service
2. Service parity for all potential 9-1-1 callers
3. Least complicated system design that results in fewest components to achieve needs (simplicity, maintainable)
4. Maximum probabilities for call and data delivery with least cost approach
5. Documented procedures, practices, and processes to ensure adequate implementation and ongoing maintenance for 9-1-1 systems

This basic technical policy is a guideline to focus technical development work on maintaining fundamental characteristics of E9-1-1 service by anyone providing equipment, software, or services.

2.10 Cost Recovery Considerations

Normal business practices shall govern the cost recovery.

2.11 Additional Impacts (non cost related

The information or requirements contained in this NENA document are known to have XXX impacts, based on the analysis of the authoring group, and development has been started. The primary impacts include:

- Improved coordination, communication, collaboration, and cooperation between 9-1-1 authorities, addressing authorities and other entities involved in 9-1-1 data development and data delivery will be required

2.12 Intellectual Property Rights Policy

NENA takes no position regarding the validity or scope of any Intellectual Property Rights or other rights that might be claimed to pertain to the implementation or use of the technology described in this document or the extent to which any license under such rights might or might not be available; nor does it represent that it has made any independent effort to identify any such rights.

NENA invites any interested party to bring to its attention any copyrights, patents or patent applications, or other proprietary rights that may cover technology that may be required to implement this standard.

Please address the information to:

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2.13 Acronyms/Abbreviations

Some acronyms/abbreviations used in this document have not yet been included in the master glossary. After initial approval of this document, they will be included. See NENA 00-001 - NENA Master Glossary of 9-1-1 Terminology located on the NENA web site for a complete listing of terms used in NENA documents.

3 Technical Description

3.1 Types of Data Exchange Formats

All data exchange formats utilize ASCII characters. The NENA Data Technical Committee has established 4 versions of standard data formats for use by Service Providers and Data Base Management System Providers when exchanging E9-1-1 data base information. Four (4) versions of standard format have been defined for each of the following; ALI source data exchange, MSAG data exchange, Header and trailer records, Wireless data formats are included in Versions 3.1 and 4.

A new standard format Version 1.0 has been defined for the ALI Request Response message sent to the PSAP screen.

Version 1 formats are the original NENA recommended formats utilizing the 240 character format for Data Exchange; 160 character format for MSAG Data Exchange and 160 character format for Header and Trailer records.

Version 2 formats recognize that the original formats needed to be expanded to accommodate additional data fields critical to some data providers and also recognizing that NENA must position the standard record for the future. Version 2 formats contain all data fields resident in Version 1 formats utilizing a 512 character format for Data Exchange; 200 character format for MSAG Data Exchange and 200 character formats for Header and Trailer records.

Version 3 formats recognize that the previous formats were limiting distribution of data as technology evolved and the Data Technical Committee, after much discussion, arrived at the present NENA Version 3 format, included in this document. This format takes a “Tag Data” approach to information exchange for both wireline and wireless data distribution. Benefits include flexibility, faster programming changes, more efficient data transmission and smaller file sizes.

Version 4 formats recognize the need for an industry standard naming convention, greater flexibility and faster programming changes. NENA Version 4 has been revised to support these needs and to introduce reusability of defined data elements, a method to introduce Schema changes that are backward compatible and do not impact operating applications. This revised XML format can be supported by off the shelf XML tools to perform proper validation of XML documents. The revised NENA Version 4 establishes a design philosophy for all new XML schema and data development.

The NENA Data Technical Committee requires that Service Providers maintain consistency by utilizing formats consistent to one version; i.e. Header and Trailer records must be the same version format as the Data or MSAG Exchange formats utilized.

3.1.1 Common Considerations:

All data exchange formats utilize ASCII characters. ASCII characters used in alpha only and alpha/numeric fields should be limited to A thru Z, a thru z (some legacy systems will not understand lower case), 0 thru 9, comma ‘, ’, forward slash ‘ / ’, semi colon ‘; ‘, ampersand ‘&’, and apostrophe ‘ ’ ’. Spaces are allowed with one exception----the first character of a field may not be a space. Spaces between words are acceptable. Other characters may impact the accurate processing of data.

Data Base Management System Providers should document how they utilize versions 1, 2, 3 and 4 and the fields that their software systems can utilize.

The “General Use” field may be used when exchange partners agree to exchange information not defined.

Header and Trailer records must be the same version format as the Data or MSAG Exchange formats utilized.

A full update record must be provided for all data exchange versions and function-of-change updates.

Data TYPE indicators are as follows: A= Alpha, N=Numeric, V=Variable, AN=Alpha Numeric, AV=Alpha Variable

3.1.2 Version 1 & 2 formats:

- Standard field location.
- Fixed record lengths.
- Data exchange formats require that complete data records be exchanged.
- All data fields are treated as “left-justified” with trailing spaces.
- Unused fields are space-filled.

3.1.3 Version 3 data formats:

- A tag data record is a record of varying length, comprised of pre-defined tag labels and the associated data elements.

- There is no particular sequence of the tag/data combinations within a Tag Data Record.
- Each tag and its associated data is separated from all other tag/data combinations by a pre-defined field separator.
- A pre-defined End of Record character follows each Tag Data Record.
- The receiving Data Base Management System Provider will specify the minimum set of tag/data elements required by that system to uniquely identify and process the record.
- If the field is not being used (I.E: “Street Suffix”, “Post Directional”, “Customer Code”) then the label is not used.
- Data Technical Committee authorized new tags may be added to the record without changing the file format.
- Header records will employ cycle counting to ensure a cycle of updates is not missed.
- Trailer records will employ record counting to ensure a record within an update file is not missed.

3.1.4 Version 4 Description Summary:

- Tags are angled brackets with the data between them. An example of a start-tag and end-tag is <NAM></NAM>.
- Content is the data between the start-tag and end-tag.
- An Element is the combination of start-tag, data and end-tag. An example of an element is <NAM>JOHN DOE</NAM>.
- Tags can have Attributes. An example is <RECORD Num="1"> which indicates that the elements for record number 1 follow this tag.
- Elements may contain other elements. A "StreetAddressType" is an example of container element with sub-elements in a group that identify the component parts for a street address and can be reused wherever a "StreetAddressType" element is needed.

```
<xs:complexType
name="StreetAddressType">
 <xs:all>
  <xs:element name="HouseNum"/>
  <xs:element name="HouseNumSuffix/>
  <xs:element name="PrefixDirectional/>
  <xs:element name="StreetName"/>
  <xs:element name="StreetSuffix/>
  <xs:element name="PostDirectional"/>
  <xs:element name="MSAGCommunity"/>
  <xs:element name="PostalCommunity"/>
  <xs:element name="StateProvince"/>
  <xs:element name="County"/>
  <xs:element name="TARCode"/>
  <xs:element name="PostalZipCode"/>
 </xs:all>
</xs:complexType>
```

Individual components or elements that make up a street address are housed is a container element called StreetAddressType.

This example is intended to show how related data elements may be grouped together and is not intended to be accurate in form or structure.

Refer to the actual XML documents located on the NENA web site at http://www.nena.org/xml_schemas/nena.htm

- In XML, records are referred to as “documents”.
- The XML schema defines the structure, sequence and required elements within an XML document.
- The receiving Data Base Management System provider will determine the minimum set of elements required by that system to uniquely identify and process the record.
- If the data is not being used (I.E: “Street Suffix”, “Post Directional”, “Customer Code”) then the Element may be omitted.
- If data is present in an XML data element but the receiving Database Management System does not use the data element, the receiving Database Management System will ignore it.
- Version 4 utilizes Generation and Release controls. A Release is a subset of a Generation. A Release may be changed such as adding new tags without effecting working applications. Generation changes will affect backward compatibility. A schema from a newer Generation cannot be used to validate documents from a previous Generation. The NENA Data Technical Committee will coordinate all Generation and Release changes.
- Header elements will employ cycle counting to ensure a cycle of updates is not missed.
- Trailer elements will employ record counting to ensure a record within an update file is not missed.
- Supporting documentation for the most current and all previous XML schema Generations and Release s will be available on the NENA web site.
- This document does not contain a complete description of XML elements and features.
- Details on each XML Generation, Release, Element Type Definition and Schema documentation is available on the NENA web site at http://www.nena.org/xml_schemas/nena.htm. More information on XML may be found at http://www.w3.org/XML/.

4 Recommended Reading and References

Refer to the NENA Master Glossary of 9-1-1 Terminology NENA-01-002 for definitions of the terms used in this document.

Refer to the NENA **04-005 NENA ALI Query Service Standard** for specifications on XML ALI source data exchange.

5 Exhibits

EXHIBIT 1

5.1 VERSION 1 FORMAT FOR DATA EXCHANGE (Obsolete – DO NOT USE)

FIELD NAME	POSITION	BYTES	TYPE	DESCRIPTION
Function Code	1	1	A	Type of activity the record is being submitted for. Valid entries: C = Change D = Delete I = Insert
NPA	2-4	3	N	Three digit area code of the Calling Number
Calling Number	5-11	7	N	Seven digit telephone number of the Calling Number
House Number	12-21	10	AN	House Number. The field should be space filled if no house number is available. *NOTE: Although the House Number field is ten characters, it is understood that telephone companies may only support up to 8 characters.*
House Number Suffix	22-25	4	AN	House number extension (e.g. ½). The field should be spaced filled if no suffix applies.
Prefix Directional	26-27	2	A	Leading street direction prefix. The field should be space filled if no prefix applies. Valid entries: N S E W NE NW SE SW
Street Name	28-67	40	AN	Valid service address of the Calling Number.

Street Suffix	68-71	4	A	Valid street abbreviation, as defined by the U.S. Postal Service Publication 28, Appendix C. (e.g. AVE)
Post Directional	72-73	2	A	Trailing street direction suffix. The field should be space filled if no suffix applies. Valid entries: N S E W NE NW SE SW
Community Name	74-105	32	A	Valid service community of the street name/house number as designated by the MSAG.
State	106-107	2	A	Alpha state abbreviation (e.g. TX)
Location	108-127	20	AN	Additional address information (free formatted) describing the exact location of the Calling Number (e.g. Apt 718)
Customer Name	128-159	32	AN	Subscriber name associated with the Calling Number.

VERSION 1 FORMAT FOR DATA EXCHANGE (Obsolete – DO NOT USE)

Class of Service	160	1	AN	Value of: 1 = Residence 2 = Business 3 = Residence PBX 4 = Business PBX 5 = Centrex 6 = Coin 1 Way out 7 = Coin 2 Way 8 = Mobile 9 = Residence OPX 0 = Business OPX

Type of Service	161	1	N	Value of: 0 = Not FX nor Non-Published 1 = FX in 911 serving area 2 = FX outside 911 serving area 3 = Non-Published 4 = Non-Published FX in serving area 5 = Non-Published FX outside 911 serving area
Exchange	162-165	4	AN	Local Exchange Carrier exchange identifier for the serving telephone office of the customer.
ESN	166-170	5	AN	Emergency Service Number associated with the House Number and Street Name. *NOTE: ESN field may be space filled when the Data Base Management System Provider is validating the address. The Service Provider providing the E9-1-1 Selective Routing will provide a list of ESNs available for assignment.*
Main NPA	171-173	3	N	Three-digit area code of the Main Number associated with the Calling Number.
Main Number	174-180	7	N	Seven Digit telephone number of the Main Number associated with the Calling Number.
Order Number	181-190	10	AN	Service order number for the activity establishing this record.
Extract Date	191-196	6	N	Date on which the record was created in the format. MMDDYY

County ID	197-200	4	AN	County Identification code (usually the FIPS code) *NOTE: County Identification field is used to identify the county of call origination. The Subcommittee recommends use of the FIPS code assigned to each county by the U S Census Bureau.*
Company ID	201-205	5	AN	NENA registered Company Identification code.
Source ID	206	1	AN	Code that indicates whether data is part of the initial data base creation process or part of the daily update process. Daily = Space, Initial Load = C

VERSION 1 FORMAT FOR DATA EXCHANGE (Obsolete – DO NOT USE)

Zip Code	207-211	5	AN	Postal Zip Code
Zip + 4	212-215	4	AN	Postal Zip Code Extension
General Use	216-226	11	AN	This field will be mutually used by data exchange partners to pass information not defined in previous fields.
Reserved	227-239	13	AN	This field is reserved for the Data Base Management Systems Provider's use.
End of Record	240	1	AN	Always an asterisk (*).

NOTE: All fields are left justified, with trailing spaces.

EXHIBIT 2

5.2 VERSION 1 FORMAT FOR MSAG DATA EXCHANGE (Obsolete – DO NOT USE)

NAME	POSITION	BYTES	TYPE
Prefix Directional	1-2	2	AN
Street Name	3-42	40	AN
Street Suffix	43-46	4	AN
Post Directional	47-48	2	AN
Low Range	49-58	10	AN
High Range	59-68	10	AN
Community Name	69-100	32	A
State	101-102	2	A
Odd/Even	103	1	O, E OR B
ESN	104-108	5	AN
Extract Date	109-114	6	MMDDYY
PSAP ID	115-118	4	AN
County ID	119-122	4	AN
Exchange	123-126	4	AN
General Use	127-146	20	AN
Reserved	147-159	13	AN
End of Record	160	1	Always “*”

NOTE: All fields are left justified, with trailing spaces.

EXHIBIT 3

5.3 VERSION 1 HEADER FORMAT FOR DATA EXCHANGE (Obsolete – DO NOT USE)

NAME	POSITION	BYTES	TYPE
Header Indicator	1-5	5	"UHL"
Extract Date	6-11	6	MMDDYY
Company Name	12-61	50	AN
Cycle Counter	62-67	6	N
County ID	68-71	4	AN
State	72-73	2	A
General Use	74-93	20	AN
Reserved	94-159	66	AN
End of Record	160	1	Always "*"

NOTE: All fields are left-justified, with trailing spaces, except the Cycle Counter, this field will be right-justified with leading spaces.

Header records will employ cycle counting to ensure a cycle of updates is not missed.

When used with an ALI source data file, the reserved field will be expanded to 146 bytes.

EXHIBIT 4

5.4 VERSION 1 TRAILER FORMAT FOR DATA EXCHANGE (Obsolete – DO NOT USE)

NAME	POSITION	BYTES	TYPE
Trailer Indicator	1-5	5	"UTL"
Extract Date	6-11	6	MMDDYY
Company Name	12-61	50	AN
Record Count	62-70	9	N
Reserved	71-159	89	AN
End of Record	160	1	Always "*"

NOTE: All fields are left justified, with trailing spaces, except for the Record Count; this field will be right-justified with leading spaces.

Trailer records will employ record counting to ensure a record within an update file is not missed
When used with an ALI source data file, the 'Reserved' field will be expanded to 169 bytes.

EXHIBIT 5

5.5 VERSION 2.0 FORMAT FOR DATA EXCHANGE

5.6 VERSION 2.0 FORMAT FOR MSAG DATA EXCHANGE

5.7 VERSION 2.0 HEADER FORMAT FOR DATA EXCHANGE

5.8 VERSION 2.0 TRAILER FORMAT FOR DATA EXCHANGE

Have Been Replaced by Version 2.1 Formats
See Exhibits 6 through 9

EXHIBIT 6

5.9 VERSION 2.1 FORMAT FOR DATA EXCHANGE

FIELD NAME	POSITION	BYTES	TYPE	DESCRIPTION
Function Code	1	1	A	Type of activity the record is being submitted for. Valid entries: C = Change D = Delete I = Insert U = Unlock M = Migrate
NPA	2-4	3	N	Three-digit area code of the Calling Number.
Calling Number	5-11	7	N	Seven-digit telephone number of the Calling Number.
House Number	12-21	10	AN	House number. The field should be space filled if no house number is available. *NOTE: Although the House Number field is ten characters, it is understood that telephone companies may only support up to 8 characters.*
House Number Suffix	22-25	4	AN	House number extension (e.g. ½). The field should be space filled if no suffix applies.
Prefix Directional	26-27	2	A	Leading street direction prefix. The field should be space filled if no prefix applies. Valid entries: N S E W NE NW SE SW
Street Name	28-87	60	AN	Valid service address of the Calling Number.

Street Suffix	88-91	4	A	Valid street abbreviation, as defined by the U. S. Postal Service Publication 28, Appendix C. (e.g. AVE)
Post Directional	92-93	2	A	Trailing street direction suffix. The field should be space filled if no suffix applies. Valid entries: N S E W NE NW SE SW
Community Name	94-125	32	A	Valid service community of the street name/house number as designated by the MSAG.
State	126-127	2	A	Alpha state abbreviation (e.g. TX)
Location	128-187	60	AN	Additional address information (free formatted) describing the exact location of the Calling Number (e.g. Apt 718).
Customer Name	188-219	32	AN	Subscriber name associated with the Calling Number. Preferred format for an individual customer name (not a business) is: Last, First and, optionally, a suffix which may be generation (Jr, III) and/or title (Phd, Esq, MD). Honorifics (Mr., Mrs, Ms.) should not be included as part of the name.

VERSION 2.1 FORMAT FOR DATA EXCHANGE

FIELD NAME	POSITION	BYTES	TYPE	DESCRIPTION

Class of Service	220	1	AN	Value of: 1 = Residence 2 = Business 3 = Residence PBX 4 = Business PBX 5 = Centrex 6 = Coin 1 Way out 7 = Coin 2 Way 8 = Mobile 9 = Residence OPX 0 = Business OPX A = Customer Owned Coin Telephone (COCT) B = Not Available *Footnote* [4] G = Wireless Phase I H = Wireless Phase II I = Wireless Phase II with Phase I information V = VoIP Services Default COS C = VoIP Residence D = VoIP Business E = VoIP Coin/Pay Phone F = VoIP Wireless J = VoIP Nomadic K = VoIP Enterprise Services – Centrex & PBX For all VoIP COS see notes on page 13 T = Telematics

Type of Service	221	1	N	Value of: 0 = Not FX nor Non-Published 1 = FX in 911 serving area 2 = FX outside 911 serving area 3 = Non-Published 4 = Non-Published FX in serving area 5 = Non-Published FX outside 911 serving area 6 = Local Ported Number (LNP) 7 = Interim Ported Number
Exchange	222-225	4	AN	Local Exchange Carrier exchange identifier for the serving telephone office of the customer.
ESN	226-230	5	AN	Emergency Service Number associated with the House number and Street Name. *NOTE: ESN field may be space filled when the Data Base Management System Provider is validating the address. The Service Provider providing the E9-1-1 Selective Routing will provide a list of ESNs available for assignment.*

VERSION 2.1 FORMAT FOR DATA EXCHANGE

FIELD NAME	POSITION	BYTES	TYPE	DESCRIPTION
Main NPA	231-233	3	N	Three-digit area code of the Main Number associated with the Calling Number.
Main Number	234-240	7	N	Seven Digit telephone number of the Main Number associated with the Calling Number.
Order Number	241-250	10	AN	Service order number for the activity establishing this record.
Extract Date	251-256	6	N	Date on which the record was created in the format MMDDYY
County ID	257-260	4	AN	County Identification Code (usually the FIPS code) *NOTE: County Identification field is used to identify the county of call origination. The Subcommittee recommends use of the FIPS code assigned to each county by the U S Census Bureau.*
Access Infrastructure Provider (Company ID 1)	261-265	5	AN	NENA registered Company Identification code of the Access Infrastructure Provider
Source ID	266	1	AN	Code that indicates whether data is part of the initial data base creation process or part of the daily update process. Daily = Space, Initial Load = C
Zip Code	267-271	5	AN	Postal Zip Code
Zip + 4	272-275	4	AN	Postal Zip Code Extension
General Use	276-286	11	AN	This field will be mutually used by data exchange partners to pass information not defined in previous fields.

Customer Code	287-289	3	AN	Code used to uniquely identify a customer.
Comments	290-319	30	AN	Optional notes, may be displayed at PSAP
X Coordinate	320-328	9	AN	Longitude/ X coordinate
Y Coordinate	329-337	9	AN	Latitude/ Y coordinate
Z Coordinate	338-342	5	AN	Structure elevation
Cell ID	343-348	6	AN	Identification number indicating a geographic region of cellular coverage.
Sector ID	349	1	AN	Sub set/section of a cell.
TAR Code	350-355	6	AN	Taxing Area Rate Code
Reserved	356-376	21	AN	This field is reserved for the Data Base Management System Provider's use.
ALT #	377-386	10	N	Customer Number being remote call forwarded in Interim Number Portability service.
Expanded Extract Date	387-394	8	N	Date on which the record was created in the format YYYYMMDD
NENA Reserved	395-475	81	AN	This field is reserved for NENA Data Technical Committee Assignment
Data Provider ID (Company ID 2)	476-480	5	AN	NENA registered Company Identification code of the Data Provider (Note 1)

VERSION 2.1 FORMAT FOR DATA EXCHANGE

FIELD NAME	POSITION	BYTES	TYPE	DESCRIPTION
Reserved	481-511	31	AN	This field is reserved for the Data Base Management System Provider's use.
End of Record	512	1	AN	Always an asterisk (*).

NOTE: All fields are left justified, with trailing spaces.

The Service Provider providing E9-1-1 Selective Routing must provide the governmental entity with a list of ESNs available for assignment by MSAG development personnel.

NOTE 1: The Data Provider ID (Company ID 2) field is used to carry the NENA Company ID of a PS/911 data provider. The NENA Reserved field has been reduced by 5 bytes to accommodate the Data Provider ID field. In addition the "Company ID" field that represents the Dialtone Provider NENA Company ID has been renamed to "Access Infrastructure Provider ID" (Company ID 1)and the definition clarified.

EXHIBIT 7

5.10 VERSION 2.1 FORMAT FOR MSAG DATA EXCHANGE

NAME	POSITION	BYTES	TYPE
Prefix Directional	1-2	2	AN
Street name	3-62	60	AN
Street Suffix	63-66	4	AN
Post Directional	67-68	2	AN
Low Range	69-78	10	AN
High Range	79-88	10	AN
Community Name	89-120	32	A
State	121-122	2	A
Odd/Even	123	1	O, E or B
ESN	124-128	5	AN
Extract Date	129-134	6	MMDDYY
PSAP ID	135-138	4	AN
County ID	139-142	4	AN
Exchange	143-146	4	AN
General Use	147-166	20	AN
TAR Code	167-172	6	AN
Function of Change	173	1	A
Reserved	174-191	18	AN
Expanded Extract Date	192-199	8	N

End of record	200	1	Always “*”

NOTE: All fields are left justified, with trailing spaces.

Function of Change for MSAG options

Insert a single range:

FOC=**I** defines the current image to be inserted

Delete a single range:

FOC=**D** defines the current image to be deleted

Changes to an MSAG Range should appear in the Delta Files as a "D" record followed by an "I" record.

Deprecated MSAG FOC options

Some DBMS providers currently provide delta MSAG files using FOC codes that were documented for Version 3.1 in the previous versions of this document. These codes are not part of the NENA 02-010 standard – but are shown below for documentation.

Insert a range:

FOC=**I** defines the current image to be inserted (no FOC=X used)

Change a single range:

FOC=**X** comes first to define the current (before) image
FOC=**C** comes second to define the after image

Delete a single range:

FOC=**D** defines the current image to be deleted (no FOC=X used)

Split one range:

FOC=**X** comes first to define the current (before) image
FOC=**S** or **L** comes next (two or more FOC=S records) to define two or more ranges after the split (S&L

are the same FOC and can not be used interchangeably)

Join two or more ranges:

FOC=**X** comes first to define two or more before images – must be in a sending sequence by house number

FOC=**J** follows to define the single after image for the join (two or more X records must proceed the J)

EXHIBIT 8

5.11 VERSION 2.1 HEADER FORMAT FOR DATA EXCHANGE

NAME	POSITION	BYTES	TYPE
Header Indicator	1-5	5	"UHL"
Extract Date	6-11	6	MMDDYY
Company Name	12-61	50	AN
Cycle Counter	62-67	6	N
County ID	68-71	4	AN
State	72-73	2	A
General Use	74-93	20	AN
Release Number	94-96	3	N
Format Version	97	1	N
Expanded Extract Date	98-105	8	N
Reserved	106-199	94	AN
End of Record	200	1	Always "*"

NOTE: All fields are left-justified, with trailing spaces, except the Cycle Counter, this field will be right-justified with leading spaces.

Header records will employ cycle counting to ensure a cycle of updates is not is missed.

When used with an ALI source data file, the 'Reserved' field will be expanded to 406 bytes (when used with an ALI source data file).

EXHIBIT 9

5.12 VERSION 2.1 TRAILER FORMAT FOR DATA EXCHANGE

NAME	POSITION	BYTES	TYPE
Trailer Indicator	1-5	5	"UTL
Extract Date	6-11	6	MMDDYY
Company Name	12-61	50	AN
Record Count	62-70	9	N
Expanded Extract Date	71-78	8	N
Reserved	79-199	121	AN
End of Record	200	1	Always "*"

NOTE: All fields are left justified, with trailing spaces, except for the Record Count; this field will be right-justified with leading spaces.

Trailer records will employ record counting to ensure a record within an update file is not missed.

When used with an ALI source data file, the 'Reserved' field will be expanded to 433 bytes.

EXHIBIT 10

5.13 VERSION 3.1 FORMAT FOR DATA EXCHANGE

NAME	LABEL	MAX # BYTES	TYPE	DESCRIPTION
Record Type	DAT or RTN	0	A	Indicates start of data record (label only, no data follows). Valid labels: DAT = Data Record sent from the Service Provider to the Data Base Management System Provider RTN = Data record returned from the Data Base Management System Provider to the Service Provider
Status Indicator	STI	1	AN	Record status indicator. Valid entries: E = Error C = Completed P = Pending processing U = Unprocessed Gateway received but not sent to processing, (future date)
Function of Change	FOC	1	A	Type of activity the record is being submitted for. Valid "x" entries: C = Change D = Delete I = Insert U = Unlock M = Migrate E = Delete error record

Calling Party Number	CPN	10	N	Number of the Calling Party. Emergency Location Identification Number (ELIN) – A valid North American Numbering Plan format telephone number assigned to the Multi-Line Telephone Systems Operator by the appropriate authority that is used to call to a PSAP and is used to retrieve the ALI for the PSAP. The ELIN may be the same number as the ANI. The North American Numbering Plan number may in some cases not be a dialable number. *Footnote* [3]

VERSION 3.1 FORMAT FOR DATA EXCHANGE

NAME	LABEL	MAX # BYTES	TYPE	DESCRIPTION
House Number	HNO	10	AN	House Number. Footnote [1,2,3]
House Number Suffix	HNS	4	AN	House number extension (e.g. ½). *Footnote* [1,2,3]
Prefix Directional	PRD	2	A	Leading street direction prefix. *Footnote* [1,2,3] Valid "x" Entries: N S E W NE NW SE SW
Street Name	STN	60	AN	Valid service address of the Calling Party Number. *Footnote* [1,2,3]
Street Suffix	STS	4	A	Valid street abbreviation, as defined by the U S Postal Service Publication 28, Appendix C. (e.g. AVE) *Footnote* [1,2,3]
Post Directional	POD	2	A	Trailing street direction suffix. *Footnote* [1,2,3] Valid "x" entries: N S E W NE NW SE SW

[1] *Where an MSAG exists, must fit the MSAG entry.*

[2] *Primary address associated with the Calling Party Number*

[3] *Must include all TN USERS information on all Multi-Line Telephone Systems that will facilitate the implementation of enhanced 9-1-1 on all PBX, Key, Hybrid and Centrex Systems. Resellers must supply end user specific name and location information, not information pertaining to the name and location of the Reseller.*

MSAG Community Name	MCN	32	A	Valid service community name as identified by the MSAG. *Footnote 1,2,3*
Postal Community Name	PCN	32	A	Valid service community name as identified by the U S Postal Service. *Footnote 3*
State/Province	STA	2	A	Alpha US state, Canadian province abbreviation e.g., TX (Texas), ON (Ontario) *Footnote 1,2,3*
Location	LOC	60	AN	Additional location information (free formatted) describing the exact location of the Calling Party Number (e.g., Apt 718, or cell sector A) Emergency Response Location (ERL) – A Location to which a 9-1-1 emergency response team may be dispatched. The location should be specific enough to provide a reasonable opportunity for the emergency response team to quickly locate a caller anywhere within it. *Footnote 2,3 This information may be displayed at the PSAP*
Landmark Address	LMK	60	AN	Landmark or Vanity address such as “One Rockefeller Plaza”

VERSION 3.1 FORMAT FOR DATA EXCHANGE

NAME	LABEL	MAX # BYTES	TYPE	DESCRIPTION
Also Rings At Address	ARA	60	AN	Secondary address for the Calling Party Number that rings at 2 locations. Not validated against the MSAG. *Footnote*[3] Not applicable to dual service. *This information may be displayed at the PSAP*
Customer Name	NAM	32	AN	Subscriber name associated with the Calling Number. Preferred format for an individual customer name (not a business) is: Last, First and, optionally, a suffix which may be generation (Jr, III) and/or title (Phd, Esq, MD). Honorifics (Mr., Mrs, Ms.) should not be included as part of the name.

Class of Service	CLS	1	AN	Valid entries: 1 = Residence 2 = Business 3 = Residence PBX 4 = Business PBX 5 = Centrex 6 = Coin 1 Way out 7 = Coin 2 Way I = Wireless Phase II with Phase I Information V = VoIP Services Default COS D = VoIP Business F = VoIP Wireless K = VoIP Enterprise Services – Centrex & PBX T = Telematics 8 = Mobile 9 = Residence OPX 0 = Business OPX A = Customer Owned Coin Telephone (COCT) B = Not Available *Footnote*[4] G = Wireless Phase I H = Wireless Phase II C = VoIP Residence E = VoIP Coin/Pay Phone J = VoIP Nomadic For all VoIP COS see notes on page 13

[4] *NA = not available – class of service for an ESCO failure*

Type of Service	TYS	1	AN	Valid entries: 0 = Not FX nor Non-Published 1 = FX in 911 serving area 2 = FX outside 911 serving area 3 = Non-Published 4 = Non-Published FX in serving area 5 = Non-Published FX outside 911 serving area 8 = PSALI Published 9 = PSALI Non-Published
Exchange	EXC	4	AN	A defined area, served by one or more telephone Central Offices, within which a Local Exchange Carrier furnishes service. *Footnote* [5]

VERSION 3.1 FORMAT FOR DATA EXCHANGE

NAME	LABEL	MAX # BYTES	TYPE	DESCRIPTION
Emergency Service Number (ESN)	ESN	5	AN	Emergency Service Number associated with the House Number and Street Name and Community Name. *Note: The Service Provider, providing the E9-1-1 Selective Routing will assign ESNs.*
Main Telephone Number	MTN	10	N	Ten-digit telephone number of the Main Billing Number associated with the Calling Party Number. Format: NPANXXXXXX *Footnote*[3]

[5] *The Data Technical Committee strongly recommends that all processing edits be removed from this Label due to technological changes requiring improved data security measures.*

Call Back Number	CBN	10	AN	Telephone Number that can be dialed to reach a specific calling party. The call back number must be a dialable number and used as a back up if the displayed number cannot be reached. Used for both wireline and wireless calls. *Footnote*[3]
P-ANI	PNI	10	AN	Pseudo ANI or locally specific code identifying the receiving antenna for the wireless 9-1-1 call for routing purposes.
Order Number	ORD	10	AN	Service order number for the activity associated with this record.
Completion Date	CPD	10	N	Completion Date in format CCYY-MM-DD
County ID	COI	5	AN	County Identification code (usually the FIPS code). *Note: County Identification field is used to identify the county of call origination. The Committee recommends use of the FIPS code assigned to each county by the U S Census Bureau.*
Access Infrastructure Provider (Company ID 1)	CPF	5	AN	NENA registered Company Identification code for Service Provider providing the network access to the end user customer (wireline, wireless, IP, etc.).
Data Provider ID (Company ID 2)	CPS	5	AN	NENA registered Company Identification code for Service Provider/Reseller/Private Switch supplying ALI record source information.
Postal/Zip Code	ZIP	10	AN	Postal or Zip code. Format: NNNNN-NNNN or ANANAN Footnote 3
Customer Code	CUS	3	AN	Code used to uniquely identify a wireline customer
Comments	CMT	30	AN	Optional notes, may be displayed at PSAP TN USERS on MLTS can include any pertinent information that will assist in reducing response time such as – contact security department, contact front desk, etc. *Footnote*[3]

TAR Code	TAR	6	AN	Taxing Area Rate Code
Alternate Telephone Number	ALT	10	N	Remote Call Forwarding number used during Interim Number Portability-NPANXXXXXX
Return Code Number	RCN	3	N	Code indicating specific processing error code or processing completed successfully. (May be used as many times as necessary.) Valid "x" entries: Not present (or 000 if used) = processing completed successfully XXX = Valid NENA Standard Error Code

VERSION 3.1 FORMAT FOR DATA EXCHANGE

NAME	LABEL	MAX # BYTES	TYPE	DESCRIPTION
Special Attention Indicator	SAI	1	AN	Calls that require special attention. Valid entries: 1 = TTY call 2 = ACN = Automatic crash/collision notification
Common Language Location Indicator (CLLI)	CLI	11	AN	CLLI code of the local loop central office for the 911 calling party.
General Use 1	GU1	60	AN	This field will be mutually used by data exchange partners to pass information not defined in previous fields.
General Use 2	GU2	60	AN	This field will be mutually used by data exchange partners to pass information not defined in previous fields.
General Use 3	GU3	60	AN	This field will be mutually used by data exchange partners to pass information not defined in previous fields.
General Use 4	GU4	60	AN	This field will be mutually used by data exchange partners to pass information not defined in previous fields.
General Use 5	GU5	60	AN	This field will be mutually used by data exchange partners to pass information not defined in previous fields.
General Use 6	GU6	60	AN	This field will be mutually used by data exchange partners to pass information not defined in previous fields.
General Use 7	GU7	60	AN	This field will be mutually used by data exchange partners to pass information not defined in previous fields.

General Use 8	GU8	60	AN	This field will be mutually used by data exchange partners to pass information not defined in previous fields.
Longitude	LON	11	N	Longitude/X coordinate. Right Justified; pad field with zeros or spaces to left of decimal degrees. +long: east of Greenwich; -long: west of Greenwich. When Phase II location cannot be provided, Phase I information should be reported, i.e., the cell site or sector where the call is received. (Can be used for wireline) Sample: +000.000000 , -000.000000 *Footnote*[3]
Latitude	LAT	10	N	Latitude/Y coordinate. Right Justified; pad field with zeros or spaces to left of decimal degrees. +lat: north of equator; -lat: south of equator. When Phase II location cannot be provided, Phase I information should be reported, i.e., the cell site or sector where the call is received. (Can be used for wireline) Sample: +00.000000 , -00.000000 *Footnote*[3]
Elevation	ELV	6	N	Elevation/Altitude indicated as height above mean sea level, measured in meters. Right Justified; pad field with zeros or spaces. (Can be used for wireline) Sample: +00000 , -00000 *Footnote*[3]
Cell Site ID	CEL	6	AN	Identification number indicating a geographic region of cellular coverage. . When Phase II location cannot be provided, Phase I information should be reported, i.e., the cell site or sector where the call is received.

VERSION 3.1 FORMAT FOR DATA EXCHANGE

NAME	LABEL	MAX # BYTES	TYPE	DESCRIPTION
Sector ID	SEC	2	AN	Sub set/section of a cell. When Phase II location cannot be provided, Phase I information, *i.e.*, the cell site or sector where the call is received should be reported.

The items below do not require a "Label" only the symbol shown

Field Separator	|	1	AN	A "pipe" is to be utilized for the field separator (ASCII HEX-7C)
End of record NL	NL	1	AN	The NEW LINE character is a single character that identifies the end of record in all cases for all records. (ASCII HEX-0A)

5.13.1 Data Record Format Example:

DAT|FOC|CPN.....|HNO.....|PRD..|STN.....|STS....|MCN.....|STA..|LOC..
.....|NAM.....|CLS.|TYS.|MTN.....|CPD.....|CPF.....|NL

NOTE: If the field is not being used (I.E: "Street Suffix", "Post Directional", "Customer Code") then the label is not used. It is also not necessary for the labels to be in any particular order. Fields may be added to the record without changing the file format.

The Service Provider, providing E9-1-1 Selective Routing must provide the governmental entity with a list of ESNs available for assignment by MSAG development personnel.

EXHIBIT 11

5.14 VERSION 3.1 FORMAT FOR MSAG DATA EXCHANGE

NAME	LABEL	MAX # BYTES	TYPE	DESCRIPTION
Record Type	MSG	0		Indicates start of MSAG record (label only, no data follows)
Function of Change	FOC	1	A	Type of activity the record is being submitted for. Valid entries[6]: D = Delete I = Insert
Prefix Directional	PRD	2	AN	Leading street direction prefix – Valid "x" Entries: N S E W NE NW SE SW
Street Name	STN	60	AN	Valid service address of the Calling Party Number.
Street Suffix	STS	4	AN	Valid street abbreviation, as defined by the U S Postal Service Publication 28, Appendix C. (e.g. AVE)
Post Directional	POD	2	AN	Trailing street direction suffix. -Valid "x" entries: N S E W NE NW SE SW
Low Range	LOR	10	AN	The lowest house number that is included in this ESN definition

[6] See Version 2.1 MSAG FOC for more details: **Function of Change for MSAG options**

High Range	HIR	10	AN	The highest house number that is included in this ESN definition
MSAG Community Name	MCN	32	A	Valid service community name as defined by the MSAG
Postal Community Name	PCN	32	A	Valid service community name as defined by the U S Postal Service
State/Province	STA	2	A	Alpha U.S. state, Canadian province abbreviation i.e., TX (Texas), ON (Ontario)
Odd/Even	OEN	1	A	Valid "x" entries: O = Odd numbering only E = Even numbering only B = Both odd and even numbering

VERSION 3.1 FORMAT FOR MSAG DATA EXCHANGE

NAME	LABEL	MAX # BYTES	TYPE	DESCRIPTION
Emergency Service Number (ESN)	ESN	5	AN	Emergency Service Number associated with the House Number and Street Name and Community Name. *Note: The Service Provider, providing the E9-1-1 Selective Routing will assign ESNs.*
Completion Date	CPD	10	N	Completion date in format CCYY-MM-DD
PSAP ID	PSI	4	AN	Code identifying the PSAP associated with the assigned ESN
County ID	COI	5	AN	County Identification code (usually the FIPS code). *Note: County Identification field is used to identify the county of call origination. The Committee recommends use of the FIPS code assigned to each county by the U S Census Bureau.*
Exchange	EXC	4	AN	A defined area, served by one or more Telephone Central Offices, within which a Local Exchange Carrier furnishes service.
TAR Code	TAR	6	AN	Taxing Area Rate Code associated with this House Number range, Street Name and Community Name
E9-1-1 Control Office	SRT	11	AN	9-1-1 Control Office CLLI
General Use 1	GU1	60	AN	This field will be mutually used by data exchange partners to pass information not defined in previous fields.

General Use 2	GU2	60	AN	This field will be mutually used by data exchange partners to pass information not defined in previous fields.

The items below do not require a "Label" only the symbol shown

Field Separator	|			A "pipe" is to be utilized for the field separator (ASCII HEX-7C)
End of record	NL			A NEW LINE character is a single character that identifies the end of record in all cases for all records. (ASCII HEX-0A)

MSAG Record Format Example:

MSG|FOC.|PRD..|STN.....|STS....|LOR.....|HIR.....|MCN.....|PCN.....|STA..|OEN.|ESN.....|CPD.....|EXC....|SRT.....|GU1.....|NL

NOTE: If the field is not being used (I.E: General Use) then the label is not used. It is also not necessary for the labels to be in any particular order. Fields may be added to the record without changing the file format.

EXHIBIT 12

5.15 VERSION 3.1 HEADER FORMAT FOR DATA EXCHANGE

NAME	LABEL	MAX # BYTES	TYPE	DATA DESCRIPTION
Record Type	HDR	0	A	Indicates start of header record (label only, no data follows)
Record Identifier	TST	3	AN	Test Records Only
Extract Date	EXD	10	N	Year, Month, Day the data was processed, Format: CCYY-MM-DD
Company Name	CON	50	AN	Name of Company forwarding file
Cycle Counter	CYC	9	N	Sequential number, 1-999,999,999
Record Count	REC	9	N	Number of records by record type in file, does not include Header and Trailer records
General Use	GEN	20	AN	Field to be utilized by sender/receiver company's to provide additional information

The items below do not require a "Label" only the symbol shown

Field Separator	|	1	AN	A "pipe" is to be utilized for the field separator (ASCII HEX-7C)
End of record NL	NL	1	AN	The NEW LINE character is a single character that identifies the end of record In all cases for all records. (ASCII HEX-0A)

5.15.1 Header Record Format Example:

HDR|EXDCCYY-MM-DD|CON……..|CYC……|REC……|GEN…….|NL

NOTE: If the field is not being used (I.E: General Use) then the label is not used. It is also not necessary for the labels to be in any particular order, except for the Record Type indicator, which must be first. Fields may be added to the record without changing the file format.

Header records will employ cycle counting to ensure a cycle of updates is not missed.

EXHIBIT 13

5.16 VERSION 3.1 TRAILER FORMAT FOR DATA EXCHANGE

NAME	LABEL	MAX # BYTES	TYPE	DATA DESCRIPTION
Record Type	TLR	0	A	Indicates start of Trailer record (label only, no data follows)
Record Count	REC	9	N	Number of records by record type in file, does not include Header and Trailer records

The items below do not require a "Label" only the symbol shown

Field Separator	|	1	AN	A "pipe" is to be utilized for the field separator (ASCII HEX-7C)
End of record	NL	1	AN	A NEW LINE character identifies the end of record value in all cases for all records. (ASCII HEX-0A)

TLR|REC.....|NL

NOTE: Fields may be added to the record without changing the file format, because a record consists of the data found between one new line and the next, labels need not follow in sequence though checking for duplicate labels within a single record would be prudent.

Trailer records will employ record counting to ensure a record within an update file is not missed.

EXHIBIT 14

5.17 VERSION 3.1 WIRELESS DATA EXCHANGE

5.17.1 Dynamic Updates of the ALI Database

The Version 1 through 4 Formats for Data Exchange applies to record and file exchanges between Service Providers and Data Base Management System Providers. These exchanges are file oriented and may be exchanged using bulk electronic file transmissions, CD-ROM, diskette, magnetic tape, or similar medium. The need to provide dynamic ALI database updates during 9-1-1 calls was introduced with Wireless Phase I solutions. The traditional record/file format for data exchange does not apply to dynamic database updates, which are real-time transaction, oriented. Header and Trailer records are not utilized in a transaction message, which is designed to be a real-time update of one or more database records.

Wireless solutions require information to be provided to the PSAP at the time a 9-1-1 call is in progress from a wireless device. This information is dynamic since it cannot be determined or stored in the ALI database prior to the 9-1-1 calls. Information such as the wireless caller's Call Back Number, Latitude, and Longitude information is only known at the time the 9-1-1 call is placed and must be dynamically populated in the ALI database. Wireless Service Providers must generate a real-time transaction to the ALI System that contains this dynamic information. The ALI database is updated with this information prior to the PSAP equipment issuing an ALI request (bid) to the ALI database. When the ALI system receives the request from the PSAP, the dynamically updated database record is retrieved and used to build the ALI source data that will be transmitted back to the PSAP, with the Call Back Number, Latitude, Longitude, and other dynamically updated information.

This dynamic update capability requires real-time interfaces to be developed between the data provider and the ALI Database Management System. Many of these interfaces are currently in place as Wireless Phase I solutions were deployed. These real-time interfaces may utilize proprietary software and data formats.

Wireless Phase II introduced the need to retrieve updated lat/long information during 911 call processing. Data Base Management System Providers should refer to TIA/EIA/IS J-STD-036 and the soon to be published NENA Standard for the Implementation of the Wireless Emergency Service Protocol E2 Interface via TCP/IP. When implementing the E2 interface DBMS System Providers must ensure compatibility between the data elements defined in the E2 interface and the data elements defined in this NENA document. When inconsistencies exist between TIA/EIA/IS J-STD-036 and the NENAE2 Interface Document, the NENA standards must take precedence. Position data retrieved from the MPC nmay need to be translated to conform to the ALI database and ALI source data formats.

NENA recognizes that existing interfaces may utilize these proprietary interfaces, protocol, and data formats. The Dynamic Update of the ALI Database shown in the XML format is for illustrative

purposes. Each interface provider should review the data elements for dynamic updates for consideration in these proprietary interfaces. Adoption of XML data format for real-time interfaces may provide the same benefits recognized for record/file exchange. New data elements may need to be added to these real-time interfaces as new technology is introduced. New data elements can be easily added when using XML format.

The following are data elements for Dynamic Updates to the ALI Database. These same data elements should be defined in the ALI source data format nused to transmit the ALI back to the PSAP.

Dynamic Updates of the ALI Database

NAME	LABEL	MAX # BYTES	TYPE	DESCRIPTION
Call-Back Number	CBN	10	AN	Telephone Number that can be dialed to reach a specific calling party. The call back number must be a dialable number and used as a back up if the displayed number cannot be reached
MOBILE ID (MIN)	MIN	10	AN	Mobile Identification number of the cellular wireless device.
Roamer Port	RPT	10	AN	Temporarily assigned "roamer" call back number.
Channel	RCC	3	AN	Channel signal received on.
Longitude	LON	11	N	Longitude/X coordinate. Right Justified; pad field with zeros to left of decimal degrees. +long: east of Greenwich; -long: west of Greenwich. When Phase II location cannot be provided, Phase I information should be reported, i.e., the cell site or sector where the call is received. (Can be used for wireline) Sample: +000.######

VERSION 3.1 FORMAT FOR WIRELESS DATA EXCHANGE

Dynamic Updates of the ALI Database

NAME	LABEL	MAX # BYTES	TYPE	DESCRIPTION
Latitude	LAT	10	N	Latitude/Y coordinate. Right Justified; pad field with zeros to left of decimal degrees. +lat: north of equator; -lat: south of equator. When Phase II location cannot be provided, Phase I information should be reported, i.e., the cell site or sector where the call is received. (Can be used for wireline) Sample: +00.######
Elevation	ELV	5	N	Elevation/Altitude indicated as height above mean sea level, measured in meters (Can be used for wireline) Sample: #####
P-ANI	PNI	10	AN	Pseudo ANI or locally specific code identifying the receiving antenna for the wireless 9-1-1 call for routing purposes.
Location Valid Flag	LVD	1	N	Valid data indicator (1=OK; 0=Invalid).
Datum	NAD	2	AN	Specifies the map projection and coordinate system for the display of the Longitude and Latitude coordinates. Two systems are commonly used for North America. The code 83 identifies North American Datum for 1983 (NAD83). Code 84 identifies the World Geodetic System for 1984 (WGS84). Other codes may be added as additional datum become available through authorized entities. Where **x** = 83 = NAD83 84 = WGS84

LDT Confidence	COF	7	N	Information that indicates the level of uncertainty inherent to the associated latitude/longitude information expressed in meters, ranging from one meter to 1800 Km expressed in meters.
LDT Confidence Percentage	COP	3	N	Information identifying the confidence by which it is known that the calling party lies within the associated shape description. It is expressed as a percentage ranging from 0 – 100.
LDT Provider ID	LDT	8	AN	LDT Provider Identification Code. Codes to be developed and held by NENA.

VERSION 3.1 FORMAT FOR WIRELESS DATA EXCHANGE

Dynamic Updates of the ALI Database

NAME	LABEL	MAX # BYTES	TYPE	DESCRIPTION
LDT Technology	LTY	2	AN	Defines how particular position information was obtained to help assess its credibility. Defined values include: Single Character Value of **x**: Translation Value of ***yyy***: 0 = Unknown 1 = Network Unspecified 2 = Network AOA 3 = Network TOA 4 = Network TDOA 5 = Network RF Fingerprinting 6 = Network Cell Sector 16 = Handset Unspecified 17 = Handset GPS 18 = Handset AGPS 19 = Handset EOTD 20 = Handset AFLT
Time Stamp	TME	8	AN	Universal Time Coordinate (UTC) indicating milliseconds into UTC day.
Day Stamp	DAY	7	N	Year and Julian date. (UTC Date). Sample: 1996187 (CCYYDDD).
Speed (in KPH)	SPD	3	N	Speed of travel in kilometers per hour.
Heading (in degrees)	HDG	3	N	Direction of travel, decimal degrees from true north. Valid entries 0-359.

Cell Site ID	CEL	6	AN	Identification number indicating a geographic region of cellular coverage. When Phase II location cannot be provided, Phase I information should be reported, i.e., the cell site or sector where the call is received.
Sector ID	SEC	2	AN	Sub set/section of a cell. . When Phase II location cannot be provided, Phase I information should be reported, i.e., the cell site or sector where the call is received.

Wireless Data Format Example:

CBN.....|MIN.....|RPT.....|RCC...|XCD.....|YCD.....|ZCD.....|PNI.....|LVD.|NDA..|COF....|COP..|LDT.....|LTY....|TME.....|DAY.....|SPD...|HDG...|NL

NOTE: Version 4 Data Exchange Format is an industry standard XML data format. NENA XML (Extensible Markup Language) documents have been adapted from SGML (Standard Generalized Markup Language) by the World Wide Web Consortium. Version 4 Data Exchange Format was created to bring the NENA Data Exchange Format in line with industry standard implementation methods, to introduce versioning control and promote reusability of previous work. All existing

NENA 4 information has been removed from this document and moved to an easily accessible area on the NENA web site. http://www.nena.org/xml_schemas/nena.htm. Go to this url and select **NENA XML Schema Repository**. Select **Schema Archive.** Select **Version 0.0.** All previous XML format exhibits are shown including Element Tags, Data Dictionary, GIS Data Model, and ALI Response V1.0.

XML ALI Exchange development should be done in accordance with the **04-005 NENA ALI Query Service Standard**. The most current versions of the ALI and AQS schemas should be used.

EXHIBIT 15

5.18 VERSION 4 XML FORMAT FOR DATA EXCHANGE

5.18.1 The XML Schema

The XML Schema is a document that represents how the XML data must be organized. It defines the data elements that are required and those that are optional. The schema also describes data types (Strings vs. integer data, date elements, etc), the relationship between data elements (single or multiple instance, parent and child elements)

5.18.2 Schema Version Control

All NENA data exchange formats, prior to NENA 3, by nature, could not be changed without becoming a completely new data exchange format and were not backward compatible.

NENA 4 provides a vehicle to support necessary change without disturbing existing systems and processes. NENA 4 can be said to be *backward* compatible within schema generations.

A *Schema Generation* change is used to make major modifications to the XML Schema, changes that are so different that they will prevent the validation process. Schema from one Generation are not backward compatible and cannot be used to validate data documents. For example, changing the schema rules about how data elements are organized will often be the cause of backward incompatibility since this type of change would modify the definition, structure or existing relationships between data elements or groupings. Again, a new *Generation* will not be backward compatible with previous generations.

A *Schema Release* change is used to introduce modifications to an XML Schema that maintain backward compatibility with all other schema releases within the current generation.

Schema Generations will be kept in “Generation” named folders on the NENA Web site linked to the NENA Home Page, following W3C conventions, and will be available to anyone who requires the schema documents for validation or development. Under each Generation folder will be folder(s) that contain the most current as well as previous schema releases. Each Release folder will contain the actual schema files, all supporting documentation and Application Information Caption Map data.

5.18.3 Schema Design

In a simple schema design, the data element type definitions may be included within the schema itself. To promote reusability data type definitions have been separated into an *ALI Type Library* schema document. The *ALI Type Library* can be used or referenced by other applications or schemas to retrieve the data types defined for 911 ALI. When schema or data definition changes are required the change will be made to a single reference file within a release instead of changing the individual schemas. When the change is made to the *ALI Type Library* schema the change is then available to all applications that reference it.

5.18.4 Schema Extensions

XML Schema Extensions provide a method to include additional data elements that have not yet been specifically defined in the ALI Library. Schema Extensions promote a data flexibility that was not available in previous NENA exchange formats. Once it has been determined that the new data element (s) provided through the extension mechanism are required they will be added to the *ALI Type Library* or other schema documents, through the NENA Data Committee process. A new schema release will then be created which includes the new data elements

5.18.5 Schema Validation

Proper Schema validation provides a level of confidence that the data being sent to and received by an application meets the established definition and requirements for the defined XML data. Previous NENA data exchange versions defined the arrangement of data elements in a fixed length record. The XML Schema describes the layout of an XML *document*. Validation checks the element tag names to ensure they are valid, ensures that required tags and data are present, the order of data elements in the XML document and the data type of each element to ensure they fit the definition and meet the requirements as specified in the Schema. Each XML data document includes information that specifies the Schema Generation and *Release* used to validate the XML document from which it was issued. This Schema *Generation* and *Release* information is included in the XML documents *Root Element* at the beginning of the XML document.

5.18.6 Validation Point

The purpose of the XML schema is to provide a means to determine that an XML document is complete and valid as to its format, structure and data element types. The most logical point in the data exchange for validation to occur is at the sending application. Performing validation at the sending end ensures that only valid XML documents are received reducing retransmissions and effort on the receiving end to return the document to the sender. An alternative method is to validate

on both ends where there is either a lack of confidence in the sender validation process or where the developer of the software wants to leverage the power of the schema.

5.18.7 Redefining of Data Elements

With a careful review of the original NENA 4 data elements it becomes apparent that the NENA 3 data elements were wrapped in an XML tag and called NENA 4 causing the real benefits available with XML to be missed. For this reason the current NENA 3 and NENA 4 data elements have been reexamined to determine areas where improvements could be made. Details regarding additions, changes or modifications can be found in README files located within the *Generation*/*Release* folders on the NENA web site.

5.18.8 Two examples of this redefining are described below.

General Use

The original NENA 4 data exchange document identifies eight (8) text elements labeled *General Use* 1 thru 8, each 60 characters in length. During the review of schema definition these 8 data elements were removed and replaced with 1 element called *General Use*. The definition of this element says that there can be 1 or many of this general use element. In this way the XML document can, without changing *Generation* or *Release* include 1 *General Use* data element or 20. This is similar to adding rows or columns to a table in a word processor or adding a column in spreadsheet program. A new column or row can be added by creating an additional instance or occurrence of the data element. In a similar manner Additional *General Use* fields can be added in the XML document without changing the schema or the definitions.

Class and Type of Service

The original NENA 4 definitions for Class and Type of Service contain a 2 dimensional data element for each Class and Type of Service The first part being the numeric representation such as 1, 2, 3, etc. The second part is a text definition of the number such as, 1= Residence, 2=Business, etc. The purpose was to make the standard text definition available for display at the PSAP. In the NENA 4 XML Schema document these definitions become part of the *ALI Type Library* schema and are, therefore, available to those applications that require it by using the schema as a cross reference to the definitions. This technique maintains the use of standard definitions, promotes reusability of data across many applications and schemas. This can also reduce the size of the data stream by not passing the definitions along with the data.

5.18.9 Transmission Protocol

The future direction of data exchange methods adopted by NENA must incorporate method and design concepts that are independent of traditional connection protocols. Among the benefits of XML data is the ability to be protocol independent. For example the current ALI source data delivery method utilizes a Start of Text (STX) / End of Text (ETX) protocol wrapped around the

ALI source data or other message. While this protocol works well in the current environment there are benefits to be gained from newer, faster data delivery methods and protocols such as TCP/IP, HTTP, HTTPS, SOAP or others.

This becomes more apparent as the additional data available from Wireless, ACN and other sources we have not yet identified are considered. Since XML is protocol independent it may be used within the existing infrastructure without limiting the possibility of using other protocols to deliver the ALI source data or other data messages.

5.18.10 XML Schema Location

NENA Version 4 Data Exchange Formats are available on the NENA web site at http://www.nena.org/xml_schemas/nena.htm.

The most current *Generation* and *Release* XML schemas and supporting documentation are available at this location.

Schema documents for all XML data sources will be coordinated and validated by the NENA Data Technical Committee.

A Schema Generation identifies XML families of schemas that are backward compatible within that family or generation.

A Schema Release is a grouping of schema documents for each XML data source such as ACN, Service Order, MSAG, etc.

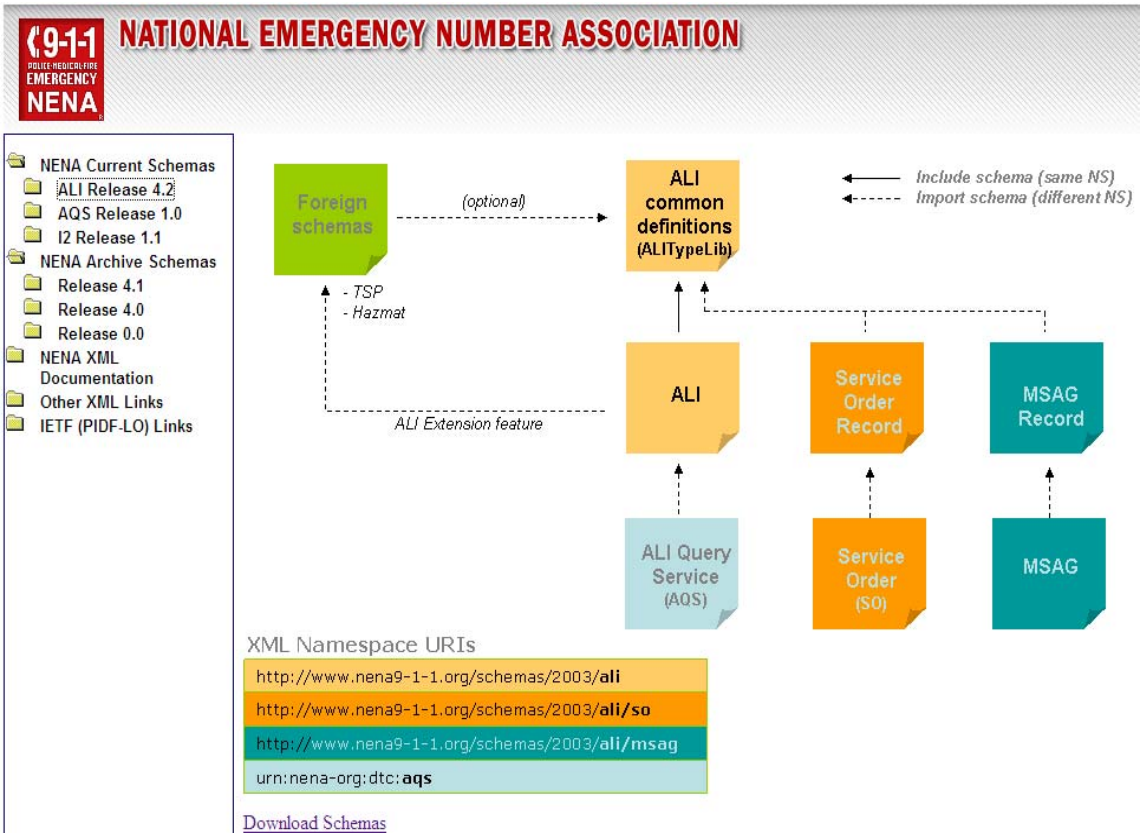
There may be many releases within a Schema Generation. The differences between releases are such that they do not cause incompatibility with previous releases within that Generation schema family.

Schema changes that cause backward incompatibility constitute a new Generation.

Some schema documents may not change between a Generation or Release; however, all files in each release within each generation will have been verified to ensure compatibility with all other schemas within that release. Once this has been accomplished the collection of schemas will be

organized into a Release, assigned a number designating the Generation family it belongs to and its order within that Generation family and then place on the NENA web site for use. An example of the Release naming convention would be *Release 1.2* for Generation 1, Release 2 designating the second release of XML schemas within Generation 1. The next release within Generation 1 would be *Release 1.3* and so on.

5.18.11 Example of the relationship between schema Generations and subsequent Releases



Schema Version 4.2

Change Log

These are the items that have been changed from Version 4.1 to 4.2 in the schemas.

5.18.12 All schemas:

1) Changed all instances of datatypes (and restrictions) xs:string to xs:token[7].
2) Set version in all schemas to 4.2.

6 ALI Schemas

6.1.1 ALI.xsd

1) Removed LocationInfo root element.
2) Removed MaxOccurs unbounded from LocationInfo occurring in AliBody.
3) Added Best Practices documentation for CallInfoType.
4) Modified CallInfoType so that all child elements are optional; specific change is that CallingPartyNum and ClassOfService are now optional.
5) Added the following optional element to the ALI schema *CallInfoType* definition: *CallInfo/SpecialMessage* : SpecialMessageType.
6) Added the following optional element to the ALI schema *CallInfoType* definition: *CallInfo*/*AlsoRingsAtAddress* : TextualCivicAddressType
7) Removed use attribute in LocationInfoType.
8) Added Best Practices documentation for AgenciesType.
9) Replaced individual Law/Fire/EMS types with Agency Type definition.

[7] An *xs:token* string is a string that does not contain the carriage return (#xD), line feed (#xA) nor tab (#x9) characters, that has no leading or trailing spaces (#x20) and that has no internal sequences of two or more spaces

10) Added ability to specify multiple OtherAgencies.
11) Modified ESN to be an optional element in Agencies.
12) Modified SourceInfoType to make DataProvider, Access Provider, ALIRetrievalGMT optional elements.
13) Modified NetworkInfo to make PSAPID and RouterID optional elements.
14) Added PSAPName as element for NetworkInfo.

6.1.2 ALITypeLib.xsd

1) Modified AdditionalAgencyInfoType size to be 75 rather than 100 chars.
2) Added AgencyType definition which contains AgencyName and AgencyTN.
3) Removed AlsoRingsAtAddressType.
4) Modified CellID and SectorID to be optional elements for CellSiteType; added Best Practices documentation.
5) Add length specifier of 1 to ClassOfServiceCodeType.
6) Added length specifier to CountryType
7) Added Name as optional element in DataProviderIDType.
8) Added length specifier of 2 to DatumType.
9) Added Name as optional element in AccessProviderIDType.
10) Removed EMSType, FireType, LawType (superceded by AgencyType).
11) Added length specifier to LDTTechnologyCodeType.
12) Removed LocationValidType.
13) Added PSAPNameType.
14) Removed RoamerPortType.
15) Added length specifier to SourceOfServiceType (this is an optional field in Call Info).
16) Added length specifier to SpecialAttentionIndicator.
17) Added SpecialMessageType.
18) Added Best Practices documentation for StreetAddressType.
19) Made all elements in StreetAddressType optional.

20) Added the following optional element to *StreetAddressType* definition: T*extualAddress* : TextualCivicAddressType. (Even though this may seem redundant with the *LocationDescription* element, the latter is defined to hold additional information about a location (for example "South Wing") rather than the civic address of the location itself. The *TextualAddress* element is there to explicitly support cases where street address is available only in textual (un-structured) form – like the address of a VoIP caller in i2.)

21) Added TextualCivicAddressType.

22) Added length specifier to TypeOfServiceCodeType.

6.1.3 ALI Query Service Directory and Schemas

The "aliqs" directory contains schemas and WSDLs for ALI Query Service. These are all new.

6.1.4 AQS and AQS.WS Removed

Directories containing preliminary work on AQS have been removed.

6.1.5 MSAGRecord.xsd

1) Removed RangeNumberType.

2) Modified LowRange and HIghRange to be HouseNumTypes.

3) Modified Function Of Change to be consistent with decisions made for NENA 2.1 retrofit. The only FOC types supported are "D" and "I".

4) Moved TARCode from the street element to the range element.

7 I2 Schemas

7.1.1 Geopriv Directory and Schemas

The geopriv directory contains the CivicAddress and geoshape schemas.

7.1.2 GML-3.1.1 Directory and Schemas

The GML directory contains GML schemas referenced from the v9 schemas.

7.1.3 All I2 Schemas

Old	New
V2-request	v2Request

v2-response	v2Response
v2-esct	v2Esct
v2-esct-ack	v2EsctAck
callserver-vpc-request	callserverVpcRequest
callserver-vpc-esct	callserverVpcEsct
esr-request	esrRequest
call-id	callId
call-origin	callOrigin
esr-response	esrResponse
esct-ack	esctAck
v3-request	v3Request
v3-response	v3Response
vpc-lis-request	vpcLisRequest
ipl-request	iplRequest
message-id	messageId
ipl-response	iplResponse
pos-source	posSource
v8-request	v8Request
v8-response	v8Response
vpc-erdb-request	vpcErdbRequest
erdb-request	erdbRequest
erdb-response	erdbResponse
v9-request	v9Request
v9-response	v9Response
vdb-identity-request	vdbIdentityRequest
erdb-identity-request	erdbIdentityRequest
identity-request	identityRequest

identity-response	identityResponse
location-key	locationKey
nena-id	nenaID
organization-name	organizationName
cert-uri	certUri
location-key	locationKey

Added version attribute to the schema element.

7.1.4 V2.xsd

1) Modified result element to be String with numeric restriction.

7.1.5 V7.xsd

1) Removed pidf import
2) Added return 500, 570, 580 to ReturnCodeType

7.1.6 V8.xsd

1) Removed pidf import
2) Added return 210, 211, 212, 213, 214, 215, 562 to ReturnCodeType
3) Modified geo-location to be consistent with V9.

7.1.7 V9.xsd

This schema has been completely re-written.

7.2 EXHIBIT 22

7.3 GIS DATA MODEL, VERSION 2.0

7.3.1 1.0 Preface

Version 2.0 of the NENA GIS Data Model identifies the minimal attributes required in a spatial dataset. It also defines the GML schema that can be used with this model. Using the GML schema, this data model can be used for GIS data exchange between neighboring public safety agencies and to meet the requirements of GIS data needed for the NENA i2 solution (NENA 08-001), and for the

Location Validation Function and the Emergency Calling Routing Function in the NENA i3 solution (NENA 08-751).

1.1 Metadata

The Content Standard for Digital Geospatial Metadata (CSDGM), Vers. 2 (FGDC-STD-001-1998) is the US Federal Metadata standard. The Federal Geographic Data Committee originally adopted the CSDGM in 1994 and revised it in 1998. According to Executive Order 12096 all Federal agencies are ordered to use this standard to document geospatial data created as of January, 1995. The standard is often referred to as the FGDC Metadata Standard and has been implemented beyond the federal level with State and local governments adopting the metadata standard as well.

The international community, through the International Organization of Standards (ISO), has developed and approved an international metadata standard, ISO 19115. As a member of ISO, the US is required to revise the CSDGM in accord with ISO 19115. Each nation can craft their own profile of ISO 19115 with the requirement that it include the 13 core elements. The FGDC is currently leading the development of a US Profile of the (ISO) international metadata standard, ISO 19115.

Metadata is information about the content, quality, condition, and other characteristics of data being sent. The basic elements to be included in the metadata file are taken from the *2003 ISO 19115 – International Standard for Geographic Information – Metadata.*

This International Standard defines an extensive set of metadata elements; typically only a subset of the full number of elements is used. However, it is essential that a basic minimum number of metadata elements be maintained for a dataset. Listed are the core metadata elements required to identify a dataset, typically for catalogue purposes. This list contains metadata elements answering the following questions: “Does a dataset on a specific topic exist (‘what’)?”, “For a specific place (‘where’)?”, “For a specific date or period (‘when’)?” and “A point of contact to learn more about or order the dataset (‘who’)?”. Using the recommended optional elements in addition to the mandatory elements will increase interoperability, allowing users to understand without ambiguity the geographic data and the related metadata provided by either the producer or the distributor. Dataset metadata profiles of this International Standard shall include this core.

Listed below are the core metadata elements (mandatory and recommended optional) required for describing a dataset. An “M” indicates that the element is mandatory. An “O” indicates that the element is optional. A “C” indicates that the element is mandatory under certain conditions.

Dataset title (M) (MD_Metadata > MD_DataIdentification.citation > CI_Citation.title)	**Spatial representation type** (O) (MD_Metadata > MD_DataIdentification.spatialRepresentationType)
Dataset reference date (M) (MD_Metadata > MD_DataIdentification.citation > CI_Citation.date) **Reference system** (O)	**Reference system** (O) (MD_Metadata > MD_ReferenceSystem)
Dataset responsible party (O) (MD_Metadata > MD_DataIdentification.pointOfContact > CI_ResponsibleParty)	**Lineage** (O) (MD_Metadata > DQ_DataQuality.lineage > LI_Lineage)
Geographic location of the dataset (by four coordinates or by geographic identifier) (C) (MD_Metadata > MD_DataIdentification.extent > EX_Extent > EX_GeographicExtent > EX_GeographicBoundingBox or EX_GeographicDescription)	**On-line resource** (O) (MD_Metadata > MD_Distribution > MD_DigitalTransferOption.onLine > CI_OnlineResource)
Dataset language (M) (MD_Metadata > MD_DataIdentification.language)	**Metadata file identifier** (O) (MD_Metadata.fileIdentifier)
Dataset character set (C) (MD_Metadata > MD_DataIdentification.characterSet)	**Metadata standard name** (O) (MD_Metadata.metadataStandardName)
Dataset topic category (M) (MD_Metadata > MD_DataIdentification.topicCategory)	**Metadata standard version** (O) (MD_Metadata.metadataStandardVersion)
Spatial resolution of the dataset (O)	**Metadata language** (C)

(MD_Metadata > MD_DataIdentification.spatialResolution > MD_Resolution.equivalentScale or MD_Resolution.distance)	(MD_Metadata.language)
Abstract describing the dataset (M) (MD_Metadata > MD_DataIdentification.abstract)	**Metadata character set** (C) (MD_Metadata.characterSet)
Distribution format (O) (MD_Metadata > MD_Distribution > MD_Format.name and MD_Format.version)	**Metadata point of contact** (M) (MD_Metadata.contact > CI_ResponsibleParty
Additional extent information for the dataset (vertical and temporal) (O) (MD_Metadata > MD_DataIdentification.extent > EX_Extent > EX_TemporalExtent or EX_VerticalExtent)	**Metadata date stamp** (M) (MD_Metadata.dateStamp)

1.2 9-1-1 SPATIAL ATTRIBUTES FOR LINE DATA

1.2.1A Centerline Layer (Required)

ATTRIBUTE NAME	USE R/O	TYPE	DATA DESCRIPTION
Low Address Left	R	N	Lowest address on left side of street in ascending order
High Address Left	R	N	Highest address on left side of street in ascending order
Low Address Right	R	N	Lowest address on right side of street in ascending order
High	R	N	Highest address on right side of street in ascending order

Address Right			
Prefix Directional	R	A	Leading street direction prefix. Valid Entries: N S E W NE NW SE SW
Street Name Pre Type	O	A	The element of the complete street name **preceding** the street name element that indicates the type of street. These are typically Street Suffixes according to Appendix C in USPS Publication 28. However, they are not abbreviated when used in this field.
Street Name	R	AN	Valid street name as assigned by local addressing authority
Street Suffix	R	A	Valid Street abbreviation, as defined by the US Postal Service Publication 28. (e.g. AVE)
Post Directional	R	A	Trailing street direction suffix. Valid Entries: N S E W NE NW SE SW
Road Class	R	N	http://www.fhwa.dot.gov/planning/fctoc.htm Highway Performance Monitoring System (HPMS) Functional Classifications: 1= Interstate 2= Other Freeways and Expressways 3= Other Principal Arterial 4= Minor Arterial 5= Major Collector 6= Minor Collector 7= Local Not designated as a HPMS Functional Classification, but non the less an important road classification for 9-1-1: 8= Trails (Recreational trails)

One-way	R	A	One way road classification. The direction of the line is an internal attribute maintained by the GIS database. The direction of the line can be displayed by symbolizing the beginning (FROM) node and the ending (TO) node of the street centerline. The direction of the street centerline should be FROM the lowest address range TO the highest address range B or Blank – travel in both directions allowed FT – One-way from FROM node to TO node (in direction of arc) TF – One way from TO node to FROM Node (opposite direction of arc)
Postal Community Name Left	R	A	Postal Community Name as identified on the left side of the street
Postal Community Name Right	R	A	Postal Community Name as identified on the right side of the street
Postal Code/Zip Code Left	R	AN	Postal or Zip code as identified on the Left side of the street. Format: ANANAN or NNNNN [2]
Postal Code/Zip Code Right	R	AN	Postal or Zip code as identified on the Right side of the street. Format: ANANAN or NNNNN[2]
MSAG Community Name Left	R	A	Valid service community name as identified by the MSAG on the left side of the street
MSAG Community Name Right	R	A	Valid service community name as identified by the MSAG on the right side of the street
ESN Left	O	AN	3-5 digit Emergency Service Number associated with street segment

ESN Right	O	AN	3-5 digit Emergency Service Number associated with street segment
Segment ID	R	N	Unique Road Segment ID number
County Name Left	R	AN	County Name on the Left side of the street as given in FIPS 6-4 [1]
County Name Right	R	AN	County Name on the Right side of the street as given in FIPS 6-4 [1]
County Code Left	R	A	County Code on the Left side of the street as given in FIPS 6-4 [1]
County Code Right	R	A	County Code on the Right side of the street as given in FIPS 6-4 [1]
State/Province Left	R	A	Two character Alpha U.S. State or Canadian province abbreviation as defined by Postal Authority or ISO 3166-2 i.e. TX (Texas), ON (Ontario)
State/Province Right	R	A	Two character Alpha U.S. State or Canadian province abbreviation as defined by Postal Authority or ISO 3166-2 i.e. TX (Texas), ON (Ontario)
Source of Data	R	A	Agency that last updated the record
Date Updated	R	N	Date of last update Format: CCYY-MM-DD

[1] http://www.census.gov/geo/www/fips/fips65/index.html The FIPS Codes Standard shall not apply to applications involving interchange of international data that require the use of the country codes of the International Organization for Standardization, i.e., ISO 3166. For the convenience of such users, the ISO 3166 country codes are published in FIPS PUB 104, *Guideline for Implementation of*

ANSI Codes for the Representation of Names of Countries, Dependencies, and Areas of Special Sovereignty. FIPS PUB 104 provides both two- and three-character alphabetic codes for each entity listed. Federal agencies that do not require FIPS PUB 104 for international data interchange, and are not involved in national defense programs or with the mission of the U.S. Department of State, may adopt either set of codes.

[2] The USPS considers zip codes to be delivery routes instead of areas. There may be differences between this depiction and actual zip code mailing address.

1.2.1B. Railroad Layer (Optional)

ATTRIBUTE NAME	USE R/O	TYPE	DATA DESCRIPTION
Line	R	A	Railroad Line Owner (Code of Association of American Railroads)
Line Sub-Division Name	R	A	Railroad Line Sub-Division Name
Line Type	R	A	Main, Secondary or Siding
Line Status	R	A	Active or Inactive
Segment ID	R	N	Unique Railroad Segment ID
Mile Post Low	R	AN	Beginning Linear Reference
Mile Post High	R	AN	Ending Linear Reference
Passenger Rail Indicator	R	A	Passenger Rail Indicator
Source of Data	R	A	Agency that last updated the record
Date Updated	R	N	Date of last update Format: CCYY-MM-DD

1.2.1C.Hydrology Layer (Optional)

ATTRIBUTE NAME	USE R/O	TYPE	DATA DESCRIPTION
Surface Water Line	R	A	Type of Surface Water (river, stream, etc.)
Surface Water Name	R	A	Name of river, stream etc.
Segment ID	R	N	Unique Hydrology Segment ID
Source of Data	R	A	Agency that last updated the record
Date Updated	R	N	Date of last update Format: CCYY-MM-DD

1.3. 9-1-1 SPATIAL ATTRIBUTES FOR POINT DATA

1.3. A Emergency Service Agency Location Layer (Required)

ATTRIBUTE NAME	USE R/O	TYPE	DATA DESCRIPTION
Agency Type	R	A	Law = L Fire = F Emergency Medical Service = E Other = O
County Name	R	AN	County Name as given in FIPS 6-4 [1]
County Code	R	A	FIPS County Code as given in FIPS 6-4 [1]
Community ID	R	N	Unique Community ID Number i.e. FIPS, GEOCODES, etc.
Agency ID	R	N	Emergency Service Agency ID defined with the first 5 digits as the County ID code and the last 4 digits as the locally assigned agency code
Agency Name	R	A	Name of Agency
Agency Contact	R	A	Agency Contact Person
House Number Prefix	R	AN	House Number Prefix to accommodate Alphanumeric characters or fire numbers in house number i.e. Wisconsin
House Number	R	N	House Number
House Number Suffix	R	AN	House Number Suffix

Prefix Directional	R	AN	Leading street direction prefix. Valid Entries: N S E W NE NW SE SW
Street Name Pre Type	O	A	The element of the complete street name **preceding** the street name element that indicates the type of street. These are typically Street Suffixes according to Appendix C in USPS Publication 28. However, they are not abbreviated when used in this field.
Street Name	R	AN	Valid street name as assigned by local addressing authority
Street Suffix	R	AN	Valid Street abbreviation, as defined by the US Postal Service Publication 28. (e.g. AVE)
Post Directional	R	AN	Trailing street direction suffix. Valid Entries: N S E W NE NW SE SW
Postal Community Name	R	A	Postal Community Name
MSAG Community Name	R	A	Valid service community name as identified by the MSAG
Postal Code/Zip Code	O	AN	Postal or Zip code. Format: NNNNN or ANANAN[2]
State/Province	R	A	Two character Alpha U.S. State or Canadian province abbreviation as defined by Postal Authority or ISO 3166-2 i.e. TX (Texas), ON (Ontario)
Telephone Number	O	AN	Telephone Number of Agency Format: NPA-NXX-XXXX
Source of Data	R	A	Agency that last updated the record

Date Updated	R	N	Date of last update Format: CCYY-MM-DD

1.3 B. Cell Site Location Layer (Required)

ATTRIBUTE NAME	USE R/O	TYPE	DATA DESCRIPTION
NENA CO ID	R	AN	. NENA Company ID www.NENA.org
Numeric Cell ID	R	N	Carrier Cell site ID
Cell Site Common Name	R	A	Location Name assigned by the wireless carrier
Cell Site Unique ID	R	AN	Cell Site Identifier provided by the wireless service provider, it is unique to the cell site
Cell Site Address	R	A	The address of the cell tower as provided by the wireless service provider. Needs to be MSAG Valid
Postal Community Name	R	A	Postal Community Name
MSAG Community Name	R	A	Valid service community name as identified by the MSAG
Cell Site State	R	A	State where the cell tower is located
County Code	R	AN	FIPS County Code as given in FIPS 6-4 [1]
Air Interface Technology	R	A	A=Analog (900MHz), P=Digital (PCS), T=TDMA (Digital AMPs), G=GSM – Type of RF Voice Technology

Source of Data	R	A	Agency that last updated the record
Date Updated	R	N	Date of last update Format: CCYY-MM-DD

1.3 C. Mile Marker Location Layer (Optional)

ATTRIBUTE NAME	USE R/O	TYPE	DATA DESCRIPTION
Mile Post ID	R	N	Mile Post Identification Number
Mile Marker Type	R	A	Type of mile marker : Railroad name Road name Trail Water Way Coastal Boardwalk
Route System Name	R	AN	Name of route system (ex: Interstate 85)
Segment ID	R	N	Unique Road or Railroad Segment ID number
Source of Data	R	A	Agency that last updated the record
Date Updated	R	N	Date of last update Format: CCYY-MM-DD

1.3 D. Railroad Grade Crossing Layer (Optional)

ATTRIBUTE NAME	USE R/O	TYPE	DATA DESCRIPTION
Grade Crossing ID	R	N	Unique USDOT ID for the Crossing

Crossing Position	R	AN	Position of Crossing At Grade RR Under RR Over
Grade Crossing Name	O	A	Name given to Grade Crossing
Source of Data	R	A	Agency that last updated the record
Date Updated	R	N	Date of last update Format: CCYY-MM-DD

1.3 E. Site/Structure Location Layer (Optional)

ATTRIBUTE NAME	USE R/O	TYPE	DATA DESCRIPTION
Community ID	R	N	Unique Community ID Number i.e. FIPS, GEOCODES, etc.
Site ID	R	N	Unique Site ID Number
House Number Prefix	R	AN	House Number Prefix to accommodate Alphanumeric characters or fire numbers in house number i.e. Wisconsin
House Number	R	N	House Number
House Number Suffix	R	AN	House Number Suffix
Location	O	AN	Additional location information. Abbreviated as shown in USPS Publication 28, Appendix C, Item C2.
Prefix Directional	R	AN	Leading street direction prefix. Valid Entries: N S E W NE NW SE SW

Street Name Pre Type	O	A	The element of the complete street name **preceding** the street name element that indicates the type of street. These are typically Street Suffixes according to Appendix C in USPS Publication 28. However, they are not abbreviated when used in this field.
Street Name	R	AN	Valid street name as assigned by local addressing authority
Street Suffix	R	AN	Valid Street abbreviation, as defined by the US Postal Service Publication 28. (e.g. AVE)
Post Directional	R	AN	Trailing street direction suffix. Valid Entries: N S E W NE NW SE SW
ESN	R	AN	Emergency Service Number associated with this House Number, Street Name and Community Name
Postal Community Name	R	A	Postal Community Name
MSAG Community Name	R	A	Valid service community name as identified by the MSAG
Postal Code/Zip Code	O	AN	Postal or Zip code. Format: NNNNN or ANANAN[2]
Landmark	R	AN	Landmark or Vanity address
Site Type	R	A	Type of Structure – Classification Field
L/R	R	A	Left/Right side of the road
Source of Data	R	A	Agency that last updated the record
Date Updated	R	N	Date of last update Format: CCYYMMDD

1.4. 9-1-1 SPATIAL ATTRIBUTES FOR POLYGON DATA

1.4 A. County Boundary Layer (Required)

ATTRIBUTE NAME	USE R/O	TYPE	DATA DESCRIPTION
County Name	R	AN	County Name as given in FIPS 6-4 [1]
County Code	R	N	FIPS County Code as given in FIPS 6-4 [1]
Source of Data	R	A	Agency that last updated the record
Date Updated	R	N	Date of last update Format: CCYY-MM-DD

1.4 B. Emergency Service Zone Boundary Layer (Required)

ATTRIBUTE NAME	USE R/O	TYPE	DATA DESCRIPTION
Community ID	R	N	Unique Community ID Number i.e. FIPS, GEOCODES, etc.
County Name	R	AN	County Name as given in FIPS 6-4 [1]
County Code	R	N	FIPS County Code as given in FIPS 6-4 [1]
PSAP ID	R	AN	Code identifying the PSAP as listed in the FCC PSAP registry http://www.fcc.gov/pshs/services/911-

			services/enhanced911/psapregistry.html http://www.fcc.gov/pshs/services/911-services/enhanced911/psapregistry.html
Agency ID	R	N	Emergency Service Agency ID
ESN	R	AN	Emergency Service Number associated with the ESZ
Source of Data	R	A	Agency that last updated the record
Date Updated	R	N	Date of last update Format: CCYY-MM-DD

1.4 C. Municipal Boundary Layer (Required)

ATTRIBUTE NAME	USE R/O	TYPE	DATA DESCRIPTION
Community ID	R	N	Unique Community ID Number i.e. FIPS, GEOCODES, etc.
MSAG Community Name	R	A	Valid service community name as identified by the MSAG
Source of Data	R	A	Agency that last updated the record
Date Updated	R	N	Date of last update Format: CCYY-MM-DD

7.4

7.5 1.4 D. Emergency Service Agency Boundary Layer (Required)

ATTRIBUTE NAME	USE R/O	TYPE	DATA DESCRIPTION
PSAP ID	R	AN	Code identifying the PSAP as listed in the FCC PSAP registry http://www.fcc.gov/pshs/services/911-services/enhanced911/psapregistry.html

County Name	R	AN	County Name as given in FIPS 6-4 [1]
County Code	R	N	FIPS County Code as given in FIPS 6-4 [1]
Agency ID	R	N	Emergency Service Agency ID
Source of Data	R	A	Agency that last updated the record
Date Updated	R	N	Date of last update Format: CCYY-MM-DD

1.4 E. Cell Site Coverage Layer (Required)

ATTRIBUTE NAME	USE R/O	TYPE	DATA DESCRIPTION

LDT Provider ID	R	AN	LDT Provider Identification Code. Codes to be developed and held by NENA
Numeric Cell ID	R	N	Carrier's Cell site ID
Cell Site Unique ID	R	AN	Cell Site Identifier provided by the wireless service provider, it is unique to the cell site
Numeric Sector ID	R	N	Carrier Sector ID usually indicates Omni or multi-sectored antenna faces
ESRD/ESRK	R	N	ESRD is a 10 digit # used for routing a wireless call & is assigned by cell sector. ESRK is a 10-digit # for routing & is assigned as a pool of numbers to a PSAP. The first # of range is entered here
Sector Orientation/ Azimuth	R	N	Orientation of the cell sector antenna face, with North being 0 degrees and South = 180 degrees.
Sector Compass Orientation	R	A	Cell Sector Antenna orientation compass direction. An alpha indicator of the section directional – e.g. NE, WSW, etc.
Sector Beam Width	R	N	Width of the sector antenna beam in degrees, under normal operating conditions
Average Sector Radius	R	N	Average true sector radius range (under average operating conditions.) Radius at which cell tower's polygon of influence ends and another begins.
Coverage source	R	A	C=Company Map, D=Digital data from Company, P=GIS Propagation Study, L=Line of Site analysis, R=Range Defined
Source of Data	R	A	Agency that last updated the record
Date updated	R	N	Date of last update Format: CCYY-MM-DD

1.4 F. Hydrology Layer (Optional)

ATTRIBUTE NAME	USE R/O	TYPE	DATA DESCRIPTION
Surface Water Line	R	A	Type of Surface Water (pond, lake, large waterway, reservoir, etc.)
Surface Water Name	R	A	Name of Pond, lake, waterway, reservoir, etc.
Segment ID	R	N	Unique Hydrology Segment ID
Source of Data	R	A	Agency that last updated the record
Date Updated	R	N	Date of last update Format: CCYY-MM-DD

2.0 References

- U.S. Department of Transportation - Federal Railroad Administration– Secretary's Action Plan for Highway-Rail Crossing Safety and Trespass Prevention Secretary of Transportation
- NENA 02-010, NENA Formats and Protocols for Data Exchange
- NENA 02-011, NENA Data Standards For Local Exchange Carriers, ALI Service Providers & 9-1-1 Jurisdictions
- NENA 02-014 NENA GIS Data Collection and Maintenance Standards
- NENA 57-001 Wireless Phase I & II Features and Functions Operational Information Document

99 Previous Acknowledgments

Data Exchange Formats Sub-Committee Members of as 11/01/2005	
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