

NENA

NG9-1-1 Data Flow Standard

Abstract: In the evolving environment of Next Generation 9-1-1, the data received will change and come from different sources.



NENA NG9-1-1 Data Flow Standard

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Prepared by:

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1 Executive Overview

Making the best use of improved data capabilities and opportunities and how such should best accomplished are fundamentally important aspects of transition to NG9-1-1. A basic background understanding comparison between E9-1-1 network interface and data flow to NG9-1-1 network interface and data flow is a necessarily important starting point. For the transition of data from legacy ALI structures to NG9-1-1 to be successful and effective, the addition of new data to the Public Safety Answering Point (PSAP) display, the Presence Information Data Format – Location Object (PIDF-LO) data element to PSAP display relationships, the conversion of legacy E9-1-1 Class of Service (CoS) indicators to the new NG9-1-1 definitions, and downstream interoperability to mapping, Computer Aided Dispatch (CAD), First Net Responder Authority (FirstNet) and other First Responder Networks are all potential considerations.

The removal or change to a single legacy E9-1-1 data item in the transition to NG9-1-1 cannot only impact Telecommunicator training and PSAP Call Handling Equipment (CHE) responsibilities, but also impact Incumbent Local Exchange Company (ILEC) or Local Exchange Company (LEC) Data Base Management System (DBMS), Service Order Input (SOI) or mapping at the PSAP and other downstream public safety systems. One of the most obvious and potentially immediate examples of such being that within PIDF-LO, there is no single legacy CoS and instead of the ALI system or the 9-1-1 System Service Provider (9-1-1 SSP), the CHE will be responsible for determining the display of the information received via PIDF-LO. Another example is Additional Data beyond current ALI equivalent data (e.g., device classification).

Transition from E9-1-1 to NG9-1-1 should include when, how, and to what extent to replace and present a single legacy CoS with some or all of the following:

- Service Type:
- Method of Location Determination:
- Service Environment: (where applicable)
- Service Mobility:
- Additional Data:

While some in the 9-1-1 community may view these as user interface issues to be decided between different 9-1-1 authorities and their vendors, others would appreciate or at least question that there is a need to educate, inform, and provide suggested guidance on these issues. Accordingly, this document seeks to inform on E9-1-1 and NG9-1-1 data flow issues and identify at least a few transition issues for additional consideration.¹

¹ This document is focused on the United States. (Because of a more regulated approach to NG9-1-1 transition, Canada transition may have different transition steps and issues, based on its particular applicable facts and/or regulations.) This

Table of Contents

1	EXECUTIVE OVERVIEW	2
	INTELLECTUAL PROPERTY RIGHTS (IPR) POLICY	6
	REASON FOR ISSUE/REISSUE	7
2	E9-1-1 AND NG9-1-1 DATA FLOW	8
2.1	E9-1-1 AND NG9-1-1 DATA PROVISIONING AND VALIDATION, AND DATA CONVEYANCE	8
2.1.1	<i>E9-1-1 Data Provisioning and Validation</i>	<i>8</i>
2.1.2	<i>NG9-1-1 Data Provisioning and Validation</i>	<i>11</i>
2.2	GENERAL PROVISIONING COMPARISONS BETWEEN E9-1-1 DATA AND NG9-1-1 DATA COMMON ELEMENTS.	13
2.2.1	<i>Callback Number</i>	<i>13</i>
2.2.2	<i>Caller Location</i>	<i>14</i>
2.2.3	<i>Additional Data, ALI Equivalent Data</i>	<i>14</i>
2.2.4	<i>Additional Data, Beyond ALI Equivalent Data (including IS-ADR)</i>	<i>15</i>
2.2.5	<i>Class of Service and its NG9-1-1 Equivalent and Expansion</i>	<i>15</i>
2.2.6	<i>Mapping Display System</i>	<i>16</i>
2.2.7	<i>Computer Aided Dispatch</i>	<i>16</i>
2.2.8	<i>Call Transfers</i>	<i>16</i>
2.2.9	<i>Interoperability to FirstNet</i>	<i>17</i>
2.2.10	<i>Interoperability to other First Responder Networks</i>	<i>17</i>
2.3	CURRENTLY IDENTIFIED TRANSITION ISSUES FOR ADDITIONAL CONSIDERATION	17
2.3.1	<i>Legacy ALI screen to NG9-1-1 ALI screen with respect to E9-1-1 Class of Service</i>	<i>17</i>
2.3.2	<i>Legacy ALI screen to NG9-1-1 ALI screen with respect to Additional Data beyond ALI Equivalent Data</i>	<i>18</i>
3	NENA REGISTRY SYSTEM (NRS) CONSIDERATIONS	18
4	DOCUMENTATION REQUIRED FOR THE DEVELOPMENT OF A NENA XML SCHEMA	18
5	IMPACTS, CONSIDERATIONS, ABBREVIATIONS, TERMS, AND DEFINITIONS	18
5.1	OPERATIONS IMPACTS SUMMARY	18
5.2	TECHNICAL IMPACTS SUMMARY	18
5.3	SECURITY IMPACTS SUMMARY	18
5.4	RECOMMENDATION FOR ADDITIONAL DEVELOPMENT WORK	19
5.5	ANTICIPATED TIMELINE	19
5.6	COST FACTORS	19
5.7	COST RECOVERY CONSIDERATIONS	19
5.8	ADDITIONAL IMPACTS (NON-COST RELATED)	19
5.9	ABBREVIATIONS, TERMS, AND DEFINITIONS	19
6	RECOMMENDED READING AND REFERENCES	35

document does not specifically address routing issues, but it is recognized that E9-1-1 and NG9-1-1 routing has data flow aspects, such as a location object being sent to the NG9-1-1 system.

7 EXHIBIT X 35

8 APPENDIX X 35

ACKNOWLEDGEMENTS..... 35



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National Emergency Number Association
1700 Diagonal Rd, Suite 500
Alexandria, VA 22314
202.466.4911
or commleadership@nena.org



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Alexandria, VA 22314
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Reason for Issue/Reissue

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

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NENA-STA-043.1-2021	01/20/2021	Initial Document

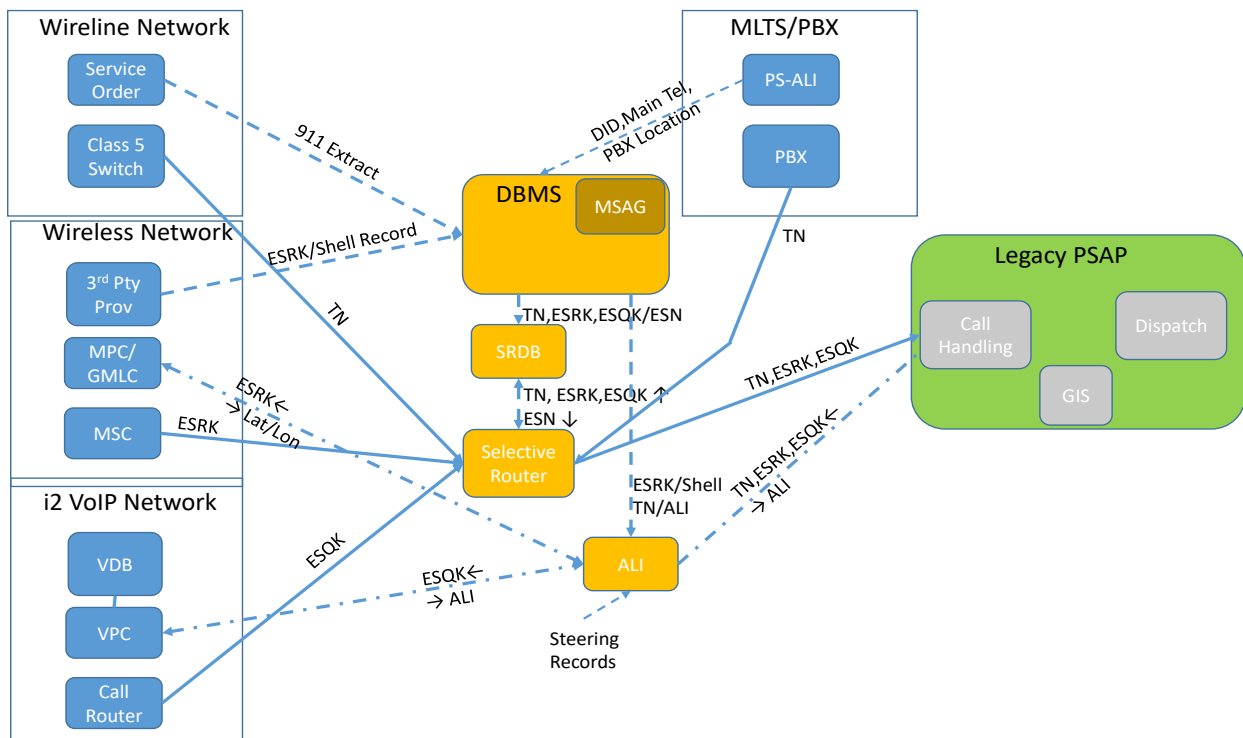
2 E9-1-1 and NG9-1-1 Data Flow

The following two subsections seek to illustrate and explain a conceptual architecture for E9-1-1 and NG9-1-1 for data provisioning and validation, for data conveyance, and then seeks to generally compare E9-1-1 and NG9-1-1 provisioning for common elements.

2.1 E9-1-1 and NG9-1-1 Data Provisioning and Validation, and Data Conveyance

The following figures and associated bullet points seek to illustrate and explain a conceptual architecture for E9-1-1 and NG9-1-1 for data provisioning and validation, and for data conveyance.

2.1.1 E9-1-1 Data Provisioning and Validation



Data Provisioning and Validation

– Wireline Networks

- E9-1-1 SSP often (historically an ILEC, but not always so and less often prospectively)
- Includes all area LECs
- Master Street Address Guide (MSAG) created for 9-1-1 Jurisdictions

- LEC SOIs provide a 9-1-1 extract that is sent to the DBMS
- DBMS Validates address against MSAG and E9-1-1 SSP, Communications Service Provider (CSP), and/or 9-1-1 Authority manages discrepancies
- DBMS pushes Telephone Number (TN)/ Emergency Service Number (ESN) relationship to Selective Routing Database (SRDB)
- DBMS pushes TN/ALI relationship to ALI server

– **Wireless Networks**

- Emergency Services Routing Key (ESRK) provisioned in DBMS associated with a Shell Record
- Minimal validation is done by DBMS
- DBMS pushes ESRK/ESN relationship to SRDB
- DBMS pushes ESRK/ALI relationship (Shell Record) to ALI server
- Steering records are provisioned into the ALI server to provide ESRK to Mobile Positioning Center (MPC)/ Gateway Mobile Location Center (GMLC) relationship

– **i2 Voice over Internet Protocol (VoIP) Networks**

- VSP or a third-party has a Validation Database (VDB)
- Records are validated and pushed to the VoIP Positioning Center (VPC)
- Steering records are provisioned into the ALI server to provide Emergency Services Query Key (ESQK) to VPC relationship

– **Multi-Line Telephone System (MLTS) /Private Branch Exchange (PBX)**

- PBX Private Switch ALI (PSALI) application historically sends the Direct Inward Dialing (DID)/Main Telephone Number (MTN) and location to the DBMS, but newer Session Initiation Protocol (SIP)-based system may send DIDs
- DBMS validates address against MSAG and E9-1-1 SSP, CSP, PBX/MLTS provider and/or 9-1-1 Authority manages discrepancies
- DBMS pushes DID, MTN/ESN relationship to SRDB
- DBMS pushes DID, MTN/ALI relationship to ALI server
- Alternate or combined solution uses i2-like solution to provide location

E9-1-1 Data Conveyance

– **Wireline Networks**

- Class 5 office sends TN to Selective Router (SR)
- SR interrogates SRDB with TN and the SRDB returns an ESN
- The SR uses the ESN to identify a PSAP trunk and forwards the call.
- If the PSAP is a Centralized Automated Message Accounting (CAMA) PSAP 8 digits (I + 7-digit ANI) are sent to the PSAP
- If the PSAP is a MF CAMA PSAP 10 or 20 are sent to the PSAP
- PSAP queries ALI server with 10-digit TN

- ALI server returns ALI information to include CoS, additional data and location

– **Wireless Networks**

- MSC offices or third-party (ESGW) sends ESRK to SR
- SR interrogates SRDB with ESRK and the SRDB returns an ESN
- The SR uses the ESN to identify a PSAP trunk and forwards the call.
- If the PSAP is a CAMA PSAP 8 digits (I + 7-digit ANI) are sent to the PSAP
- If the PSAP is a MF CAMA PSAP 10 or 20 are sent to the PSAP
- PSAP queries ALI server with 10-digit TN
- ALI server uses steering information to query the MPC/GMLC
- The GMLC returns location information (X/Y, maybe z-coordinate and z-uncertainty or wireless Dispatchable Location solution)
- ALI server builds ALI record with information from the MPC/GMLC and returns it to PSAP

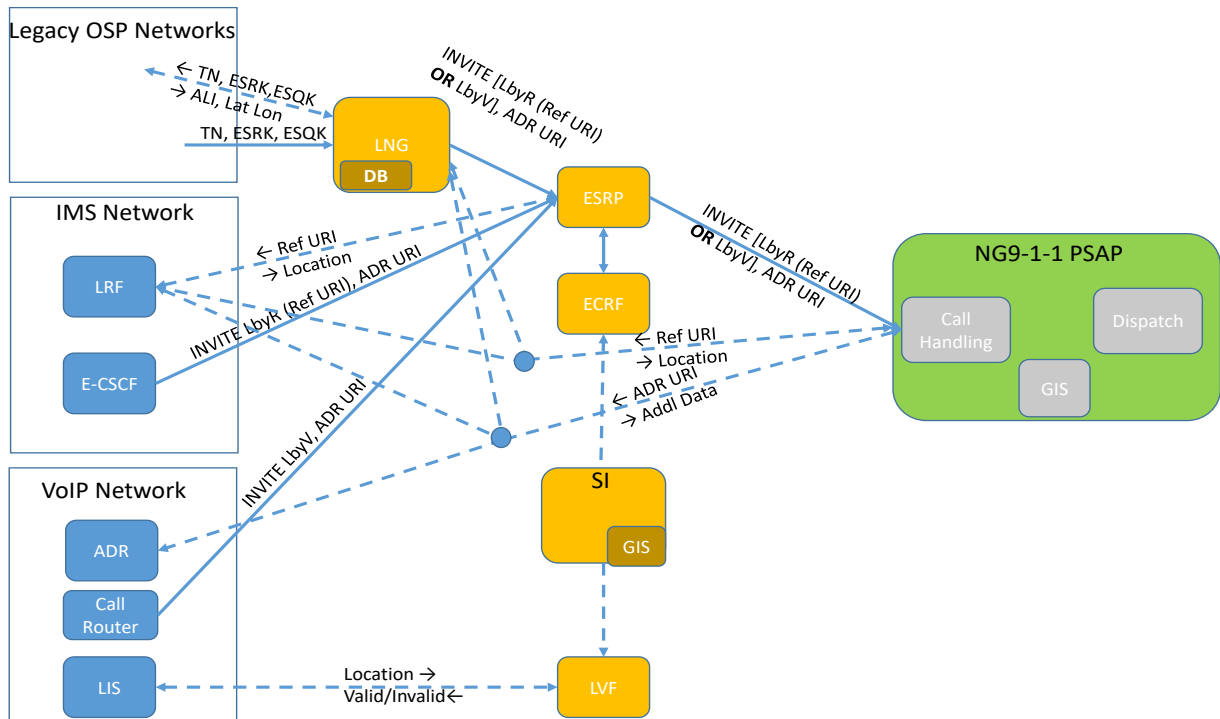
– **i2 VoIP Networks**

- Call Server or third-party (ESGW) sends ESQK to SR
- SR interrogates SRDB with ESQK and the SRDB returns an ESN
- The SR uses the ESN to identify a PSAP trunk and forwards the call.
- If the PSAP is a CAMA PSAP 8 digits (I + 7-digit ANI) are sent to the PSAP
- If the PSAP is a MF CAMA PSAP 10 or 20 are sent to the PSAP
- PSAP queries ALI server with 10-digit TN
- ALI server uses steering information to query the VPC
- The VPC returns location information (MSAG address and CoS)
- ALI server returns the location information to PSAP

– **MLTS/PBX**

- MLTS/PBX sends DID/MTN or other DIDs to SR, LEC, VoIP provider, and/or third-party
- SR interrogates SRDB with DID/MTN or other DIDs and the SRDB returns an ESN, or uses i2 VoIP approach
- The SR uses the ESN to identify a PSAP trunk and forwards the call.
- If the PSAP is a CAMA PSAP 8 digits (I + 7-digit ANI) are sent to the PSAP
- If the PSAP is a MF CAMA PSAP 10 or 20 are sent to the PSAP
- PSAP queries ALI server with 10 digit DID/MTN
- ALI server returns ALI information to include CoS and location

2.1.2 NG9-1-1 Data Provisioning and Validation



Data Provisioning and Validation

– Legacy CSP Networks

- Legacy networks enter via the Legacy Network Gateway (LNG)
- LNG must incorporate many characteristics of DBMS/ALI (accomplished by functions in the LNG such as the Location Interwork Function (LIF) and the NG9-1-1-specific Interwork Function (NIF))
- LNG data provisioning is by telephone number to location, similar to ALI
- Vendors often provision LNG using existing SOA mechanisms, so carriers don't see any differences
- Existing Internet Protocol Multimedia Subsystem (IMS) networks use LNG, with steered "ALI" query by LNG to existing MPC/GMLC with similar provisioning as used today

– IMS Networks

- IMS (Internet Protocol Multimedia Subsystem) are near term wireless
- May incorporate z-coordinate and z-uncertainty or wireless Dispatchable Location solution

- Wireless IMS networks will provide i3 origination based on an “Associated Location” agreed between PSAP and network operator, per cell/sector/device-location, routed by an RDF in the network operator’s system. 9-1-1 SSP will provide routing data to provision the RDF.
- LRF (Location Retrieval Function) may provide location and the PSAP may query for Additional Data associated with IMS provider

– Generic SIP Networks

- VSP or their agent will provide a LIS or will use a 9-1-1 Authority provided LIS
- LVF and ECRF is provided by NG9-1-1 SSP
- VSP or their agent will interrogate LVF to validate location and ECRF to route
- VSP or their agent may provide LIS
- MLTS/PBX should follow a similar model

Data Conveyance

– Legacy CSP Networks via LNG

- CSP network sends TN, ESRK, or ESQK (as applicable) to LNG
- For TN, LNG queries internal location database
- For ESRK/ESQK/ESRD, LNG steers an “ALI” query to VPC/MLC/GMLC to obtain location, translates to PIDF-LO
- Queries external ECRF with location to obtain route
- Creates an INVITE with either Location By-Reference (LbyR) or Location By-Value (LbyV) or both and route
- May add additional data by value or by reference
- If wireless call, may in parallel initiate a query to MPC/GMLC
- Forwards INVITE to Emergency Services Routing Proxy (ESRP) with LbyR or LbyV and Additional Data by value or reference
- If LbyR ESRP queries for location
- ESRP uses location to query ESInet internal ECRF
- ESRP evaluates route policy associated with ECRF response to determine route
- Routes call to PSAP
- PSAP receives call – if LbyR or Additional Data by reference, queries LNG for them
- LNG may requery MPC/GMLC for location for LbyR query
- LNG returns location and Additional Data to PSAP for LbyR and Additional Data by reference queries

– IMS Networks

- Emergency Call Session Control Function (E-CSCF) queries LRF for location, RDF for route, sends INVITE to ESRP with LbyR, LbyV, or both and Additional Data by value or reference
- ESRP queries LRF for location and may query for Additional Data

- ESRP uses location to query ECRF
- ESRP evaluates route policy associated with ECRF response to determine route
- ESRP routes call passing LbyR and Additional Data by value or reference
- PSAP queries LRF for location, by reference, and PSAP may also potentially query for Additional Data

– Generic SIP Networks

- Call Server queries external ECRF with location and obtains route. Call Server sends INVITE to ESRP with LbyR or LbyV and Additional Data by reference
- If location is passed by reference, ESRP queries LIS to obtain location. ESRP uses location (either obtained from the LIS or passed by value) to query ECRF
- ESRP evaluates route policy associated with ECRF response to determine route
- ESRP routes call to PSAP passing location and Additional Data (by reference or by value)
- PSAP may query LIS for location if passed by reference
- PSAP may query Additional Data Repository (ADR) for Additional Data if passed by reference
- Similar scenario for MLTS/PBX

2.2 General Provisioning Comparisons between E9-1-1 Data and NG9-1-1 Data Common Elements.

The following common elements and associated bullet points seek to illustrate and explain general provisioning comparisons between E9-1-1 data and NG9-1-1 data common elements.

2.2.1 Callback Number

Legacy Networks to Legacy PSAPs

- Wireline – delivered with the call
- Wireless – delivered with ALI query
- i2 VoIP – delivered with ALI query
- MLTS/PBX – delivered either with the call or with ALI query

NG9-1-1 Networks via LNG to NG9-1-1 PSAPs

- Fixed (Wireline) – delivered with the call
- Wireless – delivered with call
- i2 VoIP – delivered with call
- MLTS/PBX – delivered with the call

Native SIP to NG9-1-1 PSAPs

- IMS – delivered with the call
- Generic IP – delivered with the call

2.2.2 Caller Location

Legacy Networks to Legacy PSAPs

- Wireline – delivered with ALI query
- Wireless – delivered with ALI query
- i2 VoIP – delivered with ALI query
- MLTS/PBX – delivered with ALI query

NG9-1-1 Networks via LNG to NG9-1-1 PSAPs

- Fixed (Wireline) – delivered with the call, either by-value or by-reference
- Wireless – delivered with the call (via LNG query), either by-value or by-reference or both
- i2 VoIP – delivered with call, either by-value or by-reference
- MLTS/PBX – delivered with the call, either by-value or by-reference

Native SIP to NG9-1-1 PSAPs

- IMS – delivered by dereferencing request to LRF
- Generic IP – delivered with the call or by dereferencing request to LIS

2.2.3 Additional Data, ALI Equivalent Data

Legacy Networks to Legacy PSAPs

- Wireline – delivered with ALI query
- Wireless – delivered with ALI query
- i2 VoIP – delivered with ALI query
- MLTS/PBX – delivered with ALI query
-

NG9-1-1 Networks via LNG to NG9-1-1 PSAPs

- Fixed (Wireline) – may be delivered with call or with a dereferencing Namespace Uniform Resource Identifier (URI)
- Wireless – may be delivered with the call or with a dereferencing URI
- i2 VoIP – delivered with the call or with a dereferencing URI

Native SIP to NG9-1-1 PSAPs

- IMS – delivered by value with the call from the IMS network or dereferenced from ADR
- Generic IP – delivered by value with the call from the VoIP network or dereferenced from ADR

2.2.4 Additional Data, Beyond ALI Equivalent Data (including IS-ADR)²

Legacy Networks to Legacy PSAPs

- Wireline – delivered separately and/or somewhat similarly to ALI query (supplemental)
- Wireless – delivered separately and/or somewhat similarly to ALI query (supplemental)
- i2 VoIP – delivered separately and/or somewhat similarly to ALI query (supplemental)
- MLTS/PBX – delivered separately and/or somewhat similarly to ALI query (supplemental)

NG9-1-1 Networks via LNG to NG9-1-1 PSAPs

- Fixed (Wireline) – may be delivered with call or with a dereferencing URI
- Wireless – may be delivered with call or with a dereferencing URI
- i2 VoIP – may be delivered with call or with a dereferencing URI
- MLTS/PBX -- may be delivered with call (if the LNG queries VPC, as applicable) or with a dereferencing URI

Native SIP to NG9-1-1 PSAPs

- IMS – delivered by value with the call from the IMS network or dereferenced from ADR
- Generic IP – delivered by value with the call from the VoIP network or dereferenced from ADR

2.2.5 Class of Service and its NG9-1-1 Equivalent and Expansion

E9-1-1

Currently receive legacy E9-1-1 CoS from ALI database

NG9-1-1

“Method of Location Determination” from PIDF-LO, “service type,” “service environment,” “service mobility” from Additional Data enhance the potential information available beyond

² IS-ADR (Identity Searchable Additional Data Repository) An Additional Data Repository that provides a service that can search for Additional Data based on a sip/sips or tel URI: (e.g., Additional Data about the caller). With the implementation of NG9-1-1 there will be many forms of additional data available to emergency responders: data associated with a call, a location, and a caller. Additional Data is communicated by reference or by value in the SIP INVITE and MESSAGE, in the PIDF-LO, or within responses to queries against IS-ADR functional elements. Additional Data has many conceivable uses, including informing telecommunicators and first responders, and providing a means to drive call routing and handling rules which look beyond caller location alone (and this is what is meant by “beyond” ALI Equivalent data).

the current information provided today by a single legacy CoS. (For a legacy PSAP served via NG9-1-1 Networks, the LNG/LPG convert to legacy as necessary.)

2.2.6 Mapping Display System

E9-1-1

Currently legacy PSAP mapping often uses legacy E9-1-1 CoS to map either x, y coordinates (e.g., WPH2 CoS) or civic address (e.g. VoIP CoS) as the primary ALI.

NG9-1-1

PIDF-LO can carry either x/y/z and civic location information from multiple sources, so mapping is expected to depend on which form it is in. CHE is expected at some point to receive and display greatly enhanced information based on "method token," service and provider information from Additional Data and Additional Data may affect the mapping display.

2.2.7 Computer Aided Dispatch

E9-1-1

1. Manual Entry of certain information
2. ALI spill via serial port

NG9-1-1

Emergency Incident Data Object (EIDO)

2.2.8 Call Transfers

E9-1-1

1. Police/Fire/EMS star code transfers with ALI if secondary PSAP served by same SR or there is tandem-to-tandem connectivity between SRs.
2. May be forced to use 10-digit transfers with no relevant data automatically provided for other transfers

NG9-1-1

Geographic Information System (GIS) based transfers to any responder type to any interconnected primary or secondary PSAP with full automatic location, Additional Data and EIDO data transfer.³

"EIDO" is an abbreviation for **E**mergency **I**ncident **D**ata **O**bject. A *JSON-based object that is used to share emergency incident information between and among authorized entities and systems*. The EIDO and its conveyance mechanisms replace the serial port data connection between CPE and CAD, as well as providing a standardized CAD to CAD interface. There are several documents where the specifications and requirements relating to EIDOs are published or being developed. The requirements for PSAP functional elements for sending and receiving EIDOs are included in the [NENA/APCO NG9-1-1 PSAP Requirements Document](#) where they were described as

2.2.9 Interoperability to FirstNet

E9-1-1

CHE may have interfaces to FirstNet

NG9-1-1

EIDO and call transfers in NG9-1-1 are being worked on beyond E9-1-1, but are not yet currently specified in standards.

2.2.10 Interoperability to other First Responder Networks

E9-1-1

CHE may have interfaces to FirstNet

NG9-1-1

EIDO and call transfers in NG9-1-1 are being worked on beyond E9-1-1, but are not yet currently specified in standards.

2.3 Currently Identified Transition Issues for Additional Consideration

2.3.1 Legacy ALI screen to NG9-1-1 ALI screen with respect to E9-1-1 Class of Service

In contrast to legacy E9-1-1 having only a limited single CoS for specific types of service classifications (e.g., Residential, Business, VoIP, wireless Phase 2, etc.), in NG9-1-1 in addition to method token in a PIDF-LO, which carries the way location was determined (e.g. GPS, TDOA, manually entered, ...) there are at least three elements that will convey more information in Additional Data with additional granularity in order to help the telecommunicator – e.g., service type, service mobility, and service environment. How to best enable understanding are items of concern to those seeking to further transition, acceptance, and optimal use of these greatly enhanced capabilities.

Transition from E9-1-1 to NG9-1-1 should include when, how, and to what extent to replace and present a single legacy CoS with some or all of the following:

- Service Type:
- Method of Location Determination:
- Service Environment: (where applicable)
- Service Mobility:

"EIDDs". EIDDs used for transferred calls and other aspects of EIDDs are published in [NENA-STA-010 Detailed Functional and Interface Standards for the NENA i3 Solution](#).

2.3.2 Legacy ALI screen to NG9-1-1 ALI screen with respect to Additional Data beyond ALI Equivalent Data

Similar to the presentation changes from legacy E9-1-1 CoS to NG9-1-1 presentation, how to integrate and present on the NG9-1-1 screens Additional Data beyond current ALI Equivalent Data should also be a transition issue, such as adding:

Additional Data:

While some in the 9-1-1 community may view these as user interface issues to be decided between different 9-1-1 authorities and their vendors, others would appreciate or at least question that there is a need to educate, inform, and provide suggested guidance on these issues. Impacts, Considerations, Abbreviations, Terms, and Definitions

3 NENA Registry System (NRS) Considerations

Not Applicable

4 Documentation Required for the Development of a NENA XML Schema

Not Applicable

5 Impacts, Considerations, Abbreviations, Terms, and Definitions

5.1 Operations Impacts Summary

For the transition of data from legacy ALI structures to NG9-1-1 to be successful and effective, the addition of new data to the PSAP display, the PIDF-LO data element to PSAP display relationships, the conversion of legacy E9-1-1 CoS indicators to the new NG9-1-1 definitions, and downstream interoperability to mapping, CAD, FirstNet and other First Responder Networks are all potential considerations.

5.2 Technical Impacts Summary

For the transition of data from legacy ALI structures to NG9-1-1 to be successful and effective, the addition of new data to the PSAP display, the PIDF-LO data element to PSAP display relationships, the conversion of legacy E9-1-1 CoS indicators to the new NG9-1-1 definitions, and downstream interoperability to mapping, CAD, FirstNet and other First Responder Networks are all potential considerations.

5.3 Security Impacts Summary

This document flows from other i3 transition changes and does not create any independent changes itself.

5.4 Recommendation for Additional Development Work

While some in the 9-1-1 community may view these as user interface issues to be decided between different 9-1-1 authorities and their vendors, others would appreciate or at least question that there is a need to educate, inform, and provide suggested guidance on these issues. Accordingly, this document seeks to inform on E9-1-1 and NG9-1-1 data flow issues and identify at least a few transition issues for additional consideration. Cost Factors

5.5 Anticipated Timeline

Deployment or implementation will take place as required.

5.6 Cost Factors

Not Applicable

5.7 Cost Recovery Considerations

Not Applicable

5.8 Additional Impacts (non-cost related)

For the transition of data from legacy ALI structures to NG9-1-1 to be successful and effective, the addition of new data to the PSAP display, the PIDF-LO data element to PSAP display relationships, the conversion of legacy E9-1-1 CoS indicators to the new NG9-1-1 definitions, and downstream interoperability to mapping, CAD, FirstNet and other First Responder Networks are all potential considerations.

5.9 Abbreviations, Terms, and Definitions

See NENA Master Glossary of 9-1-1 Terminology, NENA-ADM-000 [1], for a complete listing of terms used in NENA documents. All abbreviations used in this document are listed below, along with any new or updated terms and definitions.

Term or Abbreviation (Expansion)	Definition / Description
<i>Additional Data</i>	Data that further describe the nature of how the call was placed, the person(s) associated with the device placing the call, or the location the call was placed from. There are three types of Additional Data: • Additional Data for the Call • Additional Data for the Caller • Additional Data for the Location <u>Relevant NENA Documents:</u> • NENA-STA-012, NENA Standard for NG9-1-1 Additional Data • NENA-STA-010, Detailed Functional and Interface Standards for the NENA i3 Solution
<i>ADR (Additional Data Repository)</i>	A data storage facility for Additional Data. It replaces and deprecates the concept of CIDB (Call Information Database). <u>Relevant NENA Documents:</u> • NENA-STA-012, NENA Standard for NG9-1-1 Additional Data • NENA-STA-010, Detailed Functional and Interface Standards for the NENA i3 Solution
<i>ALI (Automatic Location Identification)</i>	The automatic display at the PSAP of the caller's telephone number, the address/location of the telephone and supplementary emergency services information of the location from which a call originates

Term or Abbreviation (Expansion)	Definition / Description
<i>Associated Location</i>	A location (civic, geodetic, or polygon) within the designated PSAP jurisdiction that may be used in wireless call scenarios to route the call toward the designated PSAP. Relevant NENA Documents: NENA-STA-006, NENA Standard for NG9-1-1 GIS Data Model External References: ATIS Standard for Implementation of 3GPP Common IMS Emergency Procedures for IMS Origination and ESInet/Legacy Selective Router Termination, ATIS-0700015
<i>CAD (Computer Aided Dispatch)</i>	A computer-based system, which aids PSAP Telecommunicators by automating selected dispatching and record keeping activities. Relevant NENA Documents: NENA-STA-027, NENA E9-1-1 PSAP Equipment Standards External References: Unified CAD Functional Requirements
<i>Call Server</i>	Used in the Interim VoIP Architecture For Enhanced 9-1-1 Services standard to refer to the entity in a private or public IP domain that provides service to endpoints in an emergency caller's home domain and that interworks with the SIP servers and other elements in the IP domain used to support emergency services call routing in the i3 solution. The Call Server may use SIP or some other VoIP signaling protocol within its own serving domain.
<i>CAMA (Centralized Automated Message Accounting)</i>	A type of in-band analog transmission protocol that transmits telephone number via multi-frequency encoding. Originally designed for billing purposes.

Term or Abbreviation (Expansion)	Definition / Description
<i>CHE (Call Handling Equipment)</i>	A PSAP's or a group of PSAP's primary system for interfacing with the 9-1-1 or NG9-1-1 system. The CHE usually provides location information to a mapping and/or CAD system through an interface and other functions. In the context of NG9-1-1 the CHE is responsible for receipt of the PIDF-LO and the display of Service Type, Service Method, Service Environment, and Service Mobility.
<i>CoS (Class of Service)</i>	A designation in E9-1-1 that defines the service category of the telephony service. A few examples are residential, business, Centrex, coin, PBX, VoIP and wireless Phase II (WPH2).
<i>CSP (Communications Service Provider)</i>	Used in the Interim VoIP Architecture For Enhanced 9-1-1 Services standard to refer to the entity in a private or public IP domain that provides service to endpoints in an emergency caller's home domain and that interworks with the SIP servers and other elements in the IP domain used to support emergency services call routing in the i3 solution. The Call Server may use SIP or some other VoIP signaling protocol within its own serving domain.
<i>DBMS (Data Base Management System)</i>	A system of manual procedures and computer programs used to create, store and update the data required to provide Selective Routing and/or Automatic Location Identification for E9-1-1 systems.
<i>DID (Direct Inward Dialing)</i>	The ability for a caller outside a company to call an internal extension without having to pass through a switchboard operator or attendant at the MLTS.
<i>Dispatchable Location</i>	FCC Fourth Report & Order: A location delivered to the PSAP with a 9-1-1 call that consists of the street address of the calling party, plus additional information such as suite, apartment or similar information necessary to adequately identify the location of the calling party.
<i>E-CSCF (Emergency Call Session Control Function)</i>	The entity in the IMS core network that handles certain aspects of emergency sessions, e.g., routing of emergency requests to the correct emergency center or PSAP.

Term or Abbreviation (Expansion)	Definition / Description
<i>EIDO (Emergency Incident Data Object)</i>	A JSON-based (JavaScript Object Notation) object that is used to share emergency incident information between and among authorized entities and systems.
<i>ESN (Emergency Service Number)</i>	A 3-5 digit number that represents one or more ESZs (Emergency Service Zone). An ESN is defined as one of two types: Administrative ESN and Routing ESN (Refer to definitions elsewhere in the NENA Master Glossary.) Relevant NENA Documents: NENA 57-503, NENA Procedures for Notification of ERDB and VPC Operators of ESN Changes by 9-1-1 Administrator Operations Information Document
<i>ESQK (Emergency Services Query Key)</i>	Identifies a call instance at a VPC, and is associated with a particular SR/ESN combination. The ESQK is delivered to the E9-1-1 SR and as the calling number/ANI for the call to the PSAP. The ESQK is used by the SR as the key to the Selective Routing data associated with the call. The ESQK is delivered by the SR to the PSAP as the calling number/ANI for the call, and is subsequently used by the PSAP to request ALI information for the call. The ALI database includes the ESQK in location requests sent to the VPC. The ESQK is used by the VPC as a key to look up the location object and other call information associated with an emergency call instance. The ESQK is a non-dialable North American Numbering Plan (NANP) number in the format of NPA-NXX-XXXX. They are currently being allocated from NPA-211-XXXX and NPA-511-XXXX number sets. Relevant NENA Documents: NENA 03-507, ESQK Guidelines for VoIP to E9-1-1 Connectivity
<i>ESRK (Emergency Services Routing Key)</i>	A 10-digit North American Numbering Plan number that uniquely identifies a wireless emergency call, is used to route the call through the network, and used to retrieve the associated ALI data.

Term or Abbreviation (Expansion)	Definition / Description
<i>ESRP (Emergency Service Routing Proxy)</i>	An i3 functional element which is a SIP proxy server that selects the next hop routing within the ESInet based on location and policy. There is an ESRP on the edge of the ESInet. There is usually an ESRP at the entrance to an NG9-1-1 PSAP. There may be one or more intermediate ESRPs between them. • Originating ESRP: The first routing element within the Next Generation Core Services (NGCS). It receives calls from the BCF at the edge of the ESInet. • Terminating ESRP: The last ESRP for a call in NGCS.
<i>FirstNet (First Responder Network) Authority</i>	A nationwide wireless broadband network for first responders being built and deployed through a first of its kind public-private partnership between the federal government and AT&T. FirstNet offers public safety a communications network built and customized to meet their needs. The First Responder Network Authority is the federal entity charged with overseeing the creation and delivery of the FirstNet network. Housed within the Department of Commerce, National Telecommunications and Information Administration, the agency's role is to ensure AT&T delivers on the terms of its contract and creates a network that meets the needs of public safety now and into the future. <u>External References:</u> FirstNet website
<i>GIS (Geographic Information System)</i>	A system for capturing, storing, displaying, analyzing and managing data and associated attributes which are spatially referenced.
<i>GMLC/MLC (Gateway Mobile Location Center)</i>	The point of interface between the GSM wireless network and the Emergency Services Network. The GMLC retrieves, forwards, stores and controls position data associated with wireless callers. This includes the processing of location requests and updates (rebids).

Term or Abbreviation (Expansion)	Definition / Description
<i>ILEC (Incumbent Local Exchange Carrier)</i>	A telephone company that had the initial telephone company franchise in an area.
<i>IMS (Internet Protocol Multimedia Subsystem)</i>	A reference architecture defined by 3GPP that comprises all 3GPP/3GPP2 core network elements providing IP multimedia services that support audio, video, text, pictures alone or in combination delivered over a packet switched domain.
<i>LbyR (Location By-Reference)</i>	An identifier that when referenced in the correct manner by an authenticated and authorized entity will yield the location of an IP end-point. An example of a location reference is a URI. Relevant NENA Documents: NENA-STA-010, Detailed Functional and Interface Standards for the NENA i3 Solution
<i>LbyV (Location By-Value)</i>	In the context of location information to support IP based emergency services: A PIDF-LO containing the location of an IP end-point that can be attributed to a specific point in time. Relevant NENA Documents: NENA-STA-010, Detailed Functional and Interface Standards for the NENA i3 Solution
<i>LEC (Local Exchange Carrier)</i>	A Telecommunications Carrier (TC) under the state/local Public Utilities Act that provides local exchange telecommunications services.
<i>Legacy PSAP</i>	A PSAP that cannot process calls received via i3-defined call interfaces (IP-based calls) and still requires the use of CAMA or ISDN trunk technology for delivery of 9-1-1 emergency calls.
<i>LNG (Legacy Network Gateway)</i>	An NG9-1-1 Functional Element that provides an interface between a non-IP originating network and a Next Generation Core Services (NGCS) enabled network. Relevant NENA Documents: NENA-STA-010, Detailed Functional and Interface Standards for the NENA i3 Solution

Term or Abbreviation (Expansion)	Definition / Description
<i>Method of Location Determination</i>	A representation of the "method token" or some 9-1-1 specific grouping or simplification of the various "method tokens"
<i>LRF (Location Retrieval Function)</i>	The IMS associated functional entity that handles the retrieval of location information for the emergency caller including, where required, interim location information, initial location information and updated location information. The LRF may interact with a separate RDF or contain an integrated RDF in order to obtain routing information for an emergency call.
<i>method token</i>	One of the text strings designating the manner in which location information in a PIDF-LO object has been derived or discovered. Any party may register new method tokens with the IANA, as needed, on a first-come-first-serve basis.
<i>MLTS (Multi-Line Telephone System)</i>	Communications equipment comprised of common control unit(s), telephone sets, control hardware and software and adjunct systems used typically in enterprise settings such as hotels, government agencies, commercial offices, and campuses. Such equipment includes network and premises-based systems such as Centrex, VoIP, as well as PBX, Hybrid, and Key Telephone Systems (as classified by the FCC under Part 68 Requirements). <u>Relevant NENA Documents:</u> • NENA 03-502, Trunking for Private Switch 9-1-1 Service Technical Information Document (TID) • NENA 06-003, NENA Private Switch (PS) E-9-1-1 Database Standard • NENA 06-502, Industry Common Mechanisms for MLTS E9-1-1 Caller Location Discovery and Reporting Technical Information Documents (TID) <u>External References:</u> FCC website: Multi-line Telephone Systems - Kari's Law and Ray Baum's Act

Term or Abbreviation (Expansion)	Definition / Description
<i>MPC (Mobile Positioning Center)</i>	A Functional Entity that provides an interface between the wireless originating network and the Emergency Services Network. The MPC retrieves, forwards, stores and controls position data within the location services network. It interfaces with the location server (e.g., Position Determining Entity (PDE)) for initial and updated position determination. The MPC restricts access to provide position information only while an emergency call is active. <u>Relevant NENA Documents:</u> • NENA 05-001, NENA Standard for the Implementation of the Wireless Emergency Service Protocol E2 Interface • NENA-STA-010, Detailed Functional and Interface Standards for the NENA i3 Solution <u>External References:</u> Recommended Best Practices for Supplemental 9-1-1 Location Data
<i>MSAG (Master Street Address Guide)</i>	A database of street names and house number ranges within their associated communities defining Emergency Service Zones (ESZs) and their associated Emergency Service Numbers (ESNs) to enable proper routing of 9-1-1 calls.
<i>MTN (Main Telephone Number)</i>	Ten-digit telephone number of the main billing number associated with the Calling Party Number.
<i>PBX (Private Branch Exchange)</i>	A private telephone switch that is connected to the Public Switched Telephone Network.
<i>PIDF-LO (Presence Information Data Format – Location Object)</i>	Provides a flexible and versatile means to represent location information in a SIP header using an XML schema.
<i>PSALI (Private Switch ALI)</i>	A service option which provides Enhanced 9-1-1 features for telephone stations behind private switches. E.g., PBXs.

<i>PSAP (Public Safety Answering Point)</i>	A physical location where 911 emergency telephone calls are delivered to and answered for a defined geographic service area. <u>Related Terms:</u> <i>Primary PSAP</i> A PSAP to which 9-1-1 calls are routed directly from the 9-1-1 Control Office. <i>Secondary PSAP</i> A PSAP to which 9-1-1 calls are transferred from a Primary PSAP. <i>Alternate PSAP</i> A PSAP designated to receive calls when the primary PSAP is unable to do so. <i>Consolidated PSAP</i> A facility where multiple Public Safety Agencies choose to operate as a single 9-1-1 entity. <i>Legacy PSAP</i> A PSAP that cannot process calls received via i3-defined call interfaces (IP-based calls) and still requires the use of CAMA or ISDN trunk technology for delivery of 9-1-1 emergency calls. <i>NG9-1-1 PSAP</i> This term is used to denote a PSAP capable of processing calls and accessing data services as defined in NENA's i3 specification, NENA NENA-STA-010, and referred to therein as an "i3 PSAP". <i>Virtual PSAP</i> An operational model directly enabled through NG9-1-1 features and/or network hosted PSAP equipment in which telecommunicators are geographically dispersed, rather than working from the same physical location. Remote access to the PSAP applications by the dispersed telecommunicators requires the appropriate network connections, security, and work station equipment at the remote location. The virtual work place may be a logical combination of physical PSAPs, or an alternate work environment such as a satellite facility, or any combination of the
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Term or Abbreviation (Expansion)	Definition / Description
	above. Workers are connected and interoperate via IP connectivity. <u>Relevant NENA Documents:</u> • NENA-STA-010, Detailed Functional and Interface Standards for the NENA i3 Solution • NENA-INF-025, NENA Virtual PSAP Management Information Document
<i>Service Environment</i>	This PIDF-LO element indicates whether a call is from a business or residence. (Required unless the 'Service Type' value is "wireless".)
<i>Service Mobility</i>	This PIDF-LO element provides the service provider's view of the mobility of the caller's device. As the service provider might not know the characteristics of the actual device or access network used, the value should be treated as advisory and not be relied upon.
<i>Service Type</i>	This PIDF-LO element provides a broad definition to describe different originating network types. Examples are wireless, wire line, cable, IP, etc. Calls can be classified by their service type. The implied mobility of this service cannot be relied upon.
<i>Shell Record</i>	A partial record in the ALI database associated with a wireless or VoIP call. The key to a Shell Record is an ESRK (wireless) or ESQK (VoIP). The Shell Record is combined with the response from a MPC/GMLC or VPC to provide a complete record to the PSAP.

Term or Abbreviation (Expansion)	Definition / Description
<i>SIP (Session Initiation Protocol)</i>	An IETF-defined protocol (RFC 3261) that defines an application-layer control (signaling) protocol for creating, modifying, and terminating sessions with one or more participants. These sessions include Internet telephone calls, multimedia distribution, and multimedia conferences. Used as the call signaling protocol in VoIP, NENA i2 and NENA i3. <u>Relevant NENA Documents:</u> NENA-STA-010, Detailed Functional and Interface Standards for the NENA i3 Solution <u>External References:</u> RFC 3261, SIP: Session Initiation Protocol
<i>SOI (Service Order Input)</i>	A file of completed service order updates that is sent to the DBMSP by all SP's.
<i>SR (Selective Router)</i>	The Central Office that provides the tandem switching of 9-1-1 calls. It controls delivery of the voice call with ANI to the PSAP and provides Selective Routing, Speed Calling, Selective Transfer, Fixed Transfer, and certain maintenance functions for each PSAP.
<i>SRDB (Selective Routing Database)</i>	The routing table that contains telephone number to ESN relationships which determines the routing of 9-1-1 calls

<i>Telecommunicator</i>	An emergency response coordination professional trained to receive, assess, and prioritize emergency requests for assistance, including, but not limited to: • Determining the location of the emergency being reported • Determining the appropriate law enforcement, fire, emergency medical, or combination of those emergency services to respond to the emergency • Coordinating the implementation of that emergency response to the location of the emergency • Processing requests for assistance from emergency responders. Telecommunicators are classified as a Protected Service Occupation in the federal Standard Occupational Classification. <u>Related Terms:</u> <i>Call Taker</i> A telecommunicator who answers emergency voice, text, and multi-media calls from the public and performs other critical duties that include, but are not limited to: • Determining accurate locations for emergency responders • Assigning incident type codes for dispatch (e.g., accident, assault, fire, domestic violence, burglary) • Directing callers with critical life-saving pre-arrival instructions in support of field responders (CPR, Childbirth, etc.) • Gathering all necessary scene safety information for use by dispatchers to ensure safety for field responders <i>Dispatcher</i> A telecommunicator who prioritizes and directs the specific response of multiple public safety resources (e.g. fire, police, EMS) to emergency incidents by
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Term or Abbreviation (Expansion)	Definition / Description
	prioritizing vital information and maintaining situational awareness of all circumstances for the incident that impacts the safety of field responders. A dispatcher exercises independent judgment to determine the type and level of response necessary, coordinates essential emergency instructions to all parties in the incidents using radios, computers, and other public safety networks, and ensures alert coordination with other agencies (hospitals, air rescue, hazmat teams, etc.) is maintained to provide emergency response and transport that maximizes life safety and public law and order.
<i>TN (Telephone Number)</i>	Telephone Number
<i>URI (Uniform Resource Identifier)</i>	An identifier consisting of a sequence of characters matching the syntax rule that is named <URI> in RFC 3986. It enables uniform identification of internet resources via a set of naming schemes. A URI can be further classified as a locator (URL), a name (URN), or both. A Uniform Resource Locator (URL) is a type of URI that provides a means of locating the resource by describing its primary access mechanism (e.g., its network "location"). An example of a URI that is neither a URL nor a URN is sip:psap@example.com. <u>Relevant NENA Documents:</u> • NENA-STA-010, Detailed Functional and Interface Standards for the NENA i3 Solution • NENA-STA-006, NENA Standard for NG9-1-1 GIS Data Model <u>External References:</u> RFC 3986, Uniform Resource Identifier (URI): Generic Syntax

Term or Abbreviation (Expansion)	Definition / Description
<i>VDB (Validation Database)</i>	Contains information that describes the current, valid civic address space defined by the Emergency Services Network Provider's MSAG. Validation against this database ensures that the address is a real address (i.e., the address exists) but does not ensure that it is the location of the caller. <u>Relevant NENA Documents:</u> • NENA website: Baseline Next Generation 9-1-1 Description • NENA 57-503, NENA Procedures for Notification of ERDB and VPC Operators of ESN Changes by 9-1-1 Administrator Operations Information Document
<i>VoIP (Voice over Internet Protocol)</i>	The element that provides routing information to support the routing of VoIP emergency calls, and cooperates in delivering location information to the PSAP over the existing ALI DB infrastructure. <u>Relevant NENA Documents:</u> • NENA 57-503, NENA Procedures for Notification of ERDB and VPC Operators of ESN Changes by 9-1-1 Administrator Operations Information Document • NENA 03-507, ESQK Guidelines for VoIP to E9-1-1 Connectivity
<i>VPC (VoIP Positioning Center)</i>	The element that provides routing information to support the routing of VoIP emergency calls, and cooperates in delivering location information to the PSAP over the existing ALI DB infrastructure. <u>Relevant NENA Documents:</u> • NENA 57-503, NENA Procedures for Notification of ERDB and VPC Operators of ESN Changes by 9-1-1 Administrator Operations Information Document • NENA 03-507, ESQK Guidelines for VoIP to E9-1-1 Connectivity

Term or Abbreviation (Expansion)	Definition / Description
<i>9-1-1 Authority</i>	A State, County, Regional or other governmental entity responsible for 9-1-1 service operations. For example, this could be a county/parish or city government, a special 9-1-1 or Emergency Communications District, a Council of Governments or other similar body.
<i>9-1-1 SSP</i>	An entity that provides systems and support necessary to enable 9-1-1 calling for one or more Public Safety Answering Points (PSAPs) in a specific geographic area. A 9-1-1 SSP may provide the systems and support for either E9-1-1 or NG9-1-1. In the context of E9-1-1, it is typically, but not always, an Incumbent Local Exchange Carrier (ILEC). This includes: • A method of interconnection for all telecommunications providers including but not limited to the wireline, wireless, and VoIP carriers • A method and mechanism for routing a 9-1-1 call to the Public Safety Answering Point (PSAP) with no degradation in service regardless of the technology used to originate the call • A method to provide accurate location information for an emergency caller to a PSAP and if required, to other emergency response agencies • Installation of PSAP call handling equipment and training of PSAP personnel when contracted to do so • Coordinating with PSAP authorities and other telecommunications entities for troubleshooting and on issues involving contingency planning, disaster mitigation and recovery <u>Relevant NENA Documents:</u> NENA-STA-015, NENA Standard Data Formats for 9-1-1 Data Exchange & GIS Mapping

Term or Abbreviation (Expansion)	Definition / Description
<i>NG9-1-1 PSAP</i>	This term is used to denote a PSAP capable of processing calls and accessing data services as defined in NENA's i3 specification, NENA-STA-010 , and referred to therein as an "i3 PSAP"

6 Recommended Reading and References

- [1] National Emergency Number Association. *Master Glossary of 9-1-1 Terminology*. [NENA-ADM-000](#).
- [2] National Emergency Number Association. *NENA Detailed Functional and Interface Standards for the NENA i3 Solution*. [NENA-STA-010](#).
- [3] National Emergency Number Association. *NENA Standard for NG9-1-1 Additional Data*, [NENA-STA-012](#)

7 Exhibit X

Not Applicable.

8 Appendix X

Not Applicable.

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Members	Employer
Brooks Shannon, Data Structures Committee Co-Chair	RapidDeploy
Jason Horning, Data Structures Committee Co-Chair	North Dakota Association of Counties
Richard Muscat, Working Group Co-Chair	Bexar Metro 9-1-1 Network District, TX
Marc Berryman, Working Group Co-Chair	Mission Critical Partners, Inc.

Members	Employer
Amy McDowell, ENP, Working Group Co-Chair	Greenville County Sheriff Office, SC
Bernard Brabant	Consultant
Lisa Dodson	Motorola Solutions Inc.
Rita Falk	Northwest Central Dispatch Systems, IL
Nicole Graves	911 Datamaster, Inc.
Steve Helme	Comtech Telecommunications Corporation
Roger Hixson	NENA
Glenna Johnson	Dekalb County, IL
Tim Kenyon	Komutel, Inc.
Travis LaPage, ENP	Federal Engineering, Inc.
Brad Meixell, ENP	Clark County, IN
Patrick Melancon	GeoComm, Inc.
Mark Mendenhall	iCode Mobile Solutions
Christian Militeau, ENP	Bandwidth
Katy Myers, ENP	NORCOM
Justin Prahar	ECaTS
Sabrina Reider	Carbyne, Inc.
Phillip Rohrbough	Tarrant County 9-1-1 District, TX
Imas Sakin	West Safety Services
Matthew Schreiner	Mission Critical Partners Inc.
Steven Sharpe, EdD	Genesee County Sheriff's Office, NY
Jay Slater, ENP	Bandwidth
Melissa Tutton, ENP	North Central Texas Council of Government
Michael Vislocky	Network Orange, Inc
Jason Wellonen	Carbyne, Inc.
Mark Whitby, ENP	Michael Baker International, Datamark
Dan Wright	Chilton County, AL
Jeanna Green	T-Mobile

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Delaine Arnold, ENP, Committee Resource Manager, has facilitated the production of this document through the prescribed approval process.

The NG Data Flow Working Group is part of the NENA Development Group that is led by:

- Jim Shepard, ENP, and Wendi Rooney, ENP, Development Steering Council Co-Chairs
- Brandon Abley ENP, Technical Issues Director
- April Heinze ENP, PSAP Operations Director