

Mediant 800 Series

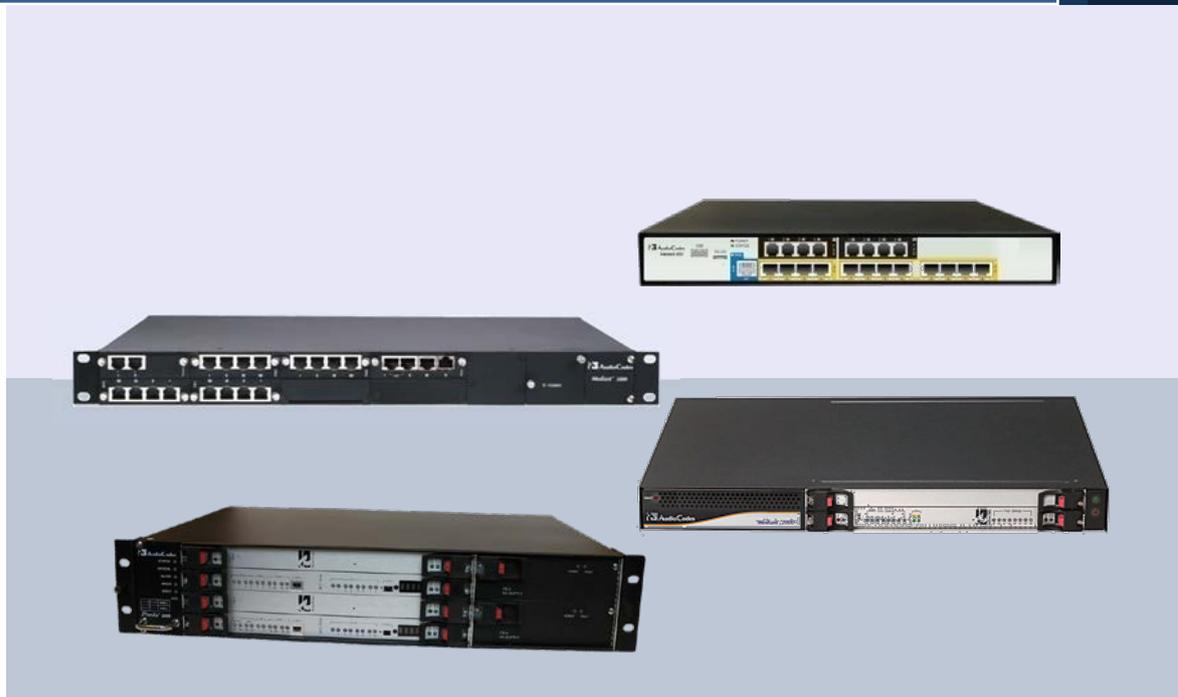
Mediant 1000 Series

Mediant 2000

Mediant 3000

Configuration Note

AudioCodes ELIN Gateway for Enhanced 9-1-1 in
Microsoft® Lync™ Server 2010 Environment



Microsoft®
Lync™



Microsoft® Partner

Gold Unified Communications

 **AudioCodes**

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Notice

This document describes Microsoft Lync Server 2010 E9-1-1 emergency service support with AudioCodes ELIN Gateway providing the interface to the PSTN-based Emergency Services provider.

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Abbreviations and Terminology

Each abbreviation, unless widely used, is spelled out in full when first used. Special abbreviations related to this document are listed in the table below.

Table 1-1: Abbreviations

Abbreviation	Description
E9-1-1	Enhanced 9-1-1
PSAP	Public Safety Answering Point
ELIN	Emergency Location Identification Number
ERL	Emergency Response Location
PIDF-LO	Presence Information Data Format - Location Object

1 Introduction

The Enhanced 9-1-1 (E9-1-1) service is becoming the mandatory emergency service required in many countries around the world. The E9-1-1 service, based on its predecessor 911, enables emergency operators to pinpoint the location (granular location) of callers who dial the 9-1-1 emergency telephone number.

Today, most enterprises implement an IP-based infrastructure providing a Voice-over-Internet (VoIP) network with fixed and nomadic users, allowing connectivity anywhere with any device. This, together with an often deployed multi-line telephone system (MLTS), poses a challenge for E9-1-1 due to the difficulty in accurately locating the E9-1-1 caller.

This document describes the E9-1-1 solution offered by Microsoft Lync Server 2010 (hereafter referred to as *Lync Server 2010*), and the deployed AudioCodes ELIN Gateway which provides the ISDN (or CAMA) connectivity to the PSTN-based E9-1-1 emergency providers. This document also describes the configuration of AudioCodes ELIN Gateway for interoperating between the Lync Server 2010 environment and the E9-1-1 emergency provider.

The ELIN Gateway functionality for E9-1-1 is supported by the following AudioCodes products:

- Mediant 800 series
- Mediant 1000 series
- Mediant 2000
- Mediant 3000

Reader's Notes

2 Overview of Enhanced 9-1-1

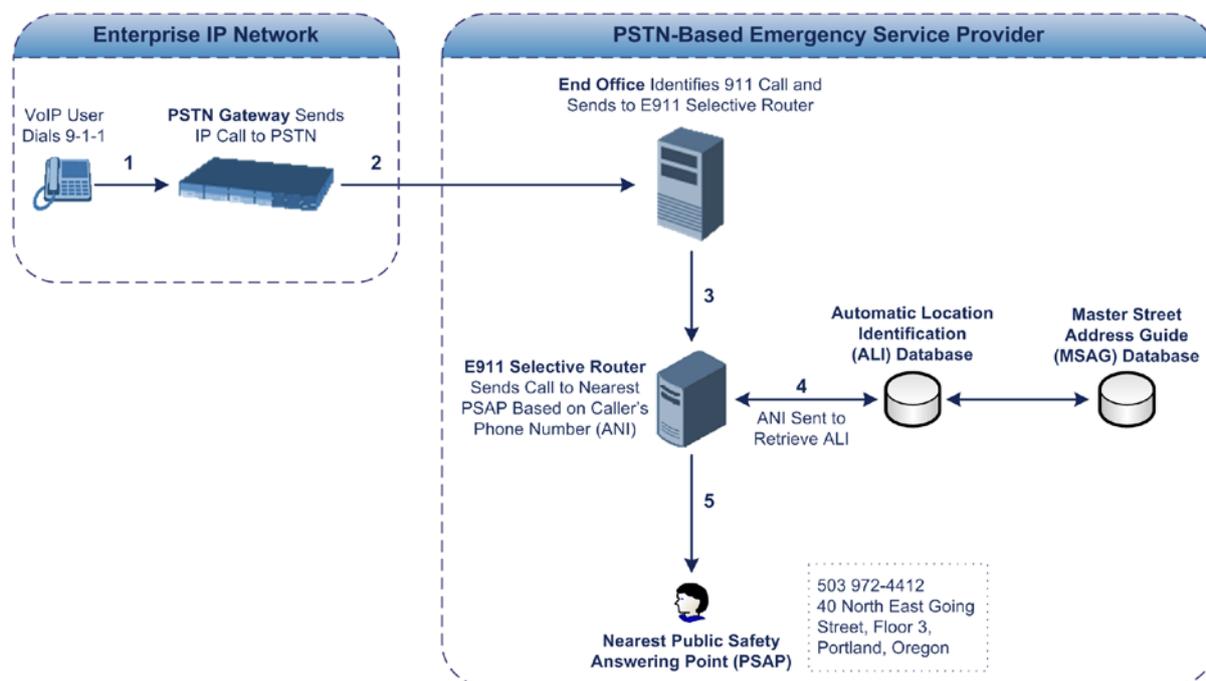
This chapter provides an overview of the E9-1-1 service and the E9-1-1 service supported by Microsoft Lync Server 2010.

2.1 About E9-1-1 Services

Enhanced 9-1-1 (E9-1-1) is a national emergency service for many countries, enabling E9-1-1 operators to automatically identify the geographical location and phone number of a 911 caller. In E9-1-1, the 911 caller is routed to the nearest E9-1-1 operator, termed *public safety answering point* (PSAP) based on the location of the caller. Automatic identification of the caller's location and phone number reduces the time spent on requesting this information from the 911 caller. Therefore, the E9-1-1 service enables the PSAP to quickly dispatch the relevant emergency services (for example, fire department or police) to the caller's location. Even if the call prematurely disconnects, the operator has sufficient information to call back the 911 caller.

The figure below illustrates the routing of an E9-1-1 call to the PSAP:

Figure 1: Call Flow of E9-1-1 to PSTN-Based Emergency Services Provider



1. The VoIP user dials 9-1-1.
2. The call is eventually sent to the PSTN through a PSTN Gateway.
3. The PSTN identifies the call is an emergency call and sends it to an E9-1-1 Selective Router in the Emergency Services provider's network.
4. The E9-1-1 Selective Router determines the geographical location of the caller by requesting this information from an Automatic Location Identification (ALI) database based on the phone number or Automatic Number Identifier (ANI) of the 911 caller. Exact location information is also supplied by the Master Street Address Guide (MSAG) database, which is a companion database to the ALI database. Phone companies and public safety agencies collaborate beforehand to create master maps that match phone numbers, addresses and cross streets to their corresponding PSAP. This MSAG is the official record of valid streets (with exact spelling), street number ranges, and other address elements with which the service providers are required to update their ALI databases.

5. The E9-1-1 Selective Router sends the call to the appropriate PSAP based on the retrieved location information from the ALI.
6. The PSAP operator dispatches the relevant emergency services to the E9-1-1 caller.

2.2 Microsoft Lync Server 2010 and E9-1-1

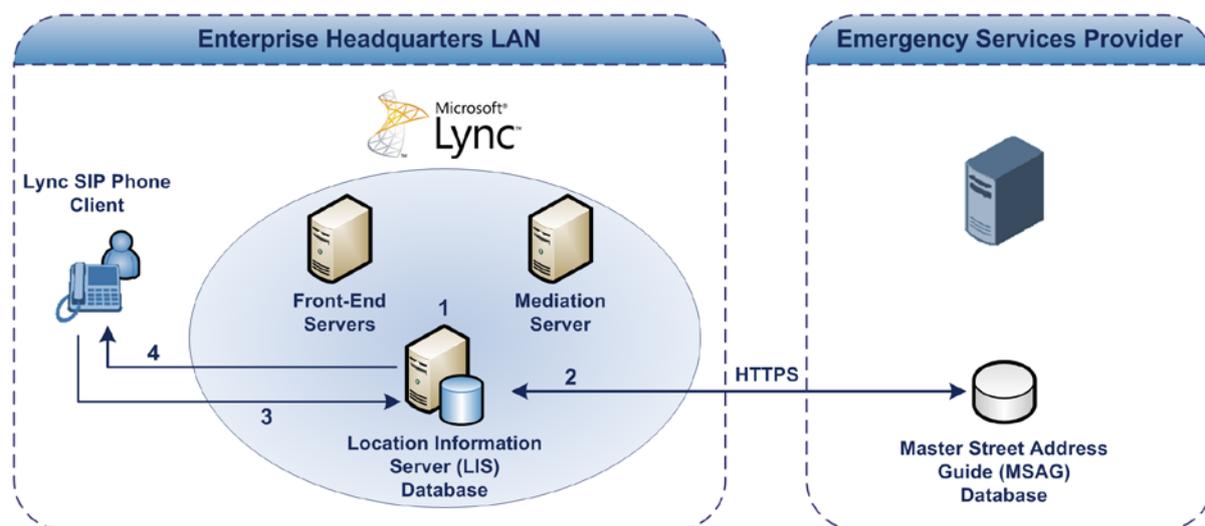
Microsoft Lync Server 2010 enables Enterprise voice users to access its unified communications platform from virtually anywhere and through many different devices. This, together with a deployed MLTS, poses a challenge for E9-1-1 due to the difficulty in accurately locating the E9-1-1 caller. However, Lync Server 2010 offers an innovative solution to solving Enterprises E9-1-1 location problems.

2.2.1 Gathering Location Information of Lync 2010 Clients for 911 Calls

When a Microsoft® Lync™ 2010 client (hereafter referred to as *Lync 2010 client*) is enabled for E9-1-1, the location data that is stored on the client is sent during an emergency call. This stored location information is acquired automatically from the Microsoft Location Information Server (LIS). The LIS stores the location of each network element in the enterprise. Immediately after the Lync 2010 client registration process or when the operating system detects a network connection change, each Lync 2010 client submits a request to the LIS for a location. If the LIS is able to resolve a location address for the client request, it returns the address in a location response. Each client then caches this information. When the Lync 2010 client dials 9-1-1, this location information is then included as part of the emergency call and used by the Emergency Services provider to route the call to the correct PSAP.

The gathering of location information in the Lync Server 2010 network is illustrated in the figure below:

Figure 2: Microsoft Lync Server 2010 Client Acquiring Location Information



1. The Administrator provisions the LIS database with the location of each network element in the Enterprise. The location is a civic address, which can include contextual in-building and company information. In other words, it associates a specific network entity (for example, a WAP) with a physical location in the Enterprise (for example, Floor 2, Wing A, and the Enterprise's street address). For more information on populating the LIS database, see Section 2.2.2 on page 12.
2. The Administrator validates addresses with the Emergency Services provider's MSAG –a companion database to the ALI database. This ensures that the civic address is valid as an official address (e.g., correct address spelling).

3. The Lync 2010 client initiates a location request to the LIS under the following circumstances:

- Immediately after startup and registering the user with Lync Server 2010
- Approximately every four hours after initial registration
- Whenever a network connection change is detected (such as roaming to a new WAP)

The Lync 2010 client includes in its location request the following known network connectivity information:

- Always included:
 - ◆ IPv4 subnet
 - ◆ Media Access Control (MAC) address
- Depends on network connectivity:
 - ◆ Wireless access point (WAP) Basic Service Set Identifier (BSSID)
 - ◆ Link Layer Discovery Protocol-Media Endpoint Discovery (LLDP-MED) chassis ID and port ID

For a Lync 2010 client that moves inside the corporate network such as a soft phone on a laptop that connects wirelessly to the corporate network, Lync Server 2010 can determine which subnet the phone belongs to or which WAP / SSID is currently serving the soft-client.

4. The LIS queries the published locations for a location and if a match is found, returns the location information to the client. The matching order is as follows:

- WAP BSSID
- LLDP switch / port
- LLDP switch
- Subnet
- MAC address

This logic ensures that for any client that is connected by a wireless connection, a match is first attempted based on the hardware address of its connected access point. The logic is for the match to be based on the most detailed location. The subnet generally provides the least detail. If no match is found in the LIS for WAP BSSID, LLDP switch / port, LLDP switch, or subnet, the LIS proxies the MAC address to an integrated Simple Network Management Protocol (SNMP) scanning application. Using SNMP may benefit some organizations for the following reasons:

- LLDP is not supported by Lync Server 2010 so this provides a mechanism for soft phones to acquire detailed location information.
- Installed Layer-2 switches may not support LLDP.

If there is no match and the LIS cannot determine the location, the user may be prompted to manually enter the location. For example, the client may be located in an undefined subnet, at home, in a coffee shop or anywhere else outside the network. When a user manually provides a location, the location is mapped based on the MAC address of the default gateway of the client's network and stored on the client. When the client returns to any previously stored location, the client is automatically set to that location. A user can also manually select any location stored in the local users table and manage existing entries.

2.2.2 Adding ELINs to the Location Information Server

As mentioned in the previous section, the Administrator needs to populate the Location Information Server (LIS) database with a network wire map, which maps the Enterprise's network elements to civic addresses. Once done, it can automatically locate clients within a network. You can add addresses individually to the LIS or in a batch using a comma-separated value (CSV) file containing the column formats listed in the table below.

Network Element	Columns
Wireless access point	<BSSID>,<Description>,<Location>,< CompanyName >,<HouseNumber>,<HouseNumberSuffix>,<PreDirectional>,...<StreetName>,<StreetSuffix>,<PostDirectional>,<City>,<State>,<PostalCode>,<Country>
Subnet	<Subnet>,<Description>,<Location>,<CompanyName>,<HouseNumber>,<HouseNumberSuffix>,<PreDirectional>,...<StreetName>,<StreetSuffix>,<PostDirectional>,<City>,<State>,<PostalCode>,<Country>
Port	<ChassisID>,<PortIDSubType>,<PortID>,<Description>,<Location>,<CompanyName>,<HouseNumber>,<HouseNumberSuffix>,...<PreDirectional>,<StreetName>,<StreetSuffix>,<PostDirectional>,<City>,<State>,<PostalCode>,<Country>
Switch	<ChassisID>,<Description>,<Location>,<CompanyName>,<HouseNumber>,<HouseNumberSuffix>,<PreDirectional>,...<StreetName>,<StreetSuffix>,<PostDirectional>,<City>,<State>,<PostalCode>,<Country>

For the ELIN number to be included in the SIP INVITE (XML-based PIDF-LO message) sent by the Mediation Server to the ELIN Gateway, the Administrator must add the ELIN number to the <CompanyName> column (shown in the table above in **bold** typeface). As the ELIN Gateway supports up to five ELINs per PIDF-LO, the <CompanyName> column can be populated with up to this number of ELINs, each separated by a semicolon. The digits of each ELIN can be separated by hyphens (xxx-xxx-xxx) or they can be adjacent (xxxxxxxx).

When the ELIN Gateway receives the SIP INVITE, it extracts the ELINs from the NAM field in the PIDF-LO (e.g., <ca:NAM>1111-222-333; 1234567890 </ca:NAM>), which corresponds to the <CompanyName> column of the LIS.

If you do not populate the location database, and the Lync Server 2010 location policy, Location Required is set to **Yes** or **Disclaimer**, the user will be prompted to enter a location manually.

2.2.3 Passing Location Information to the PSTN Emergency Provider

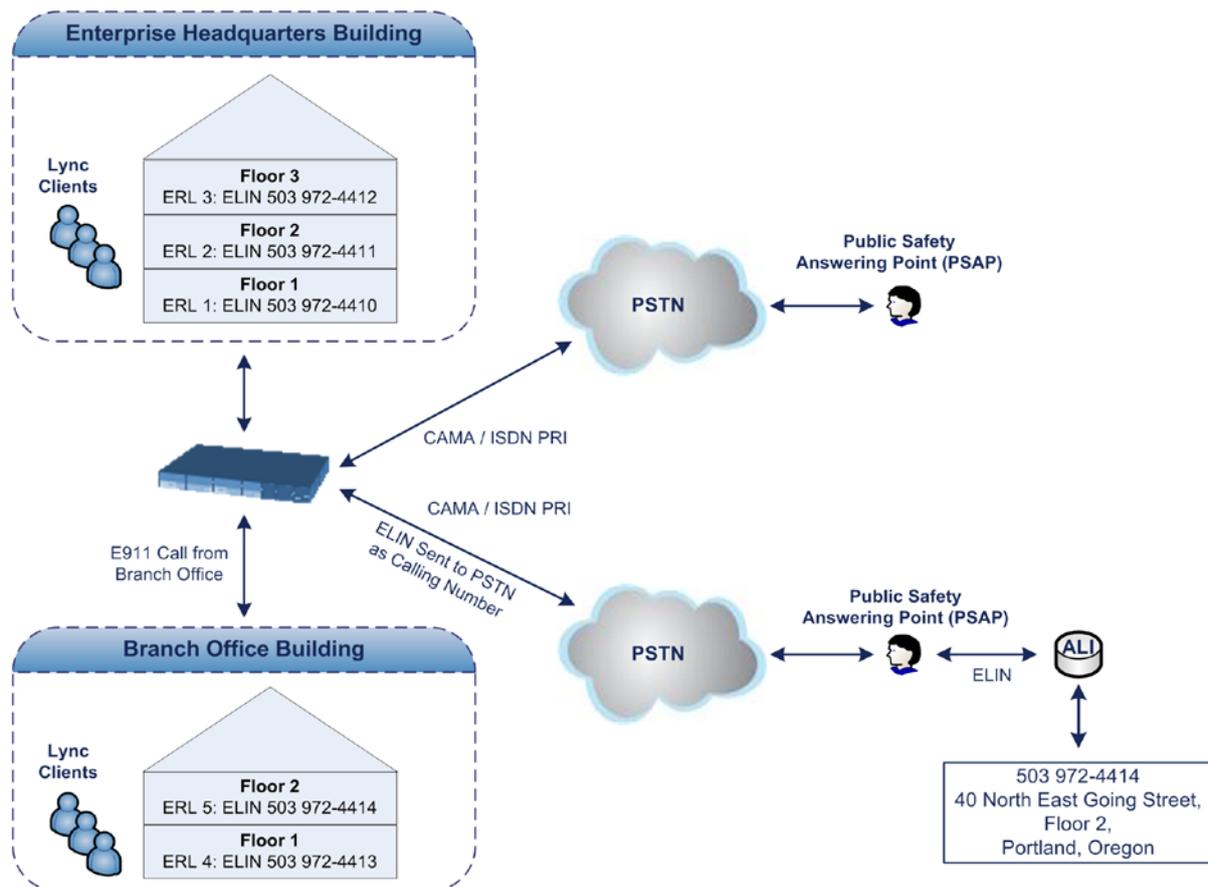
When a Lync 2010 client, enabled for E9-1-1 emergency services, dials 9-1-1, the location data and callback information stored on the client is sent with the call through the Mediation Server to a PSTN-based Emergency Services provider. The Emergency Services provider then routes the call to the nearest and most appropriate PSAP based on the location information contained within the call.

Lync Server 2010 passes the location information of the Lync 2010 client in an IETF-standard format—Presence Information Data Format - Location Object (PIDF-LO)—in a SIP INVITE message. However, this content cannot be sent on the PSTN network using ISDN PRI due to protocol limitations. To overcome this, Enterprises using PSTN Gateways can divide their office space into Emergency Response Locations (ERLs) and assign a dedicated Emergency Location Identification Number (ELIN) to each ERL (or zone). When Lync Server 2010 sends a SIP INVITE message with the PIDF-LO to the PSTN Gateway, it can parse the content and translate the calling number to an appropriate ELIN. The PSTN Gateway then sends the call to the PSTN with the ELIN number as the calling number. This ELIN number is sent to the Emergency Services provider, which sends it on to the appropriate PSAP according to the ELIN address match in the ALI database lookup.

The ERL defines a specific location at a street address, for example, the floor number of the building at that address. The geographical size of an ERL is according to local or national regulations (for example, less than 7000 square feet per ERL). Typically, you would have an ERL for each floor of the building. The ELIN is used as the phone number for 911 callers within this ERL.

The figure below illustrates the use of ERLs and ELINs, with an E9-1-1 call from floor 2 at the branch office:

Figure 3: Implementing ERLs and ELINs for E9-1-1 in Microsoft Lync Server 2010



The table below shows an example of designating ERLs to physical areas (floors) in a building and associating each ERL with a unique ELIN.

ERL Number	Physical Area	IP Address	ELIN
1	Floor 1	10.13.124.xxx	503 972-4410
2	Floor 2	10.15.xxx.xxx	503 972-4411
3	Floor 3	10.18.xxx.xxx	503 972-4412

In the table above, a unique IP subnet is associated per ERL. This is useful if you implement different subnets between floors. Therefore, IP phones, for example, on a specific floor are in the same subnet and therefore, use the same ELIN when dialing 9-1-1.

2.2.4 Planning Considerations for E-9-1-1

This section discusses various planning considerations for E9-1-1.

2.2.4.1 Implementing Emergency Response Locations (ERL)

The following issues should be considered when implementing ERLs:

- Verify the local or national regulations with regards to the number of ERLs and the maximum area in square meters allowed per ERL.
- Ensure that the ERL location is sufficiently specific to allow dispatched emergency services to easily and quickly locate the 911 caller.
- Assign up to five ELINs per ERL.
- Contact your phone service provider to request phone numbers that you will designate as ELINs.

2.2.4.2 Network Identifiers Usage in Location Policies

The following issues should be considered when determining the usage of network identifiers in your location policy:

- Network settings: It is important to assign network sites based on network subnets within your organization because location policies (ERL) can be assigned to network sites. If you are setting up your infrastructure to support automatic client location detection, you first need to decide which network elements you are going to use to correlate to locations:
 - Wireless access point (BSSID)
 - LLDP Port
 - LLDP Switch
 - Subnet
 - MAC
- Subnets: A subnet is a common mechanism, supported by all Lync 2010 clients, that is used to automatically detect client location. Before deciding to use subnets, you should use the following questions to help determine if the granularity of the subnet suffice to accurately locate a client:
 - Does the subnet cover multiple floors?
 - Does the subnet cover more than one building?
 - How many offices are included in a single subnet?

If the subnet covers too wide of an area, you may need to use another mechanism to locate clients.

As a general rule, subnets that resolve to corporate virtual private network (VPN) connections should be excluded from the LIS. This is because typically there is not a civic address that can be associated to the subnets that correlate to where the users are located. It is possible to associate a generic location with VPN-based subnets and not attempt to validate the civic address. However, this will flag every emergency call that originates as a manually entered address, and then screen the call to ensure the caller is connected to the correct PSAP.

- MAC Address: To use a MAC address to locate a client, you must first deploy a third-party SNMP application. An SNMP application takes a MAC address from the LIS and returns a matching port and switch information. The LIS then uses this information to query the published locations for a matching location. If you use this option, make sure that the port information is synchronized between the SNMP application and the published locations.

2.2.4.3 Maintaining an Updated Location Information Server

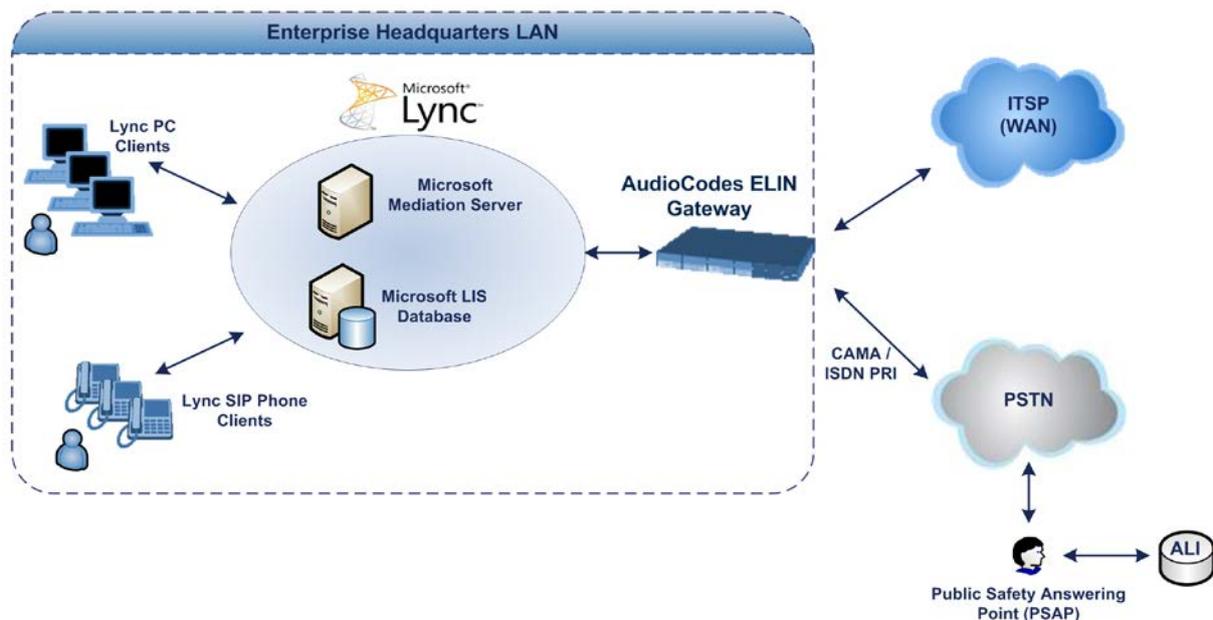
It is paramount that you maintain an updated LIS database. For example, if you change or create a new network element such as a WAP, you must delete the old LIS record entries and update the records with this re-deployed network element.

3 AudioCodes ELIN Gateway for Lync Server 2010 E9-1-1 Calls to PSTN

The Microsoft Mediation Server sends the location information of the E9-1-1 caller in the XML-based PIDF-LO body contained in the SIP INVITE message. However, this content cannot be sent on the PSTN network using ISDN PRI due to protocol limitations. To solve this issue, Lync Server 2010 requires a PSTN Gateway (*ELIN Gateway*) to send the E9-1-1 call to the PSTN. When Lync Server 2010 sends the PIDF-LO to the PSTN Gateway, it parses the content and translates the calling number to an appropriate ELIN. This ensures that the call is routed to an appropriate PSAP, based on ELIN-address match lookup in the Emergency Services provider's ALI database.

The figure below illustrates an AudioCodes ELIN Gateway deployed in the Lync Server 2010 environment for handling E9-1-1 calls between the Enterprise and the PSTN.

Figure 4: AudioCodes ELIN Gateway for E9-1-1 in Microsoft Lync Server 2010 Environment



3.1 Detecting and Handling E9-1-1 Calls

The ELIN Gateway identifies E9-1-1 calls and translates their incoming E9-1-1 calling numbers into ELIN numbers, sent toward the PSAP. The ELIN Gateway handles the received E9-1-1 calls as follows:

1. The ELIN Gateway identifies E9-1-1 calls if the incoming SIP INVITE message contains a PIDF-LO XML message body. This is indicated in the SIP *Content-Type* header, as shown below:

```
Content-Type: application/pidf+xml
```

2. The ELIN Gateway extracts the ELIN number(s) from the "NAM" field in the XML message. The "NAM" field corresponds to the <CompanyName> column in the Location Information Server (LIS). The ELIN Gateway supports up to five ELIN numbers per XML message. The ELINs are separated by a semicolon. The digits of the ELIN number can be separated by hyphens (xxx-xxx-xxx) or they can be adjacent (xxxxxxxxx), as shown below:

```
<ca:NAM>1111-222-333; 1234567890 </ca:NAM>
```

3. The ELIN Gateway saves the *From* header value of the SIP INVITE message in its ELIN database table (**Call From** column). The ELIN table is used for PSAP callback, as discussed later in Section 3.3 on page 21. The ELIN table also stores the following information:

- **ELIN:** ELIN number
- **Time:** Time at which the original E9-1-1 call was terminated with the PSAP
- **Count:** Number of E9-1-1 calls currently using this ELIN

An example of the ELIN database table is shown below:

ELIN	Time	Count	Index	Call From
4257275678	22:11:52	0	2	4258359333
4257275999	22:11:57	0	3	4258359444
4257275615	22:12:03	0	0	4258359555
4257275616	22:11:45	0	1	4258359777

The ELIN table stores this information for a user-defined period (see Section 4.2 on page 23), starting from when the E9-1-1 call, established with the PSAP, terminates. After this time expires, the table entry with its ELIN is disregarded and no longer used (for PSAP callback). Therefore, table entries of only the most recently terminated E9-1-1 callers are considered in the ELIN table.

The maximum entries in the ELIN table depend on the AudioCodes ELIN Gateway deployed in the Lync Server 2010 environment:

- **Mediant 1000 Series and Mediant 2000:** 100 entries
 - **Mediant 3000:** 300 entries
4. The ELIN Gateway uses the ELIN number as the E9-1-1 calling number and sends it in the ISDN Setup message (as an ANI / Calling Party Number) to the PSTN.

An example of a SIP INVITE message received from an E9-1-1 caller is shown below. The SIP *Content-Type* header indicating the PIDF-LO, and the NAM field listing the ELINs are shown in **bold** typeface.

```
INVITE sip:911;phone-context=Redmond@192.168.1.12;user=phone
SIP/2.0
From:
"voip_911_user1" <sip:voip_911_user1@contoso.com>;epid=1D19090AED;t
ag=d04d65d924
To: <sip:911;phone-context=Redmond@192.168.1.12;user=phone>
CSeq: 8 INVITE
Call-ID: e6828be1-1cdd-4fb0-bdda-cda7faf46df4
VIA: SIP/2.0/TLS 192.168.0.244:57918;branch=z9hG4bK528b7ad7
CONTACT:
<sip:voip_911_user1@contoso.com;opaque=user:epid:R4bCDaUj51a06PUbk
raS0QAA;gruu>;text;audio;video;image
PRIORITY: emergency
CONTENT-TYPE: multipart/mixed; boundary= -----
=_NextPart_000_4A6D_01CAB3D6.7519F890
geolocation: <cid:voip_911_user1@contoso.com>;inserted-
by="sip:voip_911_user1@contoso .com"
Message-Body:
-----=_NextPart_000_4A6D_01CAB3D6.7519F890
Content-Type: application/sdp ; charset=utf-8
v=0
o=- 0 0 IN IP4 Client
s=session
c=IN IP4 Client
t=0 0
m=audio 30684 RTP/AVP 114 111 112 115 116 4 3 8 0 106 97
c=IN IP4 172.29.105.23
a=rtcp:60423
a=label:Audio
a=rtpmap:3 GSM/8000/1
a=rtpmap:101 telephone-event/8000
a=fmtp:101 0-16
a=rtpmap:0 PCMU/8000
a=rtpmap:8 PCMA/8000
aptime:20

-----=_NextPart_000_4A6D_01CAB3D6.7519F890
Content-Type: application/pidf+xml
Content-ID: <voip_911_user1@contoso.com>
<?xml version="1.0" encoding="utf-8"?>
<presence xmlns="urn:ietf:params:xml:ns:pidf"
xmlns:gp="urn:ietf:params:xml:ns:pidf:geopriv10"
xmlns:bp="urn:ietf:params:xml:ns:pidf:geopriv10:basicPolicy"
xmlns:ca="urn:ietf:params:xml:ns:pidf:geopriv10:civicAddr"
xmlns:ms="urn:schema:Rtc.LIS.msftE911PidfExtn.2008"
entity="sip:voip_911_user1@contoso.com"><tuple
id="0"><status><gp:geopriv><gp:location-
info><ca:civicAddress><ca:country>US</ca:country><ca:A1>WA</ca:A1>
<ca:A3>Redmond</ca:A3><ca:RD>163rd</ca:RD><ca:STS>Ave</ca:STS><ca:
```

```

POD>NE</ca:POD><ca:HNO>3910</ca:HNO><ca:LOC>40/4451</ca:LOC>
<ca:NAM>1111-222-333; 1234567890 </ca:NAM>
<ca:PC>98052</ca:PC></ca:civicAddress></gp:location-
info><gp:usage-rules><bp:retransmission-
allowed>true</bp:retransmission-allowed></gp:usage-
rules></gp:geopriv><ms:msftE911PidfExtn><ms:ConferenceUri>sip:+142
55550199@contoso.com;user=phone</ms:ConferenceUri><ms:ConferenceMo
de>twoway</ms:ConferenceMode><LocationPolicyTagID
xmlns="urn:schema:Rtc.Lis.LocationPolicyTagID.2008">user-
tagid</LocationPolicyTagID
></ms:msftE911PidfExtn></status><timestamp>1991-09-
22T13:37:31.03</timestamp></tuple></presence>
-----=_NextPart_000_4A6D_01CAB3D6.7519F890--
  
```

3.2 Pre-empting Existing Calls for E9-1-1 Calls

If the ELIN Gateway receives an E9-1-1 call from the IP network and there are unavailable channels (for example, all busy), the ELIN Gateway immediately terminates one of the non-E9-1-1 calls (arbitrary) and accepts the E9-1-1 call on the freed channel.

The preemption is done only on a channel pertaining to the same Trunk Group for which the E9-1-1 call was initially destined. For example, if an E9-1-1 call is destined for Trunk Group #2 and all the channels belonging to this group are busy, the ELIN Gateway terminates one of the calls in this group to free a channel for accepting the E9-1-1 call.

This feature is initiated only if the received SIP INVITE message contains a *Priority* header set to "emergency", as shown below:

```
PRIORITY: emergency
```

3.3 PSAP Callback to Lync 2010 Clients for Dropped E9-1-1 Calls

As the E9-1-1 service automatically provides all the contact information of the E9-1-1 caller to the PSAP, the PSAP operator can call back the E9-1-1 caller. This is especially useful in cases where the caller disconnects prematurely. However, as the Enterprise sends ELINs to the PSAP for E9-1-1 calls, a callback can only reach the original E9-1-1 caller using the ELIN Gateway to translate the ELIN number back into the E9-1-1 caller's extension number.

In the ELIN table of the ELIN Gateway, the temporarily stored *From* header value of the SIP INVITE message originally received from the E9-1-1 caller is used for PSAP callback. When the PSAP makes a callback to the E9-1-1 caller, the ELIN Gateway translates the called number (i.e., ELIN) received from the PSAP to the corresponding E9-1-1 caller's extension number as matched in the ELIN table.

The handling of PSAP callbacks by the ELIN Gateway is as follows:

1. When the ELIN Gateway receives any call from the PSTN, it searches the ELIN table for an ELIN that corresponds to the received Called Party Number in the incoming PSTN call.
2. If a match is found in the ELIN table, it routes the call to the Mediation Server by sending a SIP INVITE, where the values of the *To* and *Request-URI* are taken from the value of the original *From* header that is stored in the ELIN table (in the **Call From** column).
3. The ELIN Gateway updates the Time in the ELIN table. (The Count is not affected).

The PSAP callback can be done only within a user-defined timeout (see Section 4.2 on page 23) started from after the original E9-1-1 call established with the PSAP is terminated. After this time expires, the table entry with its ELIN is disregarded and no longer used (for PSAP callback). Therefore, table entries of only the most recently terminated

E9-1-1 callers are considered in the ELIN table. If the PSAP callback is done after this timeout expires, the ELIN Gateway is unable to route the call to the E9-1-1 caller and instead, either sends it as a regular call or most likely, rejects it if there are no matching routing rules. However, if another E9-1-1 caller has subsequently been processed with the same ELIN number, then the PSAP callback is routed to this new E9-1-1 caller.

In scenarios where the same ELIN number is being used by multiple E9-1-1 callers, upon receipt of a PSAP callback, the ELIN Gateway sends the call to the most recent E9-1-1 caller. For example, if the ELIN number "4257275678" is being used by three E9-1-1 callers, as shown in the table below, then when a PSAP callback is received, the ELIN Gateway sends it to the E9-1-1 caller with phone number "4258359555".

ELIN	Time	Call From
4257275678	11:00	4258359333
4257275678	11:01	4258359444
4257275678	11:03	4258359555

3.4 Selecting ELIN for Multiple Calls within Same ERL

The ELIN Gateway supports the receipt of up to five ELIN numbers in the XML message of each incoming SIP INVITE message. As discussed in the preceding sections, the ELIN Gateway sends the ELIN number as the E9-1-1 calling number to the PSTN-based emergency provider. If the XML message contains more than one ELIN number, the ELIN Gateway chooses the ELIN according to the following logic:

- If the first ELIN in the list is not being used by other active calls, it chooses this ELIN.
- If the first ELIN in the list is being used by another active call, the ELIN Gateway skips to the next ELIN in the list, and so on until it finds an ELIN that is not being used and sends this ELIN.
- If all the ELINs in the list are in use by active calls, the ELIN Gateway selects the ELIN number as follows:
 1. The ELIN with the lowest count (i.e., lowest number of active calls currently using this ELIN).
 2. If the count between ELINs is identical, the ELIN Gateway selects the ELIN with the greatest amount of time passed since the original E9-1-1 call using this ELIN was terminated with the PSAP. For example, if E9-1-1 caller using ELIN 4257275678 was terminated at **11:01** and E9-1-1 caller using ELIN 4257275670 was terminated at **11:03**, then the ELIN Gateway selects ELIN 4257275678.

In this scenario, multiple E9-1-1 calls will be sent with the same ELIN.

3.5 Prerequisites for Deploying E9-1-1

For implementing the E9-1-1 support, the following is required:

- Deployed Lync Server 2010 (including either a Front-End pool or a Standard Edition server, and Lync 2010 clients)
- Deployed AudioCodes ELIN Gateway, providing at least one ISDN or Centralized Automatic Message Accounting (CAMA) trunk with the PSTN

4 Configuring AudioCodes ELIN Gateway

This chapter describes E9-1-1 configuration of the AudioCodes ELIN Gateway deployed in the Microsoft Lync Server 2010 environment.

4.1 Enabling the E9-1-1 Feature

By default, the E9-1-1 feature in the ELIN Gateway for Lync Server 2010 is disabled. To enable it, the following *ini* file parameter setting must be done:

```
E911Gateway = 1
```

4.2 Configuring the E9-1-1 Callback Timeout

The PSAP can use the ELIN to call back the E9-1-1 caller within a user-defined time interval (in minutes) from when the initial call established with the PSAP has been terminated. By default, an ELIN can be used for PSAP callback within 30 minutes after the call is terminated. You can change this interval, by using the following *ini* file parameter:

```
E911CallbackTimeout = <time value> ; where <time value > can be  
any value from 0 through 60
```

4.3 Configuring the SIP Release Cause Code for Failed E9-1-1 Calls

When a Lync 2010 client makes an emergency call, the call is routed through the Microsoft Mediation Server to the ELIN Gateway, which sends it on to the PSTN. In some instances, the call may not be established due to either the PSTN (for example, the destination is busy or not found) or ELIN Gateway (for example, lack of resources or an internal error). In such a scenario, the Mediation Server requires that the ELIN Gateway "reject" the call with the SIP release cause code 503 "Service Unavailable", instead of the designated release call. Such a release cause code enables the Mediation Server to issue a failover to another entity (for example, another ELIN Gateway), instead of retrying the call or returning the release call to the user.

To support this requirement, the ELIN Gateway can be configured to send the 503 "Service Unavailable" release cause code instead of SIP 4xx if an emergency call cannot be established. To enable this support, the following *ini* file parameter setting must be done:

```
EmergencySpecialReleaseCause = 1
```

To disable this feature, set the EmergencySpecialReleaseCause parameter to 0 (default).

4.4 Viewing the ELIN Table

You can view the ELIN table of the ELIN Gateway. The method depends on the type of AudioCodes device:

- **Mediant 800 and Mediant 1000:** Using the following CLI command:

```
# show voip gw e911
ELIN              Time          Count  Index  Call From
-----
4257275678        22:11:52    0      2      4258359333
4257275999        22:11:57    0      3      4258359444
4257275615        22:12:03    0      0      4258359555
4257275616        22:11:45    0      1      4258359777
-----
----- Current Time: 22:12:40
```

- **Mediant 800, Mediant 1000, Mediant 2000, Mediant 3000:** Using Syslog, by invoking the following Web command shell:

```
SIP / GateWay / E911Dump
```

Reader's Notes

Configuration Note