

# Intrado® V9-1-1® Services

## *PSAP Methods and Procedures*

*Version 2008.03.07*



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Intrado Inc.  
1601 Dry Creek Drive  
Longmont, CO 80503  
720.494.5800

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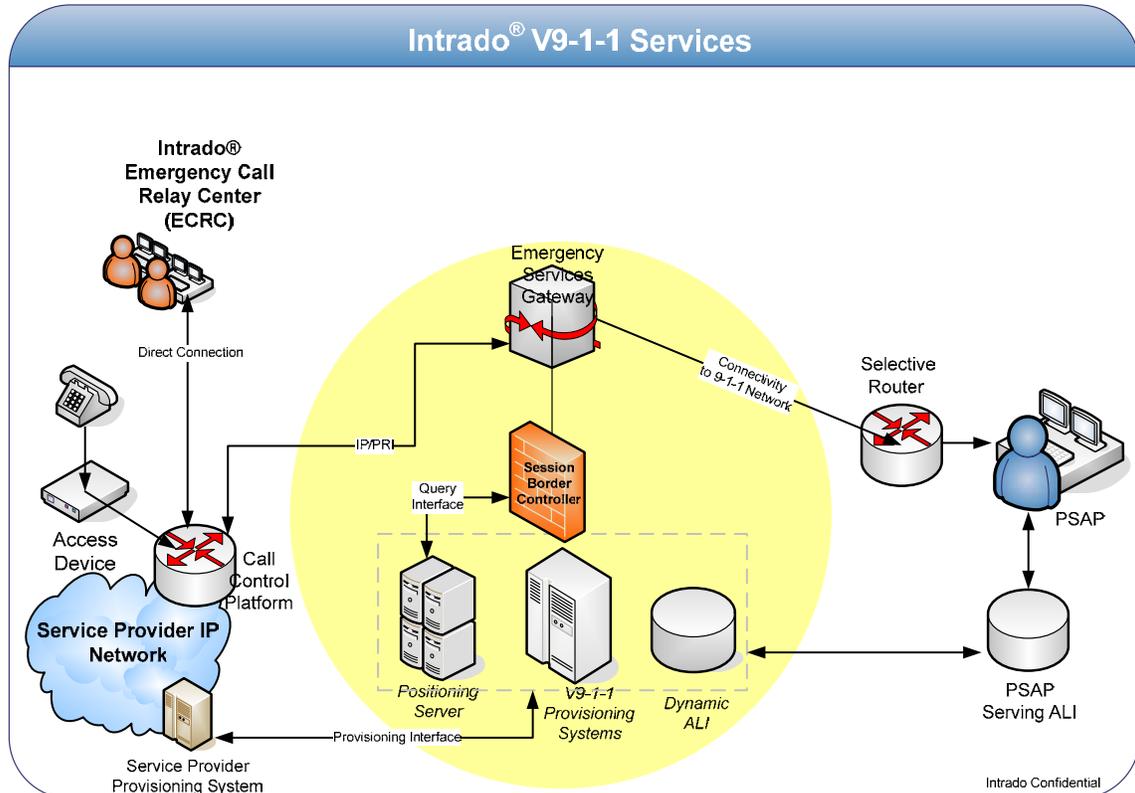
## Introduction

The purpose of this document is to describe the overall Intrado requirements to deploy the VoIP E9-1-1 (V9-1-1®) Services for the Public Service Answering Point (PSAP) community. Intrado is working with vendors, Incumbent Local Exchange Carriers (ILECs), and PSAPs to enable access to all of the network elements required to deliver a comprehensive V9-1-1 Services offering. There are three (3) critical components required to deploy V9-1-1 Services with each component typically requiring separate negotiations and contracts. These components include: selective router (SR) access, Automatic Location Identification (ALI) steering agreements, and ALI provisioning. Intrado is aggressively striving to provision all three (3) components throughout the nation to deliver Intrado V9-1-1 Services as quickly as possible.

Intrado has instituted comprehensive testing practices to ensure all the V9-1-1 elements are working properly prior to deployment. The network elements involved in this testing include:

- The VoIP Service Provider's (VSP) Softswitches
- Intrado Positioning Server
- Intrado's Dynamic Automatic Location Identification (DALI) System
- Regional/Local ALI Systems
- Selective Router Switches

### Intrado V9-1-1 Network Design for System Testing



## Dynamic ALI (DALI) Database

The Intrado DALI database is the location information gateway to the country's 9-1-1 ALI systems. Intrado currently has connectivity to regional ALI (R-ALI) databases with every major E9-1-1 Service Provider in the country, as well as many Stand-Alone ALIs (SALIs). The ALI systems will steer ALI queries to Intrado over Intrado's nationwide wireless E9-1-1 interfaces. In order for the VoIP end user information to be provisioned within this database, the VSP must provide Intrado with their subscriber's telephone number (TN) and address information.

## VoIP Record Processing

Intrado offers two (2) methods through which a VSP may submit subscriber TN and address records to Intrado as described in the following sub-sections.

### Transactional Record Processing Interface

The transactional record processing interface is a near real-time method for a VSP to send subscriber address record information to Intrado.

### Batch Record Processing Interface

Batch record processing is a method by which a VSP sends multiple subscriber address records in a file to Intrado's systems.

## Geocoding

Geocoding is the process that establishes a graphical location for each subscriber based on the address provided by the subscriber. The geodetic parameters are used to determine which PSAP will serve each subscriber.

## Master Street Address Guide (MSAG) Validation

The MSAG is an addressing database created by each individual county/PSAP across the country. Intrado's extensive knowledge and tools utilized in the MSAG validation process enables our VoIP data analysts to generally resolve any MSAG address errors very quickly.

## **Local Exchange Carrier (LEC) Provisioning Process**

In order for a VoIP call to properly route through the wireline E9-1-1 network, many regional databases must be provisioned. These include the Selective Router (SR) database, ALI database, and ALI steering tables. Intrado is responsible for provisioning the various systems using processes established between Intrado and each specific E9-1-1 Service Provider. As noted earlier, approval to access these systems is needed to enable full end-to-end V9-1-1 Services.

### **E9-1-1 Service Provider Provisioning**

To properly provision affected systems, a file is generated in the proper format containing Emergency Service Query Key (ESQK) records that will be used for routing a VoIP 9-1-1 call. The ESQK acts as an index in the ALI steering tables to enable delivery of the dynamic VoIP address information. To process the ESQK records to the ALI database, a unique MSAG entry must be created that is associated with each PSAP. Additionally, the MSAG associates the proper VoIP record with an Emergency Service Number (ESN). Once the record is fully processed, the Intrado VoIP data analyst resolves any outstanding issues or problems.

### **Selective Router**

When a VoIP call is passed to the SR, the SR queries the appropriate database with the ESQK passed during call setup to obtain the routing ESN. Upon retrieving the ESN, the SR translates the ESN to identify the PSAP trunk route that the call is to be terminated over, connects the caller to the destined PSAP, and passes the ESQK as the ANI over the voice path before voice cut-through.

### **ALI**

Each ALI database requires that an ESQK (shell) record be built in the respective ALI system prior to V9-1-1 activation. This ESQK record is associated with a unique VoIP MSAG entry and associated ESN. The VoIP-related MSAG entry must be approved (and signed off) by the associated PSAP's MSAG coordinator prior to provisioning the ALI system.

### **ALI Steering**

ALI Steering is a function of the ALI system that enables access to the Intrado DALI system for dynamic ALI retrieval. These ALI tables are accessed when a PSAP issues a bid for ALI display. Once the ESQK number ranges have been provisioned in the ALI steering tables, a query received from a PSAP by the ALI that contains an Intrado ESQK will cause a query to be sent to Intrado's DALI system for retrieval of the caller's information. Recognize that different ALI providers handle steering tables in various ways, and Intrado is working within each ALI provider's process to enable this functionality.

## Testing

Testing is a necessary and vitally important part of the overall VoIP deployment process for Intrado. Intrado performs pre-testing to confirm the VoIP-related voice path before conducting end-to-end acceptance testing. In addition, Intrado performs testing activities that include PSAP route tests and PSAP display format tests.

### Intrado Testing Overview

Intrado extensively tests both call -through and failure scenarios prior to turn up. These include voice routing, data return, and display elements, as well as service fallback scenarios. The following solutions are tested.

#### **V9-1-1 Gateway**

The V9-1-1 Gateway is Intrado's entry point into the SRs across the country. For this solution, an Emergency Service Routing Number (ESRN) and Emergency Service Query Key (ESQK) are sent to the VSP. The VSP will send the call and ESQK to the Intrado Gateway for call delivery into the native wireline 9-1-1 network.

#### **V9-1-1 Public Switch Telephone Network (PSTN) Solution**

**Note:** This solution may require cooperation of E9-1-1 Service Providers and Industry.

For this solution, the same information (that is, ESRN and ESQK) are sent to the VSP. Upon receipt, the softswitch examines the ESRN, and if it is in a dialable format, the call is then sent over the PSTN with the ESQK as the caller's ANI.

### Intrado Testing and Service Activation

Intrado will perform internal tests for selective routing to each PSAP that will test the ESRN functionality. Intrado will perform routing tests on behalf of our VSPs when an ESQK range has completed the provisioning processes in the E9-1-1 Service Provider SR. If there are any issues or problems that occur during these tests, Intrado will resolve these prior to service activation. Once the ALI and steering provisioning is complete, Intrado will activate service for the VSP.

#### **ALI Display Format Testing**

Prior to service activation, Intrado will validate any new type(s) of protocol format(s) including various ALI provider communications protocols. In addition, any specific format needs, such as call back # or location, will be pre-tested. If a PSAP requires special placement of location or call back # information, Intrado will work with that PSAP to resolve any issues.

## **Service Activation**

As stated above, Intrado will perform pre-tests to each PSAP. When pre-testing is completed and deemed successful, the ESRN, gateway, and selective routing functionality have been proven. Since V9-1-1 query, response, and route testing have all been completed with the VSP during initial turn up, there is no need to retest the VSP softswitch and its ability to accept the V9-1-1 ESRN and ESQK. Once ALI provisioning and ALI steering is complete, Intrado provisions the specific V9-1-1 PSAPs in the Intrado systems. When this provisioning is complete, the VoIP V9-1-1 call will flow through to the appropriate PSAP and display the VoIP caller's location and callback telephone number.

## **Monitoring and Maintenance**

Intrado believes that the deployment of an area is a significant milestone; however, there is an ongoing need to monitor the delivery systems. Intrado provides an ongoing 24X7 support structure for our customers and PSAPs across the country.

### **Maintenance by Intrado Analysts**

As PSAPs are deployed, Intrado VoIP data analysts continue to resolve provisioning errors as they occur. Additionally, VoIP data analysts address any trouble reports, questions, or special requests that come from the PSAP. The Intrado VoIP data analysts are highly trained and experienced when dealing with questions/issues surrounding 9-1-1 information and are valuable assets for ongoing support for the VSP and PSAP community.

### **PSAP Spot Checks Monitoring**

Along with daily conversations with VSPs and serving PSAPs, Intrado will work in conjunction with the VSP to perform random spot checks across the country. These checks are conducted to validate the service continuity of current deployments. Random spot checking of the ALI display will assist the PSAP in validating the functionality of their service.

## **Test Cases**

Test cases are used to validate the functionality of V9-1-1 call delivery over the native wireline E9-1-1 network.

### **Successful End-to-End V9-1-1 Call Testing**

Intrado will perform an end-to-end test call for each new combination of call delivery methods and data delivery methods.

### **Successful V9-1-1 Call Routing – ESRN Validation (Intrado Network)**

Intrado will test call routing to validate call delivery methods and validates the ESRN.

### **Successful V9-1-1 Call Routing – ESRN Validation (Non-Intrado Network)**

Intrado will test end-to-end calls for VSPs who elect to use a non-Intrado network provider. Intrado will request and establish a test account with the VSP to conduct call routing testing.

## **Intrado VoIP Network**

The Intrado Network provides a common point of entry into the native wireline E9-1-1 network for VSPs. The Intrado Network supports the VSPs end-to-end call flow.

### **Reliability and Availability**

V9-1-1 Services provides VSPs with a reliable and highly-available solution for interconnecting 9-1-1 calls from the VSP network into the existing 9-1-1 network. V9-1-1 provides VSPs with a reliable access method for delivery of VoIP 9-1-1 calls into the Intrado network. The service provides VSPs with true E9-1-1 capability for VoIP callers by enabling the caller's valid street address and callback number to be displayed at emergency service dispatch centers.

V9-1-1 Services utilizes carrier-grade softswitch infrastructure and gateways to transport 9-1-1 calls to the SR of the native E9-1-1 network. The Intrado peering network is capable of accepting and routing PSTN traffic for emergency calls only for redundancy purposes when the native E9-1-1 network is not available.

### **V9-1-1 Services Availability and Redundancy**

V9-1-1 Services combines a highly available provisioning process and highly available, redundant positioning servers to supply call routing instructions to VSPs for call termination to the native E9-1-1 network. When an emergency call is placed, the VSP utilizes its interconnect links with Intrado to one of the redundant databases to obtain call routing data.

### **V9-1-1 Services Reliability**

The Intrado Peering Points contain internal redundancy for call processing through the use of active and standby network elements. If the active network elements or hardware fails, the solution automatically switches over to the standby without loss of active calls. The active components within each Intrado site network are redundant. Additionally, the media is carried between the Peering Point and Emergency Services Gateways utilizing protocols to ensure the highest possible voice quality.

## **Intrado Emergency Services Gateway (ESGW)**

The ESGWs are connected through 9-1-1 trunking that is diversely routed to the extent possible to the SRs. This can include the use of third party selective router access providers (SRAPs). Each T1 is configured to support anticipated VoIP 9-1-1 call loads and provide redundancy in call flow to the SR.

## Intrado V9-1-1 Testing Approach

Intrado is committed to providing quality service to the PSAP, end user community, VSP, and 9-1-1 stakeholders. Intrado has a defined testing process to enable native delivery of VoIP emergency calls. Prior to testing, Intrado will contact the respective PSAP manager (or designated person in charge) of our intention to perform an end-to-end V9-1-1 test call. Intrado will also recommend that the call taker print the screen display for local PSAP review and training purposes and will document the name of the individual spoken to at the PSAP. Should the PSAP request additional testing, the PSAP manager will inform the Intrado call tester as to what tests are requested. Intrado will work to accommodate such requests where technically feasible and reasonable. Where state or local testing and activation requirements are published, those requirements will take precedence over this approach.

Intrado will conduct two (2) different types of testing, each of which is detailed below:

**Route Test** - Intrado performs a route test within the network to verify that connectivity, routing, and ESQKs are properly implemented in the IPS and E9-1-1 Service Provider's network. This single simulated call test usually occurs in the middle of the night prior to any ANI/ALI display testing at the PSAP.

**End-to-End Call Through Test** - Intrado will perform an end-to-end call-through test to each PSAP to verify the call completes to the appropriate location and that appropriate information displays in the proper format. The Intrado tester will identify them self and inform the call taker that this is a VoIP test call and will proceed to verify the screen display.

If all information is correct during testing, Intrado will ask the call taker to print a copy of the ALI display (if possible) and provide the printed display to the PSAP supervisor. Upon successful testing, Intrado will activate the V9-1-1 services for live traffic.

If display or routing issues are identified during the end-to-end test, the V9-1-1 service is delayed and Intrado invokes corrective actions necessary to resolve the issue. Once the display or routing problem is resolved, Intrado will conduct another end-to-end test call.

Intrado has established a website available as a resource for PSAPs to learn more about Intrado's V9-1-1 Services. The website contains technical descriptions, automated call flow, etc., and may be found at:

<http://www.intrado.com/main/company/government/voipdeployment/voipservicemethods/>.

Requests for additional information should be sent to Intrado VoIP Testing at [intradovoiptesting@intrado.com](mailto:intradovoiptesting@intrado.com).

## V9-1-1 Problem Reporting

Intrado continuously strives to deliver the highest quality of V9-1-1 Services; however, because the VoIP user has direct control over their Registered Location used in making VoIP call routing and display determinations, misrouted V9-1-1 calls or improperly displayed caller information may occur.

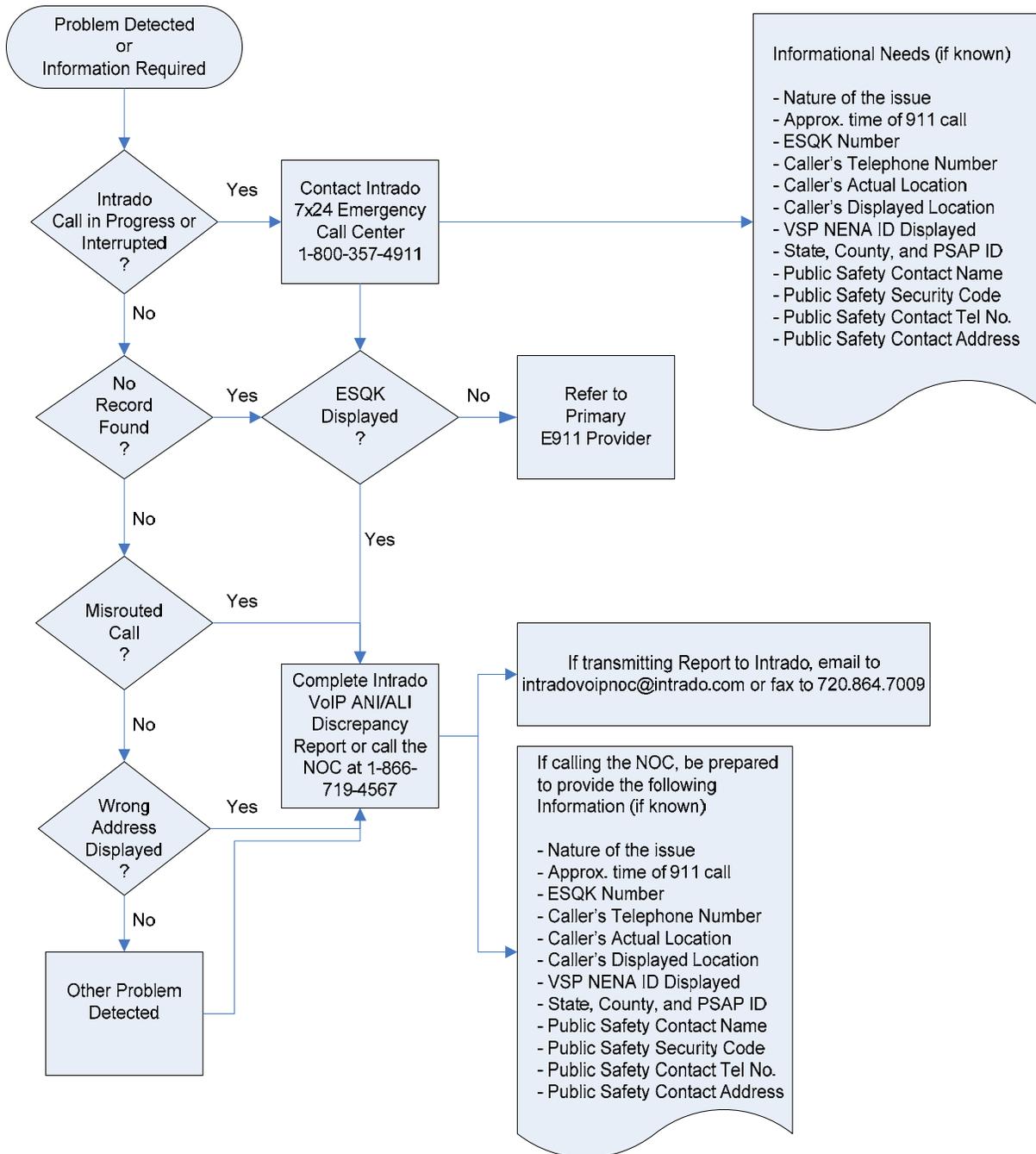
In an effort to further aid public safety in responding to emergencies, Intrado has established a 24x7 emergency support center to provide additional emergency information when a call is in progress or has been interrupted. In situations where Intrado is acting as the VoIP Positioning Center (VPC) and such event(s) occur, public safety personnel should immediately contact Intrado's Emergency Call Relay Center (ECRC) at 1-800-357-4911 for additional assistance. Intrado will use commercially reasonable efforts to provide all relevant information it has available to the public safety personnel; however, the Intrado ECRC is not equipped to relay the 9-1-1 call to a different PSAP on behalf of the PSAP originally receiving the call.

For post-call problem reporting, the Intrado VoIP Operations team has established an Automatic Number Identification/Automatic Location Identification (ANI/ALI) discrepancy/inquiry report process very similar to that in place for standard wireline post-call problem reporting.

Email or fax the Intrado VoIP ANI/ALI Inquiry form to the address or telephone number listed on the form. The Intrado VoIP ANI/ALI Inquiry form and a sample are attached. If not using the VoIP ANI/ALI Inquiry form, call the Intrado Network Operations Center (NOC) at 1-866-719-4567 and be prepared to provide the required information detailed on the ANI/ALI Inquiry form.

The Intrado VoIP Problem Reporting Process Flow diagram is intended to aid public safety personnel in determining when and how to communicate problems and/or to seek assistance from Intrado.

## Intrado VoIP E9-1-1 Problem Reporting Process Flow



# Intrado VoIP ANI/ALI Inquiry Form (Blank Form)

**Intrado VoIP ANI/ALI Inquiry Form**  
Email to: [intradovoipnoc@intrado.com](mailto:intradovoipnoc@intrado.com) – or – Fax to: 720.864.7009

PSAP Name:

ESQK/ANI Received:

Date/Time of Call:

Call Pos./Truck No:

Class of Service:

PSAP Agent:   
Name:  
Phone:  
Fax:  
Email:

No Record Found (NRF)

Incorrect Information Displayed

Misrouted

**Displayed/Incorrect Information**

PSAP:   
ANI Telephone:   
Name:   
Address:   
Community:   
Location:   
ESN:   
VPC:   
Company NENA ID:

**Correct Information**

PSAP:   
ANI Telephone:   
Name:   
Address:   
Community:   
Location:   
ESN:   
VPC:   
Company NENA ID:

PSAP Comments:

Date Forwarded to Intrado:

**For Internal Intrado Use Only**

Resolution:

Date:

Specialist:

Comments:

# Intrado VoIP ANI/ALI Inquiry Form (Completed Sample)

**Intrado VoIP ANI/ALI Inquiry Form**  
 Email to: [intradovoipnoc@intrado.com](mailto:intradovoipnoc@intrado.com) – or – Fax to: 720.864.7009

PSAP Name:

ESQK/ANI Received:

Date/Time of Call:

Call Pos./Truck No:

Class of Service:

PSAP Agent:

No Record Found (NRF)

Incorrect Information Displayed

Misrouted

**Displayed/Incorrect Information**

PSAP:   
 ANI Telephone:   
 Name:   
 Address:   
 Community:   
 Location:   
 ESN:   
 VPC:   
 Company NENA ID:

**Correct Information**

PSAP:   
 ANI Telephone:   
 Name:   
 Address:   
 Community:   
 Location:   
 ESN:   
 VPC:   
 Company NENA ID:

PSAP Comments:

Date Forwarded to Intrado:

**For Internal Intrado Use Only**

Resolution:

Date:

Specialist:

Comments:

## Glossary of Terms and Definitions

Term	Definition
ALI	<b>Automatic Location Identification</b> is a feature of E9-1-1 service that displays the name and address associated with the number of the phone used to dial 9-1-1 at the PSAP. A database managed by a database provider.
ANI	<b>Automatic Number Identification</b> is a feature of 9-1-1 service in which the phone number of the phone from which 9-1-1 is dialled displays at the PSAP.
DALI	<b>Dynamic Automatic Location Identification</b> is the database where information sent regarding the location associated with the caller's telephone number is stored. DALI acts as a data storage and retrieval system to determine the appropriate address and location. A sample DALI display follows:  (303) 555-5555 12:42 09/16  600-1/2 NW MAPLETON STREET BOULDER CO 056 RESD JOHN DOE MAPLETON HILL P# 555-5555  X Coord (Long) -075.572782 Y Coord (Lat) +39.677021  BOULDER COUNTY SHERIFF  FIRE STATION 2  EMS \$82
ECRC	Emergency Call Relay Center
ESGW	Emergency Services Gateway
ESN	<b>Emergency Service Number</b> is a three to five digit alphanumeric code that represents an emergency service zone. This number is used by the selective router to route E9-1-1 calls to a particular PSAP.
ESQK	<b>Emergency Service Query Key</b> is a 10-digit alphanumeric code that represents the emergency service zone and is used by the selective router to route an E9-1-1 call to a particular PSAP.
ESRN	Emergency Service Routing Number
Geocoding	<b>Geocoding</b> is the association of address information to longitude (x) and latitude (y) spatial coordinates.
LEC	Local Exchange Carrier
LOS	Level of Service
MSAG	<b>Master Street Address Guide</b> is a listing of all streets in a 9-1-1 service area and the house number ranges for each ESN. The MSAG is typically controlled by the 9-1-1 coordinator. The primary functions of the MSAG database are to validate subscriber addresses and assign an ESN to each customer telephone number, which is then used to develop the selective routing feature.
NOC	Network Operations Center
PSAP	<b>Public Safety Answering Point</b> is a facility equipped and staffed to receive 9-1-1 calls.

Term	Definition
PSTN	<b>Public Switched Telephone Network</b> is the network of equipment, lines, and controls assembled to establish communication paths between calling and called parties in North America.
SALI	Stand Alone ALI
SR	<b>Selective Router</b> is a telephone switching center that receives 9-1-1 calls from other offices and uses the ANI or pANI to route them to the proper PSAP.
SRAP	Selective Router Access Provider
TN	<b>Telephone Number</b> is the unique combination of ten (10) digits that identifies the equipment used to place and receive calls.
VoIP	<b>Voice over Internet Protocol</b> is a technology use to transmit voice conversations over a data network using the Internet Protocol.
VSP	<b>VoIP Service Provider</b> is the telecommunications carrier that provides dial tone to subscribers by means of an Internet Protocol.

## Revision History

Issue	Date	Author(s)	Change Description
Version 01	10/1/05	Richard Johnston	1 <sup>st</sup> Release
Version 02	10/3/05	Sean Fitzsimmons	2 <sup>nd</sup> Release
Version 03	11/3/05	Matt Wilson	3 <sup>rd</sup> Release
V2007.01.10	1/10/07	Renee Law, Tom Hicks, Lynn Knutson, Jane Spaulding	4 <sup>th</sup> Release
V2007.03.05	3/5/07	Muriel Haglind, Jane Spaulding	5 <sup>th</sup> Release. Corrected typos, grammar, and punctuation. No technical changes were made.
V2007.04.05	4/5/07	Tom Hicks, Renee Law	6 <sup>th</sup> Release. Deleted sentence on page 5 under V9-1-1 Public Switch Telephone Network (PSTN) Solution regarding PSTN routable numbers routing directly into PSAP E9-1-1 equipment; statement was inaccurate.
V2007.06.01	6/1/07	Jane Spaulding, Lynn Knutson	7 <sup>th</sup> Release. Changed NOC email address on ANI/ALI Inquiry Forms (pages 13-14) and on process flow diagram on page 12 to <a href="mailto:intradovoipnoc@intrado.com">intradovoipnoc@intrado.com</a> . Updated the V9-1-1 services hyperlink on page 10.
V2008.03.07	3/7/08	Jane Spaulding, Mark Osler	Deleted the statement "Intrado Proprietary and Confidential" from the footer of all pages.