

Enhanced 911 Services

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Prerequisites for Enhanced 911 Services

- SCCP or SIP phones must be registered to Cisco Unified CME.
- At least one CAMA or ISDN trunk must be configured from Cisco Unified CME to each of the 911 service provider's public safety answering point (PSAP).
- An Enhanced 911 network must be designed for each customer's voice network.
- Cisco Unified CME has an FXS, FXO, SIP, or H.323 trunk interface configured.

Cisco Unified CME

- Cisco Unified CME 4.2 or a later version.

Cisco Unified CME in SRST Fallback Mode

- Cisco Unified CME 4.1 or a later version, configured in SRST fallback mode. See SRST Fallback Mode.

Note For information about configuring ephones, ephone-dns, voice register pools, and voice register dns, see Configure Phones to Make Basic Call.

Restrictions for Enhanced 911 Services

- Enhanced 911 Services for Cisco Unified CME does not interface with the Cisco Emergency Responder.

- The information about the most recent phone that called 911 is not preserved after a reboot of Cisco Unified CME.
- Cisco Emergency Responder does not have access to any updates made to the emergency call history table when remote Cisco Unified IP phones are in SRST fallback mode. Therefore, if the PSAP calls back after the IP phones register back to Cisco Unified Communications Manager, Cisco Emergency Responder has no history of those calls. As a result, those calls are not routed to the original 911 caller. Instead, the calls are routed to the default destination that is configured on Cisco Emergency Responder for the corresponding ELIN.
- For Cisco Unified Wireless 7920 and 7921 IP phones, a caller's location can only be determined by the static information configured by the system administrator. For more information, see Precautions for Mobile Phones, on page 7.
- The extension numbers of 911 callers can be translated to only two emergency location identification numbers (ELINs) for each emergency response location (ERL). For more information, see Overview of Enhanced 911 Services, on page 2.
- Using ELINs for multiple purposes can result in unexpected interactions with existing Cisco Unified CME features. These multiple uses of an ELIN can include configuring an ELIN for use as an actual phone number (ephone-dn, voice register dn, or FXS destination-pattern), a Call Pickup number, or an alias rerouting number. For more information, see Multiple Usages of an ELIN, on page 9.
- Your configuration of Enhanced 911 Services can interact with existing Cisco Unified CME features and cause unexpected behavior. For a complete description of interactions between Enhanced 911 Services and existing Cisco Unified CME features, see Interactions with Existing Cisco Unified CME Features, on page 9.

Information About Enhanced 911 Services

Overview of Enhanced 911 Services

Enhanced 911 Services enable 911 operators to:

- Immediately pinpoint the location of the 911 caller based on the calling number
- Callback the 911 caller if a disconnect occurs

Before this feature was introduced, Cisco Unified CME supported only outbound calls to 911. With basic 911 functionality, calls were simply routed to a public safety answering point (PSAP). The 911 operator at the PSAP then had to verbally gather the emergency information and location from the caller, before dispatching a response team from the ambulance service, fire department, or police department. Calls could not be routed to different PSAPs, based on the specific geographic areas that they cover.

With Enhanced 911 Services, 911 calls are selectively routed to the closest PSAP based on the caller's location. In addition, the caller's phone number and address automatically display on a terminal at the PSAP. Therefore, the PSAP can quickly dispatch emergency help, even if the caller is unable to communicate the location. Also, if the caller disconnects prematurely, the PSAP has the information it needs to contact the 911 caller.

To use Enhanced 911 Services, you must define an emergency response location (ERL) for each of the geographic areas needed to cover all of the phones supported by Cisco Unified CME. The geographic specifications for ERLs are determined by local law. For example, you might have to define an ERL for each

floor of a building because an ERL must be less than 7000 square feet in area. Because the ERL defines a known, specific location, this information is uploaded to the PSAP's database and is used by the 911 dispatcher to help the emergency response team to quickly locate a caller.

To determine which ERL is assigned to a 911 caller, the PSAP uses the caller's unique phone number, which is also known as the emergency location identification number (ELIN). Before you can use Enhanced 911 Services you must supply the PSAP with a list of your ELINs and street addresses for each ERL. This information is saved in the PSAP's automatic location identification (ALI) database. Typically, you give this information to the PSAP when your phone system is installed.

With the address information in the ALI database, the PSAP can find the caller's location and can also use the ELIN to callback the 911 caller within a specified time limit. This limit applies to the Last Caller table, which provides the PSAP with the 911 caller's ELIN. If no time limit is specified for the Last Caller table, the default expiry time is three hours.

In addition to saving call formation in the temporary Last Caller table, you can configure permanent call detail records. You can view the attributes in these records from RADIUS accounting, the syslog service, or Cisco IOS **show** commands.

You have the option of configuring zero, one, or two ELINs for each ERL. If you configure two ELINs, the system uses a round-robin algorithm to select which ELIN is sent to the PSAP. If you do not define an ELIN for an ERL, the PSAP sees the original calling number. You may not want to define an ELIN if Cisco Unified CME is using direct-inward-dial numbers or the call is from another Cisco voice gateway that has already translated the extension to an ELIN.

Optionally define a default ELIN that the PSAP can use if a 911 caller's IP phone's address does not match the IP subnet of any location in any zone. This default ELIN can be an existing ELIN that is already defined for one of the ERLs or it can be a unique ELIN. If no default ELIN is defined and the 911 caller's IP Address does not match any of the ERLs' IP subnets, a syslog message is issued stating that no default ELIN is defined, and the original ANI remains intact.

You can also define a designated callback number that is used when the callback information is lost in the Last Caller table because of an expiry timeout or system restart. You can use this designated callback number if the PSAP cannot reach the 911 caller at the caller's ELIN or the default ELIN for any other reason. You can further customize your system by specifying the expiry time for data in the Last Caller table and by enabling syslog messages that announce all emergency calls.

For large installations, you can optionally specify that calls from specific ERLs are routed to specific PSAPs. This is done by configuring emergency response zones, which lists the ERLs within each zone. This list of ERLs also includes a ranking of the locations which controls the order of ERL searches when there are multiple PSAPs. You do not need to configure emergency response zones if all 911 calls on your system are routed to a single PSAP.

One or more ERLs can be grouped into a zone which could be equivalent to the area serviced by a PSAP. When an outbound emergency call is placed, configured emergency response zones allow the searching of a subset of the ERLs in any order. The ERLs can be ranked in the order of desired usage.

Zones are also used to selectively route 911 calls to different PSAPs.You can configure selective routing by creating a zone with a list of unique locations and assigning each zone to a different outbound dial peer. In this case, zones route the call based on the caller's ERL. When an emergency call is made, each dial peer matching the called number uses the zone's list of locations to find a matching IP subnet to the calling phone's IP address. If an ERL and ELIN are found, the dial peer's interface is used to route the call. If no ERL or ELIN is found, the next matched dial peer checks its zone.

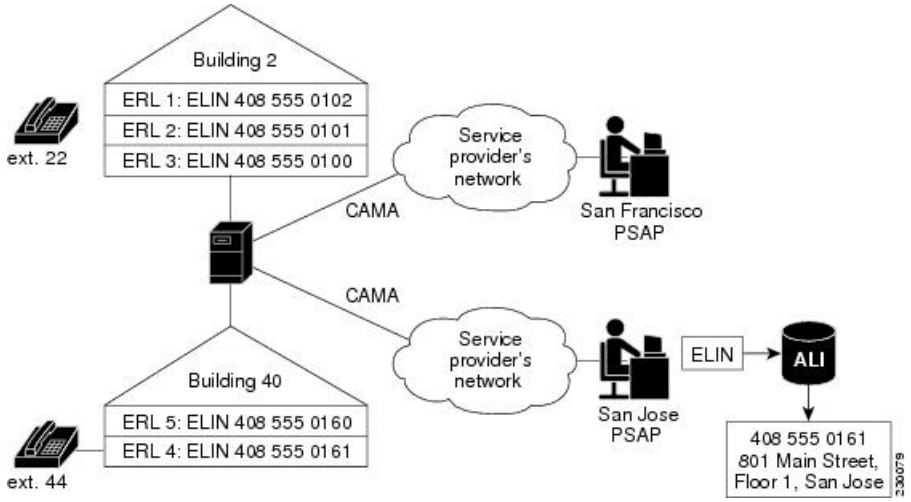
Note

- If a caller's IP address does not match any location in its dial-peers zone, the last dial peer that matched is used for routing and the default ELIN is used.
- If you want 911 calls from any particular phone to always use the same dial peer when you have multiple dial peers going to the same destination-pattern (911) and the zones are different, you must configure the preferred dial peer to be the highest priority by setting the preference field.

Duplicate location tags are not allowed in the same zone. However, the same location tag can be defined in multiple zones. You are allowed to enter duplicate location priorities in the same zone, however, the existing location's priority is then increased to the next number. For example, if you configure "location 36 priority 5" followed by "location 19 priority 5," location 19 has priority 5 and location 36 becomes priority 6. Also, if two locations are assigned priority 100, rather than bump the first location to priority 101, the first location becomes the first nonprioritized location.

Figure 1: Implementation of Enhanced 911 for Cisco Unified CME, on page 4 shows an example configuration for 911 services. In this example, the phone system handles calls from multiple floors in multiple buildings. Five ERLs are defined, with one ELIN defined for each ERL. At the PSAP, the ELIN is used to find the caller's physical address from the ALI database. Building 2 is closer to the PSAP in San Francisco and Building 40 is closer to the PSAP in San Jose. Therefore, in this case, we recommend that you configure two emergency response zones to ensure that 911 calls are routed to the PSAP closest to the caller. In this example, you can configure an emergency response zone that includes all of the ERLS in building 2 and another zone that includes the ERLs in building 40. If you choose to not configure emergency response zones, 911 calls are routed based on matching the destination number configured for the outgoing dial peers.

Figure 1: Implementation of Enhanced 911 for Cisco Unified CME



Call Processing for E911 Services

When a 911 call is received by Cisco Unified CME, the initial call processing is the same as for any other call. Cisco Unified CME takes the called-number and searches for dial peers that can be used to route the call to that called-number.

The Enhanced 911 feature also analyzes the outgoing dial peer to see if it is going to a PSAP. If the outgoing dial peer is configured with the **emergency response zone** command, the system is notified that the call needs Enhanced 911 handling. If the outgoing dial peer is not configured with the **emergency response zone** command, the Enhanced 911 functionality is not activated and the caller's number is not translated to an ELIN.

When the Enhanced 911 functionality is activated, the first step in Enhanced 911 handling is to determine which ERL is assigned to the caller. There are two ways to determine the caller's ERL.

- Explicit Assignment—If a 911 call arrives on an inbound dial peer that has an ERL assignment, this ERL is automatically used as the caller's location.
- Implicit Assignment—If a 911 call arrives from an IP phone, its IP address is determined and Enhanced 911 searches for the IP address of the caller's phone in one of the IP subnets configured in the ERLs. The ERLs are stored as an ordered list according to their tag numbers, and each subnet is compared to the caller's IP address in the order listed.

After the caller's ERL is determined, the caller's number is translated to that ERL's ELIN. If no ERLs are implicitly or explicitly assigned to a call, you can define a default ERL for IP phones. This default ERL does not apply to nonIP-phone endpoints, such as phones on VoIP trunks or FXS/FXO trunks.

After an ELIN is determined for the call, the following information is saved to the Last Caller table:

- Caller's ELIN
- Caller's original extension
- Time the call originated

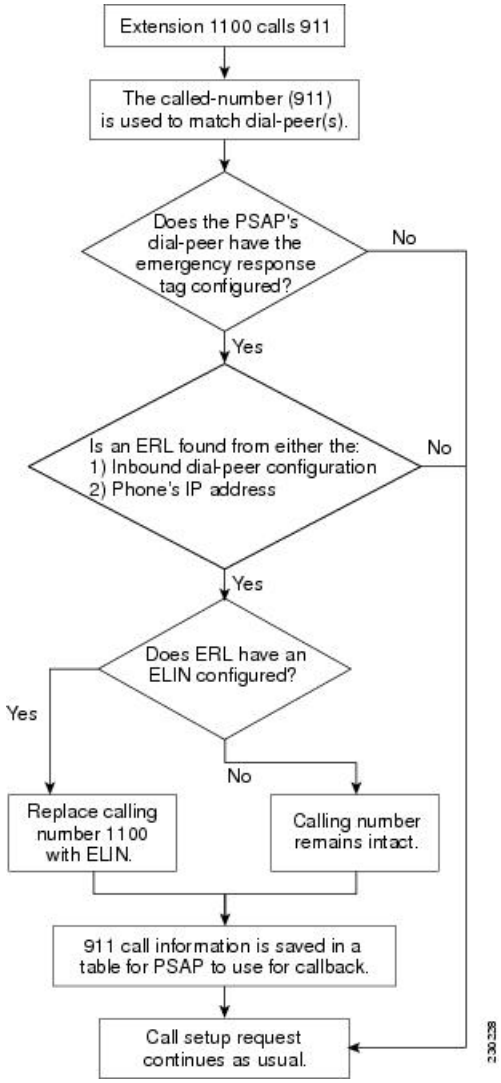
The Last Caller table contains this information for the most recent emergency callers from each ERL. A caller's information is purged from the table when the specified expiry time has passed after the call was originated. If no time limit is specified, the default expiry time is three hours.

After the 911 call information is saved to the Last Caller table, the system determines whether an emergency response zone is configured that contains the caller's ERL. If no emergency response zone is configured with the ERL, all ERLs are searched sequentially to match the caller's IP address and then route the 911 call to the appropriate PSAP. If an ERL is included in a zone, the 911 call is routed to the PSAP associated with that zone.

After the 911 call is routed to appropriate PSAP, Enhanced 911 processing is complete. Call processing then proceeds as it does for basic calls, except that the ELIN replaces the original calling number for the outbound setup request.

Figure 2: Processing a 911 Call, on page 6 summarizes the procedure for processing a 911 call.

Figure 2: Processing a 911 Call



The 911 operator is unable to find information about a call in the Last Caller table if the router was rebooted or specified expiry time (three hours by default) has passed after the call was originated. If this is the case, the 911 operator hears the reorder tone. To prevent the 911 operator from getting this tone, you can configure the default callback as described in Customize E911 Settings, on page 23. Alternately, you can configure a call forward number on the dial peer that goes to an operator or primary contact at the business.

Because the 911 callback feature tracks the last caller by its extension number, if you change the configuration of your ephone-dns in-between a 911 call and a 911 callback and within the expiry time, the PSAP might not be able to successfully contact the last 911 caller.

If two 911 calls are made from different phones in the same ERL within a short period of time, the first caller's information is overwritten in the Last Caller table with the information for the second caller. Because the table can contain information about only one caller from each ERL, the 911 operator does not have the information needed to contact the first caller.

In most cases, if Cisco Emergency Responder is configured, you should configure Enhanced 911 Services with the same data for the ELIN and ERL as used by Cisco Emergency Responder.

Precautions for Mobile Phones

Emergency calls placed from phones that have been removed from their primary site might not be answered by local safety authorities. IP phones should not be used to place emergency calls if removed from the site where it was initially configured. Therefore, we recommend that you require your mobile phone users to agree to a policy similar to the one stated below.

Telecommuters, remote office, and traveling personnel must place emergency calls on a locally configured hotel, office, or home phone (in other words, their landline). If they must use a remote IP phone for emergency calls while away from their configured site, they must be prepared to provide specific information regarding their location (their country, city, state, street address, and so on) to the answering safety authority or security operations center personnel.

By accepting this policy your mobile phone users are confirming that they:

- Understand this advisory
- Agree to take reasonable precautions to prevent use of any remote IP phone device for emergency calls when it is removed from its configured site

By not responding to or declining to accept this policy, your mobile phone users are confirming that they understand that all remote IP phone devices associated with them will be disconnected, and no future requests for these services will be fulfilled.

Plan Your Implementation of Enhanced 911 Services

Before you configure Enhanced 911 Services for Cisco Unified CME:

Procedure

Step 1 Make a list of your sites that are serviced by Cisco Unified CME, and the PSAPs serving each site.

Be aware that you must use a CAMA/PRI interface to connect to each PSAP. Table 1: List of Sites and PSAPs, on page 7 shows an example of the information that you need to gather.

Table 1: List of Sites and PSAPs

Building Name and Address	Responsible PSAP	Interface to which Calls Are Routed
Building 2, 201 Maple Street, San Francisco	San Francisco, CA	Port 1/0:D
Building 40, 801 Main Street, San Jose	San Jose, CA	Port 1/1:D

Step 2 Use local laws to determine the number of ERLs you need to configure.

According to the National Emergency Number Association (NENA) model legislation, make the location specific enough to provide a reasonable opportunity for the emergency response team to quickly locate a caller anywhere within it. Table 2: ERL Calculation, on page 8 shows an example.

Table 2: ERL Calculation

Building	Size in Square Feet	Number of Floors	Number of ERLs Required
Building 2	200,000	3	3
Building 40	7000	2	1

Step 3 (Optional) Assign one or two ELINs to each ERL.

You must contact your phone service provider to request phone numbers that are designated as ELINs.

Step 4 (Optional) Assign each of your ERLs to an emergency response zone to enable 911 calls to be routed to the PSAP that is closest to the caller. Use the **voice emergency response zone** command.

Step 5 Configure one or more dial peers for your 911 callers with the **emergency response zone** command.

You might need to configure multiple dial peers for different destination-patterns.

Step 6 Configure one or more dial peers for the PSAP's 911 callbacks with the **emergency response callback** command.

Step 7 Decide what method to use to assign ERLs to phones.

You have the following choices:

- For a group of phones that are on the same subnet, you can create an IP subnet in the ERL that includes each phone's IP address. Each ERL can have one or two unique IP subnets. This is the easiest option to configure. Table 3: Definitions of ERL, Description, IP Subnets, and ELIN, on page 8 shows an example.

Table 3: Definitions of ERL, Description, IP Subnets, and ELIN

ERL Number	Description	IP Address Assignment	ELIN
1	Building 2, 1st floor	10.5.124.xxx	408 555-0142
2	Building 2, 2nd floor	10.7.xxx.xxx	408 555-0143
3 & 4	Building 2, 3rd floor	10.8.xxx.xxx and 10.9.xxx.xxx	408 555-0144 and 408 555-0145

- You can assign an ERL explicitly to a group of phones by using the ephone-template or voice register template configurations. Instead of assigning an ERL to phones individually, you can use these templates to save time if you want to apply the same set of features to several SCCP phones or SIP phones.
- You can assign an ERL to a phone individually. Depending on which type of phone you have, you can use one of three methods. You can assign an ERL to a phone's:
  - Dial-peer configuration
  - Ephone configuration (SCCP phones)
  - Voice register pool configuration (SIP phones)

Table 4: Explicit ERL Assignment Per Phone, on page 9 shows examples of each of these options.

Table 4: Explicit ERL Assignment Per Phone

Phone Configuration	ERL
Dial-peer voice 213 pots	3
Dial-peer voice 214 voip	4
Ephone 100	3
Voice register pool 1	2

Step 8 (Optional) Define a default ELIN to be sent to the PSAP for use if a 911 caller's IP phone's address does not match the IP subnet of any location in any zone.

Step 9 (Optional) Define a designated callback number that is used if the callback information is removed from the Last Caller table because of an expiry timeout or system restart.

Step 10 (Optional) Change the expiry time for data in the Last Caller table from the default time of three hours.

Step 11 (Optional) Enable RADIUS accounting or the syslog service to permanently record call detail records.

Interactions with Existing Cisco Unified CME Features

Enhanced 911 Services interacts with several Cisco Unified CME features. The interactions with each of the following features are described in separate sections below:



Note Your version of Cisco Unified CME may not support all of these features.

Multiple Usages of an ELIN



Note We recommend that you do not use ELINs for any other purpose because of possible unexpected interactions with existing Cisco Unified CME features.

Examples of using ELINs for other purposes include configuring an ELIN for use as an actual phone number (ephone-dn, voice register dn, FXS destination-pattern), a Call Pickup number, or an alias rerouting number.

Using ELINs as an actual phone number causes problems when calls are made to that number. If a 911 call occurs and the last caller information has not expired from the Last Caller table, any outside callers will reach the last 911 caller instead of the actual phone. We recommend that you do not share the phone numbers used for ELINs with real phones.

There is no impact on outbound 911 calls if you use the same number for an ELIN and a real phone number.

Number Translation

The Enhanced 911 feature translates the calling number to an ELIN during an outbound 911 call, and translates the called-number to the last caller’s extension during a 911 callback (when the PSAP makes a callback to

the 911 caller). Alternative methods of number translation can conflict with the translation done by the Enhanced 911 software, such as:

- Dialplan-pattern—Prefixes a pattern to an extension configured under telephony-service
- Num-expansion—Expands extensions to full E.164 numbers
- Voice-port translation of called and calling numbers
- Outgoing number translation for dial peers
- Translate-profile for dial peers
- Voice translation profiles done for the dial peer, voice-port, POTS voice service, trunk group, trunk group member, voice source-group, call-manager-fallback, and ephone-dn
- Ephone-dn translation
- Voice register dn's outgoing translation

Configuring these translation features impacts the Enhanced 911 feature if they translate patterns that are part of your ELINs' patterns. For an outgoing 911 call, these features might translate an Enhanced 911 ELIN to a different number, giving the PSAP a number they cannot look-up in their ALI databases. If the 911 callback number (ELIN) is translated before Enhanced 911 callback processing, the Enhanced 911 feature is unable to find the last caller's history.

Call Transfer

If a phone in a Cisco Unified CME environment performs a semi attended or consultative transfer to the PSAP that involves another phone that is in a different ERL, the PSAP will use the wrong ELIN. The PSAP will see the ELIN of the transferor party, not the transferred party.

There is no impact on 911 callbacks (calls made by the PSAP back to a 911 caller) or transfers that are made by the PSAP.

A 911 caller can transfer the PSAP to another party if there is a valid reason to do so. Otherwise, we recommend that the 911 caller remain connected to the PSAP at all times.

Call Forward

There is no impact if an IP phone user calls another phone that is configured to forward calls to the PSAP.

If the PSAP makes a callback to a 911 caller that is using a phone that has Call Forward enabled, the PSAP is redirected to a party that is not the original 911 caller.

Call Blocking Features

Outbound 911 calls can be blocked by features such as After-Hours Call Blocking if the system administrator does not create an exception to 911 calls.

911 callbacks will not reach the 911 caller if the phone is configured with a blocking feature (for example, Do Not Disturb).

Call Waiting

After a 911 call is established with a PSAP, call waiting can interrupt the call. The 911 caller has the choice of putting the operator on hold. Although holding is not prohibited, we recommend that the 911 caller remain connected to the PSAP until the call is over.

Three-Way Conference

Although the 911 caller is allowed to activate three-way conferencing when talking to the PSAP, we recommend that the 911 caller remain connected privately to the PSAP until the call is over.

Dial-Peer Rotary

If a 911 caller uses a rotary phone, you must configure each dial peer with the **emergency response zone** command for the call to be processed as an Enhanced 911 call. Otherwise, calls received on dial peers that are not configured for Enhanced 911 functionality are treated as regular calls and there is no ELIN translation.

Do not configure two dial peers with the same destination-pattern to route to different PSAPs. The caller's number will not be translated to two different ELINs and the two dial peers will not route to different PSAPs. However, you can route calls to different PSAPs if you configure the dial peers with different destination-patterns (for example, 9911 and 95105558911). You might need to use the number translation feature or add prefix/forward-digits to change the 95105558911 to 9911 for the second dial peer if a specific called-number is required by the service provider.



Caution We recommend that you do not configure the same dial peer using both the **emergency response zone** and **emergency response callback** commands.

Dial Plan Patterns

Dial plan patterns expand the caller's original extension number into a fully qualified E.164 number. If an ERL is found for a 911 caller, the expanded number is translated to an ELIN.

For 911 callbacks, the called-number is translated to the 911 caller's expanded number.

Caller ID Blocking

When you set Caller ID Blocking for an ephone or voice-port configuration, the far-end gateway device blocks the display of the calling party information. This feature is overridden when an Enhanced 911 call is placed because the PSAP must receive the ELIN (the calling party information).

The Caller ID Blocking feature does not impact callbacks.

Shared Line

The Shared Line feature allows multiple phones to share a common directory number. When a shared line receives an incoming call, each phone rings. Only the first user that answers the call is connected to the caller.

The Shared Line feature does not affect outbound 911 calls.

For 911 callbacks, all phones sharing the directory number will ring. Therefore, someone who did not originate the 911 call might answer the phone and get connected to the PSAP. This could cause confusion if the PSAP needs to talk only with the 911 caller.

Configure Enhanced 911 Services

Configure the Emergency Response Location

Perform this procedure to create the ERL. The ERL defines an area that allows emergency teams to quickly locate a caller.

The ERL can define zero, one, or two ELINs. If one ELIN is defined, this ELIN is always used for phones calling from this ERL. If you define two ELINs, the system alternates using each ELIN for phones calling from this ERL. If you define no ELINs and phones use this ERL, the outbound calls do not have their calling numbers translated. The PSAP sees the original calling numbers for these 911 calls.

If multiple ERLs are created, the Enhanced 911 software uses the ERL tag number to determine which ELIN to use. The Enhanced 911 software searches the ERLs sequentially from tag 1 to 2147483647. The first ERL that has a subnet mask encompassing the caller's IP address is used for ELIN translation.

Before you begin

- Cisco Unified CME 4.1 or a later version.
- The **address** and **name** commands are supported in Cisco Unified CME 4.2 and later versions.
- Plan your 911 configuration as described in Plan Your Implementation of Enhanced 911 Services, on page 7

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **voice emergency response location** *tag*
4. **elin** [**1** | **2**] *E.164-number*
5. **address** *address*
6. **name** *name*
7. **end**

DETAILED STEPS

Procedure

	Command or Action	Purpose
Step 1	**enable** **Example:** `Router> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**configure terminal** **Example:** `Router# configure terminal`	Enters global configuration mode.

	Command or Action	Purpose
Step 3	**voice emergency response location** *tag* **Example:** `Router(config)# voice emergency response location 4`	Enters emergency response location configuration mode to define parameters for an ERL.
Step 4	**elin** [**1** | **2**] *E.164-number* **Example:** `Router(cfg-emrgncy-resp-location)# elin 14085550100`	(Optional) Specifies the ELIN, an E.164 PSTN number that replaces the caller's extension. • This number is displayed on the PSAP's terminal and is used by the PSAP to query the ALI database to locate the caller. It is also used by the PSAP for callbacks. You can define a second ELIN using the optional elin 2 command. If an ELIN is not defined for the ERL, the PSAP sees the original calling number.
Step 5	**address** *address* **Example:** `Router(cfg-emrgncy-resp-location)# address I,604,5550100, ,184 ,Main St,Kansas City,KS,1,`	(Optional) Defines a comma-separated string used for the automatic location identification (ALI) database upload of the caller's address. • String must conform to the record format that is required by the service provider. The string maximum is 247 characters. • Address is saved as part of the E911 ERL configuration. When used with the **show voice emergency addresses** command, the address information can be saved to a text file. • This command is supported in Cisco Unified CME 4.2 and later versions.
Step 6	**name** *name* **Example:** `Router(cfg-emrgncy-resp-location)# name Bldg C, Floor 2`	(Optional) Defines a 30-character string used internally to identify or describe the emergency response location. • This command is supported in Cisco Unified CME 4.2 and later versions.
Step 7	**end** **Example:** `Router(cfg-emrgncy-resp-location)# end`	Returns to privileged EXEC mode.

Configure Locations under Emergency Response Zones

In the configuration of emergency response zones, a list of locations within a zone is created using location tags. The zone configuration allows a ranking of the locations which controls the order of ERL searches when there are multiple PSAPs. The **zone** command is not used if all 911 calls on the system are routed to a single PSAP.

Before you begin

- Cisco Unified CME 4.2 or a later version
- Define your ERLs as described in Configure the Emergency Response Location, on page 12.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **voice emergency response zone** *tag*
4. **location** *location-tag* [**priority** *number*]
5. **end**

DETAILED STEPS

Procedure

	Command or Action	Purpose
Step 1	**enable** **Example:** `Router> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**configure terminal** **Example:** `Router# configure terminal`	Enters global configuration mode.
Step 3	**voice emergency response zone** *tag* **Example:** `Router(config)# voice emergency response zone 10`	Enters voice emergency response zone configuration mode to define parameters for an emergency response zone. • *tag*—Range is 1-100.
Step 4	**location** *location-tag* [**priority** *number*] **Example:** `Router(cfg-emrgncy-resp-zone)# location 8 priority 2`	Each location tag must correspond to a location tag created using the **voice emergency response location** command. • *number*—(optional) Ranks the location in the zone list. Range is 1-100, with 1 being the highest priority. • Repeat this command for each location included in the zone.
Step 5	**end** **Example:** `Router(cfg-emrgncy-resp-zone)# end`	Returns to privileged EXEC mode.

Configure Outgoing Dial Peers for Enhanced 911 Services

Depending on whether you decided to configure emergency response zones while you planned your 911 configuration as described in Plan Your Implementation of Enhanced 911 Services, on page 7, use one of the following procedures:

- If you decided to not use zones, see Configure Dial Peers for Emergency Calls, on page 15.
- If you decided to use zones, see Configure Dial Peers for Emergency Response Zones, on page 16.

Configure Dial Peers for Emergency Calls

Perform this procedure to create a dial peer for emergency calls to the PSAP. The destination-pattern of this dial peer is usually some variation of 911, such as 9911. This dial peer uses the port number of the CAMA or PRI network interface card. The new command **emergency response zone** specifies that this dial peer translates the calling number of any outgoing call's to an ELIN.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **dial-peer voice** *number* **pots**
4. **destination-pattern** *n* **911**
5. **prefix** *number*
6. **emergency response zone**
7. **end**

DETAILED STEPS

Procedure

	Command or Action	Purpose
Step 1	**enable** **Example:** `Router> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**configure terminal** **Example:** `Router# configure terminal`	Enters global configuration mode.
Step 3	**dial-peer voice** *number* **pots** **Example:** `Router(config)# dial-peer voice 911 pots`	Enters dial-peer configuration mode to define parameters for an individual dial peer.
Step 4	**destination-pattern** *n* **911** **Example:** `Router(config-dial-peer)# destination-pattern 9911`	Matches dialed digits to a telephony device. The digits included in this command specify the E.164 or private dialing plan telephone number. For Enhanced 911 Services, the digits are usually some variation of 911.

	Command or Action	Purpose
Step 5	**prefix** *number* **Example:** `Router(config-dial-peer)# prefix 911`	(Optional) Includes a prefix that the system adds automatically to the front of the dial string before passing it to the telephony interface. For Enhanced 911 Services, the dial string is some variation of 911.
Step 6	**emergency response zone** **Example:** `Router(config-dial-peer)# emergency response zone`	Defines this dial peer as the one to use to route all ERLs defined in the system to the PSAP.
Step 7	**end** **Example:** `Router(config-dial-peer)# end`	Returns to privileged EXEC mode.

Configure Dial Peers for Emergency Response Zones

You can selectively route a 911 call based on the ERL by assigning different zones to dial peers. The **emergency response zone** command identifies the dial peer that routes the 911 call and the voice interface to use. Only ERLs that are defined in the zone can be routed on the dial peer. Callers dialing the same emergency number are routed to different voice interfaces based on the zone of the ERL.

Before you begin

- Cisco Unified CME 4.2 or a later version
- Define your ERLs and emergency response zones as described in:
  - Configure the Emergency Response Location, on page 12
  - Configure Locations under Emergency Response Zones, on page 13

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **dial-peer voice** *number* **pots**
4. **destination-pattern** *n***911**
5. **prefix number**
6. **emergency response zone** *tag*
7. **end**

DETAILED STEPS

Procedure

	Command or Action	Purpose
Step 1	**enable**	Enables privileged EXEC mode.

	Command or Action	Purpose
	Example: `Router> enable`	• Enter your password if prompted.
Step 2	**configure terminal** **Example:** `Router# configure terminal`	Enters global configuration mode.
Step 3	**dial-peer voice** *number* **pots** **Example:** `Router(config)# dial-peer voice 911 pots`	Enters dial-peer configuration mode to define parameters for an individual dial peer.
Step 4	**destination-pattern** *n***911** **Example:** `Router(config-dial-peer)# destination-pattern 9911`	Matches dialed digits to a telephony device. The digits included in this command specify the E.164 or private dialing plan telephone number. For E911 services, the digits are usually some variation of 911.
Step 5	**prefix number** **Example:** `Router(config-dial-peer)# prefix 911`	(Optional) Includes a prefix that the system adds automatically to the front of the dial string before passing it to the telephony interface. For E911 services, the dial string is some variation of 911.
Step 6	**emergency response zone** *tag* **Example:** `Router(config-dial-peer)# emergency response zone 10`	Defines this dial peer as the one that is used to route ERLs defined for that zone. • *tag*—Points to an existing configured zone. Range is 1-100.
Step 7	**end** **Example:** `Router(config-dial-peer)# end`	Returns to privileged EXEC mode.

Configure a Dial Peer for Callbacks from the PSAP

Perform this procedure to create a dial peer for 911 callbacks from the PSAP. This dial peer enables the PSAP to use the ELIN to make callbacks. When a call arrives that matches this dial peer, the **emergency response callback** command instructs the system to find the last caller that used the ELIN and translate the destination number of the incoming call to the extension of the last caller.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **dial-peer voice** *number* **pots**
4. **incoming called-number** *number*
5. **direct-inward-dial**
6. **emergency response callback**
7. **end**

DETAILED STEPS

Procedure

	Command or Action	Purpose
Step 1	**enable** **Example:** `Router> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**configure terminal** **Example:** `Router# configure terminal`	Enters global configuration mode.
Step 3	**dial-peer voice** *number* **pots** **Example:** `Router(config)# dial-peer voice 100 pots`	Enters dial-peer configuration mode to define parameters for an individual dial peer.
Step 4	**incoming called-number** *number* **Example:** `Router(config-dial-peer)# incoming called-number 4085550100`	(Optional) Selects the inbound dial peer based on the called number to identify the last caller. This number is the ELIN.
Step 5	**direct-inward-dial** **Example:** `Router(config-dial-peer)# direct-inward-dial`	(Optional) Enables the Direct Inward Dialing (DID) call treatment for the incoming called number. For more information, see the chapter *Configuring Voice Ports* in the Cisco Voice, Video, and Fax Configuration Guide.
Step 6	**emergency response callback** **Example:** `Router(config-dial-peer)# emergency response callback`	Identifies a dial peer as an ELIN dial peer.
Step 7	**end** **Example:** `Router(config-dial-peer)# end`	Returns to privileged EXEC mode.

Assign ERLs to Phones

You must specify an ERL for each phone. The type of phones that you have determines which of the following tasks you use to associate an ERL with your phones, as explained in *Step 7* in Plan Your Implementation of Enhanced 911 Services, on page 7.

- To create an IP subnet in the ERL that includes each phone's IP address, you must also configure each ERL to specify which phones are part of the ERL. See Assign an ERL to a Phone's IP Subnet, on page 19. You can optionally specify up to two different subnets.
- To assign an ERL to a SIP phone, you must specify the ERL in the voice register pool configuration. See Assign an ERL to a SIP Phone, on page 20.

- To assign an ERL to a SCCP phone, you must specify the ERL in the ephone configuration. See Assign an ERL to a SCCP Phone, on page 21.
- To assign an ERL to a phone's dial peer, you must specify the ERL in the dial-peer configuration. See Assign an ERL to a Dial Peer, on page 22.

Prerequisites for Assigning ERLs to Phones

Define your ERLs and emergency response zones as described in the Configure the Emergency Response Location, on page 12.

Assign an ERL to a Phone's IP Subnet

Use this procedure when you have a group of phones that are on the same subnet. You can configure an ERL to be associated with one or two unique IP subnets. This indicates that all IP phones in a specific subnet use the ELIN defined in this ERL.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **voice emergency response location** *tag*
4. **subnet** [**1** | **2**] *IPaddress-mask*
5. **end**

DETAILED STEPS

Procedure

	Command or Action	Purpose
Step 1	**enable** **Example:** `Router> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**configure terminal** **Example:** `Router# configure terminal`	Enters global configuration mode.
Step 3	**voice emergency response location** *tag* **Example:** `Router(config)# voice emergency response location 4`	Enters emergency response location configuration mode to define parameters for an ERL.
Step 4	**subnet** [**1** | **2**] *IPaddress-mask* **Example:** `Router(cfg-emrgncy-resp-location)# subnet 1 192.168.0.0 255.255.0.0`	Defines the groups of IP phones that are part of this location. You can create up to 2 different subnets. • To include all IP phones on a single ERL, use the command **subnet 1 0.0.0.0 0.0.0.0** to configure a default subnet. This subnet does not apply to

	Command or Action	Purpose
		nonIP-phone endpoints, such as phones on VoIP trunks or FXS/FXO trunks.
Step 5	**end** **Example:** `Router(cfg-emrgncy-resp-location)# end`	Returns to privileged EXEC mode.

Assign an ERL to a SIP Phone

Perform this procedure if you chose to assign a specific ERL to a SIP phone instead of using the phone's IP address to match a subnet defined for an ERL. For more information about this decision, see *Step 7* in Plan Your Implementation of Enhanced 911 Services, on page 7.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **voice register pool** *tag*
4. **emergency response location** *tag*
5. **end**

DETAILED STEPS

Procedure

	Command or Action	Purpose
Step 1	**enable** **Example:** `Router> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**configure terminal** **Example:** `Router# configure terminal`	Enters global configuration mode.
Step 3	**voice register pool** *tag* **Example:** `Router(config)# voice register pool 8`	Enters voice register pool mode to define parameters for an individual voice register pool.
Step 4	**emergency response location** *tag* **Example:** `Router(config-register-pool)# emergency response location 12`	Assigns an ERL to a phone s voice register pool using an ERL s tag. • *tag*—Range is 1 to 2147483647. • If the ERL's tag is not a configured tag, the phone is not associated to an ERL and the phone defaults to its IP address to find the inclusive ERL subnet.

	Command or Action	Purpose
		• This command can also be configured in voice register template configuration mode and applied to one or more phones. The voice register pool configuration has priority over the voice register template configuration.
Step 5	**end** **Example:** `Router(config-register-pool)# end`	Returns to privileged EXEC mode.

Assign an ERL to a SCCP Phone

Perform this procedure if you chose to assign an ERL to a SCCP phone instead of configuring an ERL to be associated with IP subnets. For more information about this decision, see *Step 7* in Plan Your Implementation of Enhanced 911 Services, on page 7.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **ephone** *tag*
4. **emergency response location** *tag*
5. **end**

DETAILED STEPS

Procedure

	Command or Action	Purpose
Step 1	**enable** **Example:** `Router> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**configure terminal** **Example:** `Router# configure terminal`	Enters global configuration mode.
Step 3	**ephone** *tag* **Example:** `Router(config)# ephone 224`	Enters ephone configuration mode to define parameters for an individual ephone.
Step 4	**emergency response location** *tag* **Example:** `Router(config-ephone)# emergency response location 12`	Assigns an ERL to a phone s ephone configuration using an ERL s tag. • *tag*—Range is 1 to 2147483647.

	Command or Action	Purpose
		• If the ERL's tag is not a configured tag, the phone is not associated to an ERL and the phone defaults to its IP address to find the inclusive ERL subnet. • This command can also be configured in ephone-template configuration mode and applied to one or more phones. The ephone configuration has priority over the ephone-template configuration.
Step 5	**end** **Example:** `Router(config-ephone)# end`	Returns to privileged EXEC mode.

Assign an ERL to a Dial Peer

Perform this procedure to assign an ERL to a FXS/FXO or VoIP dial peer. Because these interfaces do not have IP addresses associated with them, you must use this procedure instead of configuring an ERL to be associated with IP subnets. For more information about this decision, see *Step 7* in Plan Your Implementation of Enhanced 911 Services, on page 7.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **dial-peer voice** *tag type*
4. **emergency response location** *tag*
5. **end**

DETAILED STEPS

Procedure

	Command or Action	Purpose
Step 1	**enable** **Example:** `Router> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**configure terminal** **Example:** `Router# configure terminal`	Enters global configuration mode.
Step 3	**dial-peer voice** *tag type* **Example:** `Router(config)# dial-peer voice 100 pots`	Enters dial peer configuration mode to define parameters for an individual dial peer.

	Command or Action	Purpose
Step 4	**emergency response location** *tag* **Example:** `Router(config-dial-peer)# emergency response location 12`	Assigns an ERL to a phone s dial peer configuration using an ERL's tag. The tag is an integer from 1 to 2147483647. If the ERL's tag is not a configured tag, no translation occurs and no Enhanced 911 information is saved to the last emergency caller table.
Step 5	**end** **Example:** `Router(config-dial-peer)# end`	Returns to privileged EXEC mode.

Customize E911 Settings

The E911 settings you can customize are:

- **Elin**: The default ELIN. If a 911 caller's IP phone address does not match the subnet of any location in any zone, the default ELIN is used to replace the original automatic number identification (ANI). The default ELIN can be already defined in one of the ERLs or can be unique. If a default ELIN is not defined and there is no match for the 911 caller's IP address, the PSAP sees the ANI for callback purposes. A syslog message is sent requesting the default ELIN, and no caller location information is available to the PSAP.
- **Expiry**: The number of minutes a 911 call is associated to an ELIN in case of a callback from the 911 operator. The callback expiry can be changed from a default of 3 hours to any time between 2 minutes and 48 hours. The timer is started the moment the 911 call goes to the PSAP. The PSAP can call back the ELIN and reach the last caller within this expiry time.
- **Callback**: The default phone number to contact if a 911 callback cannot find the last 911 caller from the Last Caller table. This can happen if the callback occurs after a router has rebooted or if the expiration has elapsed.
- **Logging**: A syslog informational message is printed to the console every time an emergency call is made. Such a message is required for third party applications to send an e-mail or page to an in-house emergency administrator. This is a default feature that can be disabled using the **no logging** command. The following is an example of a syslog notification message:

```
%E911-5-EMERGENCY_CALL_PLACED: calling #[4085550100] called
#[911] ELIN [4085550199]
```

Before you begin

- Cisco Unified CME 4.2 or a later version

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **voice emergency response settings**
4. **expiry** *time*
5. **callback** *number*

6. **logging**
7. **elin** *number*
8. **end**

DETAILED STEPS

Procedure

	Command or Action	Purpose
Step 1	**enable** **Example:** `Router> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**configure terminal** **Example:** `Router# configure terminal`	Enters global configuration mode.
Step 3	**voice emergency response settings** **Example:** `Router(config)# voice emergency response settings`	Enters voice emergency response settings mode to define settings you can customize for E911 calls.
Step 4	**expiry** *time* **Example:** `Router(cfg-emrgncy-resp-settings)# expiry 300`	(Optional) Defines the time period (in minutes) that the emergency caller history information for each ELIN is stored in the Last Caller table. The time can be an integer in the range of 2 minutes to 2880 minutes. The default value is 180 minutes.
Step 5	**callback** *number* **Example:** `Router(cfg-emrgncy-resp-settings)# callback 7500`	(Optional) Defines the E.164 callback number (for example, a company operator or main help desk) if a 911 callback cannot find the last caller associated to the ELIN.
Step 6	**logging** **Example:** `Router(cfg-emrgncy-resp-settings)# no logging`	(Optional) Enables syslog messages that announce every emergency call. The syslog messages can be tracked to send pager or e-mail notifications to an in-house support number. By default, logging is enabled. Use the **no** form of this command to disable logging.
Step 7	**elin** *number* **Example:** `Router(cfg-emrgncy-resp-settings)# elin 4085550100`	Specifies the E.164 number to be used as the default ELIN if no ERL has a subnet mask that matches the current 911 caller s IP phone address.
Step 8	**end** **Example:** `Router (cfg-emrgncy-resp-settings)# end`	Returns to privileged EXEC mode.

Using the Address Command for Two ELINS

For ERLs that have two ELINs defined, you cannot use just one **address** field to have two address entries for each ELIN in the ALI database. Instead of entering the specific phone number, a key phrase is entered to represent each ELIN. The **show voice emergency address** command produces output that replaces the key phrase with the ELIN information and generates two lines of addresses.

To define the expression, use the keyword *elin* (context-insensitive), followed by a period, the starting position of the ELIN to use, followed by another period, and finally the ending position of the ELIN. For example:

```
address I,ELIN.1.3,ELIN.4.7,678 ,Alder Drive ,Milpitas ,CA,95035
```

In the example, the second parameter of **address** following I are digits 1-3 of each ELIN. The third parameter are digits 4-7 of each ELIN. When you enter the **show voice emergency address** command, the output will replace the key phrase as seen in the following:

```
I,408,5550101,678,Alder Drive ,Milpitas ,CA,95035
I,408,5550190,678,Alder Drive ,Milpitas ,CA,95035
```

Enable Call Detail Records

To conform to internal policy or external regulations, you may be required to save 911 call history data including the following information:

- Original caller's extension
- ELIN information
- ERL information (the integer tag and the text name)
- Original caller's phone IP address

These attributes are visible from the RADIUS accounting server and syslog server output, or by using the **show call history voice** command.

Note You must enable the RADIUS server or the syslog server to display these details. See your RADIUS or syslog server documentation.

Output from a RADIUS Accounting Server

For RADIUS accounting, the emergency call information is under a feature-vsa record. The fields are:

- EMR: Emergency call
- CGN: Original calling number
- ELIN: Emergency line identification number; the translated number
- CDN: Called number
- ERL: Emergency response location tag number
- ERLN: Emergency response location name; the name entered for the ERL, if one exists

- CIP: Caller's IP address; nonzero for implicit ERL assignments
- ETAG: ERL tag; nonzero for explicit ERL assignments

The following shows an output example from a RADIUS server:

```
*Jul 18 15:37:43.691: RADIUS: Cisco AVpair [1] 202 "feature-vsa=fn:EMR
,ft:07/18/2007 15:37:32.227,frs:0,fid:6,fcid:A2444CAF347B11DC8822F63A1B4078DE,
legID:57EC,cgn:6045550101,elin:6045550199,cdn:911,erl:2,erln:Fisco,cip:1.5.6.200,etag:0"
```

Output from a Syslog Server

If gateway accounting is directed to the syslog server, a VOIP_FEAT_HISTORY system message appears. The feature-vsa parameters are the same ones described for RADIUS accounting.

The following shows an output example from a syslog server:

```
*Jul 18 15:37:43.675: %VOIPAAA-5-VOIP_FEAT_HISTORY: FEAT_VSA=fn:EMR,ft:07/18/2007
15:37:32.227,frs:0,fid:6,fcid:A2444CAF347B11DC8822F63A1B4078DE,legID:57EC,cgn:6045550199,
elin:6045550100,cdn:911,erl:2,erln:ABCDEFGHIJKLMNOPQRSTUVWXYZ123,cip:1.5.6.200,etag:0,
bguid:A23F6AD7347B11DC881DF63A1B4078DE
```

Output from the show call history voice Command

View emergency call information on the gateway using **show call active voice** and **show call history voice**. Some emergency call information is already in existing fields. The original caller's number is under *OriginalCallingNumber*. The ELIN is at *TranslatedCallingNumber*. The four new fields are the ERL, ERL name, the calling phone's IP address, and any explicit ERL assignments. These fields only appear if an ELIN translation occurs. For example, any 911 calls from an ERL with no ELIN defined do not print the four emergency fields in the **show call** commands. If no ERLs match the calling phone and the default ELIN is used, the ERL field displays *No Match*.

The following shows an output example using the **show call history voice** command:

```
EmergencyResponseLocation=3 (Cisco Systems 3)
ERLAssignment=3
DeviceIPAddress=1.5.6.202
```

Verify E911 Configuration

New **show** commands are introduced to display E911 configuration or usage.

- Use the **show voice emergency callers** command to see the translations made by outbound 911 calls. This command lists the originating number, the ELIN used, and the time for each 911 call. This history is active for only three hours after the call is placed. Expired calls are not shown in this output.

  ```
  router# show voice emergency callers

  EMERGENCY CALLS CALL BACK table
  ELIN                    | CALLER                  | TIME
  6045550100              | 6045550150              | Oct 12 2006 03:59:43
  6045550110              | 8155550124              | Oct 12 2006 04:05:21
  ```

- Use the **show voice emergency** command to display IP addresses, subnet masks, and ELINs for each ERL.

```
Router# show voice emergency

EMERGENCY RESPONSE LOCATIONS
ERL               | ELIN 1     | ELIN2      | SUBNET 1 | SUBNET 2
1                 | 6045550101 |            | 10.0.0.0        | 255.0.0.0
2                 | 6045550102 | 6045550106 | 192.168.0.0     | 255.255.0.0
3                 |            | 6045550107 | 172.16.0.0      | 255.255.0.0
4                 | 6045550103 |            | 192.168.0.0     | 255.255.0.0
5                 | 6045550105 |            | 209.165.200.224 | 255.0.0.0
6 6045550198      |            | 6045550109 | 209.165.201.0   | 255.255.255.224
```

- Use the **show voice emergency addresses** command to display address information for each ERL.

```
Router# show voice emergency addresses

3850 Zanker Rd, San Jose,604,5550101
225 W Tasman Dr, San Jose,604,5550102
275 W Tasman Dr, San Jose,604,5550103
518 Bellew Dr,Milpitas,604,5550104
400 Tasman Dr,San Jose,604,5550105
3675 Cisco Way,San Jose,604,5550106
```

- Use the **show voice emergency all** command to display all ERL information.

```
Router# show voice emergency all

VOICE EMERGENCY RESPONSE SETTINGS
   Callback Number: 6045550103
   Emergency Line ID Number: 6045550155
   Expiry: 2 minutes
   Logging Enabled

EMERGENCY RESPONSE LOCATION 1
   Name: Cisco Systems 1
   Address: 3850 Zanker Rd, San Jose,elin.1.3,elin.4.10
   IP Address 1: 209.165.200.226 IP mask 1: 255.255.255.254
   IP Address 2: 209.165.202.129 IP mask 2: 255.255.0.0
   Emergency Line ID 1: 6045550180
   Emergency Line ID 2:
   Last Caller:  6045550188 [Jan 30 2007 16:05.52 PM]
   Next ELIN For Emergency Call: 6045550166

EMERGENCY RESPONSE LOCATION 3
   Name: Cisco Systems 3
   Address: 225 W Tasman Dr, San Jose,elin.1.3,elin.4.10
   IP Address 1: 209.165.202.133 IP mask 1: 255.255.0.0
   IP Address 2: 209.165.202.130 IP mask 2: 255.0.0.0
   Emergency Line ID 1:
   Emergency Line ID 2: 6045550150
   Last Caller:
   Next ELIN For Emergency Call: 6045550151
```

- Use the **show voice emergency zone** command to display each zone's list of locations in order of priority.

```
Router# show voice emergency zone

EMERGENCY RESPONSE ZONES
 zone 90
```

```
      location 4
      location 5
      location 6
      location 7
      location 2147483647
   zone 100
      location 1 priority 1
      location 2 priority 2
      location 3 priority 3
```

Troubleshooting Enhanced 911 Services

Procedure

Use the **debug voice application error** and the **debug voice application callsetup** command. These are existing commands for calls made using the default session or TCL applications.

This example shows the debug output when a call to 911 is made:

```
Router# debug voice application error
Router# debug voice application callsetup

Nov 10 23:49:05.855: //emrgncy_resp_xlate_callingNum: InDialPeer[20001], OutDialPeer[911]
callingNum[6046692003]
Nov 10 23:49:05.855: //ER_HistTbl_Find_CallHistory: 6046699100
Nov 10 23:49:05.855: //59//Dest:/DestProcessEmergencyCall: Emergency Call detected: Using ELIN
6046699100
```

This example shows the debug output when a PSAP calls back an emergency caller:

```
Router# debug voice application error
Router# debug voice application callsetup

Nov 10 23:49:37.279: //emrgncy_resp_xlate_calledNum: calledNum[6046699100], dpeerTag[6046699]
Nov 10 23:49:37.279: //ER_HistTbl_Find_CallHistory: 6046699100
Nov 10 23:49:37.279: //HasERHistoryExpired: elapsedTime[10 minutes]
Nov 10 23:49:37.279: //67//Dest:/DestProcessEmergencyCallback: Emergency Response Callback:
Forward to 6046692003.
Nov 10 23:49:37.279: //67//Dest:/DestCaptureCallForward: forwarded to 6046692003 reason 1
```

Error Messages

The Enhanced 911 feature introduces a new system error message. The following error message displays if a 911 callback cannot route to the last 911 caller because the saved history was lost because of a reboot, an expiration of an entry, or a software error:

```
%E911_NO_CALLER:  Unable to contact last 911 caller.
```

Configuration Examples for Enhanced 911 Services

Example for Configuring Enhanced E911 Services with Cisco Unified CME 4.2

Emergency response settings are:

- default elin if no elin match is found: 604 555-0120
- expiry time for information in the Last Caller table: 180 minutes
- callback number if the PSAP operator must call back the 911 caller and the call back history has expired: 604 555-0199

Zone 1 has four locations, 1, 2, 3, and 4, and a name, address, and elin are defined for each location. Each of the four locations is assigned a priority. In this example, because location 4 has been assigned the highest priority, it is the first that is searched for IP subnet matches to identify the ELIN assigned to the 911 caller's phone. A dial peer is configured to route 911 calls to the PSAP (voice port 1/0/0). Callback dial peers are also configured.

```
!
voice emergency response settings
elin 6045550120
expiry 180
callback 6045550199
!
voice emergency response location 1
name Bldg C, Floor 1
address I,604,5550135, ,184 ,Main St,Kansas City,KS,1,
elin 1 6045550125
subnet 1 172.16.0.0 255.255.0.0
!
voice emergency response location 2
name Bldg C, Floor 2
address I,elin.1.3,elin.4.7, ,184 ,Main St,Kansas City,KS,2,
elin 1 6045550126
elin 2 6045550127
subnet 1 192.168.0.0 255.255.0.0
!
voice emergency response location 3
name Bldg C, Floor 3
address I,604,5550138, ,184 ,Main St,Kansas City,KS,3,
elin 2 6045550128
subnet 1 209.165.200.225 255.255.0.0
subnet 2 209.165.200.240 255.255.0.0
!
voice emergency response location 4
name Bldg D
address I,604,5550139, ,192 ,Main St,Kansas City,KS,
elin 1 6045550129
subnet 1 209.165.200.231 255.255.0.0
!
voice emergency response zone 1
location 4 priority 1
location 3 priority 2
location 2 priority 3
location 1 priority 4
!
```

```
dial-peer voice 911 pots
description Public Safety Answering Point
emergency response zone 1
destination-pattern 911
port 1/0/0
!
dial-peer voice 6045550 voip
emergency response callback
destination-pattern 6045550...
session target loopback:rtp
codec g711ulaw
!
dial-peer voice 1222 pots
emergency response location 4
destination-pattern 6045550130
port 1/0/1
!
dial-peer voice 5550144 voip
emergency response callback
session target ipv4:1.5.6.10
incoming called-number 604555....
codec g711ulaw
!
```

Example for Configuring Enhanced E911 Services with Cisco Unified CME 4.1 in SRST Fallback Mode

In this example, Enhanced 911 Services is configured to assign an ERL to the following:

- The 10.20.20.0 IP subnet
- Two dial peers
- An ephone
- A SI P phone

```
Router#show running-config

Building configuration...

Current configuration : 7557 bytes
!
version 12.4
service timestamps debug datetime msec
service timestamps log datetime msec
no service password-encryption
!
hostname rm-uut3-2821
!
boot-start-marker
boot-end-marker
!
no logging console
!
no aaa new-model
network-clock-participate wic 1
network-clock-participate wic 2
no network-clock-participate wic 3
!
```

```
!
!
ip cef
no ip dhcp use vrf connected
!
ip dhcp pool sccp-7912-phone1
host 10.20.20.122 255.255.0.0
client-identifier 0100.1200.3482.cd
default-router 10.20.20.3
option 150 ip 10.21.20.218
!
ip dhcp pool sccp-7960-phone2
host 10.20.20.123 255.255.0.0
client-identifier 0100.131a.a67d.cf
default-router 10.20.20.3
option 150 ip 10.21.20.218
dns-server 10.20.20.3
!
ip dhcp pool sip-phone1
host 10.20.20.121 255.255.0.0
 client-identifier 0100.15f9.b38b.a6
default-router 10.20.20.3
option 150 ip 10.21.20.218
!
ip dhcp pool sccp-7960-phone1
host 10.20.20.124 255.255.0.0
client-identifier 0100.14f2.37e0.00
default-router 10.20.20.3
option 150 ip 10.21.20.218
dns-server 10.20.20.3
!
!
no ip domain lookup
ip host rm-uut3-c2821 10.20.20.3
ip host RescuMe01 10.21.20.218
multilink bundle-name authenticated
!
isdn switch-type basic-net3
!
!
voice service voip
allow-connections h323 to h323
allow-connections h323 to sip
allow-connections sip to h323
allow-connections sip to sip
supplementary-service h450.12
sip
registrar server
!
!
voice register global
system message RM-SIP-SRST
max-dn 192
max-pool 48
!
voice register dn  1
number 32101
!
voice register dn  185
number 38301
!
voice register dn  190
number 38201
!
```

```
voice register dn  191
number 38202
!
voice register dn  192
number 38204
!
voice register pool  1
id mac DCC0.2222.0001
number 1 dn 1
 emergency response location 2100
!
voice register pool  45
id mac 0015.F9B3.8BA6
number 1 dn 185
!

voice emergency response location 1
elin 1 22222
subnet 1 10.20.20.0 255.255.255.0
!
voice emergency response location 2
elin 1 21111
elin 2 21112
!
!
voice-card 0
no dspfarm
!
!
archive
log config
hidekeys
!
!
controller T1 0/1/0
framing esf
linecode b8zs
pri-group timeslots 8,24
!
controller T1 0/1/1
framing esf
linecode b8zs
pri-group timeslots 2,24
!
controller T1 0/2/0
framing esf
clock source internal
linecode b8zs
ds0-group 1 timeslots 2 type e&m-immediate-start
!
controller T1 0/2/1
framing esf
linecode b8zs
pri-group timeslots 2,24
!
!
translation-rule 5
Rule 0 ^37103 1
!
!
translation-rule 6
Rule 6 ^2 911
```

```
!
!
interface GigabitEthernet0/0
ip address 31.20.0.3 255.255.0.0
duplex auto
speed auto
!
interface GigabitEthernet0/1
ip address 10.20.20.3 255.255.0.0
duplex auto
speed auto
!
interface Serial0/1/0:23
no ip address
encapsulation hdlc
isdn switch-type primary-5ess
isdn incoming-voice voice
no cdp enable
!
interface Serial0/1/1:23
no ip address
encapsulation hdlc
isdn switch-type primary-net5
isdn incoming-voice voice
no cdp enable
!
interface Serial0/2/1:23
no ip address
encapsulation hdlc
isdn switch-type primary-net5
isdn incoming-voice voice
no cdp enable
!
interface BRI0/3/0
no ip address
isdn switch-type basic-5ess
isdn twait-disable
isdn point-to-point-setup
isdn autodetect
isdn incoming-voice voice
no keepalive
!
interface BRI0/3/1
no ip address
isdn switch-type basic-5ess
isdn point-to-point-setup
!
!
ip http server
!
!
voice-port 0/0/0
!
voice-port 0/0/1
!
voice-port 0/1/0:23
!
voice-port 0/2/0:1
!
voice-port 0/1/1:23
!
voice-port 0/2/1:23
!
voice-port 0/3/0
```

```
!
voice-port 0/3/1
!
!
dial-peer voice 2002 pots
shutdown
destination-pattern 2....
port 0/2/0:1
forward-digits all
!
dial-peer voice 2005 pots
description for-cme2-408-pri
 emergency response location 2000
shutdown
incoming called-number 911
direct-inward-dial
port 0/2/1:23
forward-digits all
!
dial-peer voice 2004 voip
description for-cme2-408-thru-ip
 emergency response location 2000
shutdown
session target loopback:rtp
incoming called-number 911
!
dial-peer voice 1052 pots
description 911callbackto-cme2-3
shutdown
incoming called-number .....
direct-inward-dial
port 0/1/1:23
forward-digits all
!
dial-peer voice 1013 pots
description for-analog
destination-pattern 39101
port 0/0/0
forward-digits all
!
dial-peer voice 1014 pots
description for-analog-2
destination-pattern 39201
port 0/0/1
forward-digits all
!
dial-peer voice 3111 pots

emergency response Zone
destination-pattern 9....
port 0/1/0:23
forward-digits all
!
dial-peer voice 3121 pots

emergency response callback
incoming called-number 2....
direct-inward-dial
port 0/1/0:23
forward-digits all
!
!
telephony-service
```

```
srst mode auto-provision none
load 7960-7940 P00307020200
load 7970 TERM70.7-0-1-0s
load 7912 CP7912060101SCCP050429B.sbin
max-ephones 50
max-dn 190
ip source-address 10.20.20.3 port 2000
system message RM-SCCP-CME-SRST
max-conferences 8 gain -6
moh flash:music-on-hold.au
multicast moh 236.1.1.1 port 3000
transfer-system full-consult
transfer-pattern .....
transfer-pattern 911
!
!
ephone-dn  1  dual-line
number 31101
!
!
ephone-dn  2  dual-line
number 31201
!
!
ephone-dn  3  dual-line
number 31301
!
!
ephone-dn  100  dual-line
number 37101 secondary 37111
name 7960-sccp-1
!
!
ephone-dn  101  dual-line
number 37102
!
!
ephone-dn  102  dual-line
number 37103
!
!
ephone-dn  105
number 37201
!
!
ephone-dn  106  dual-line
number 37101
!
!
ephone-dn  107  dual-line
number 37302
!
!
ephone-dn  108  dual-line
number 37303
!
!
ephone-dn  110  dual-line
number 37401
!
!
ephone-dn  111  dual-line
number 37402
!
```

```
!
ephone  1
mac-address DCC0.1111.0001
type 7960
button  1:1
!
!
ephone  2
mac-address DCC0.1111.0002
type 7960
button  1:2
!
!
ephone  3
mac-address DCC0.1111.0003
type 7970
button  1:3
!
!
ephone  40
mac-address 0013.1AA6.7DCF
type 7960
button  1:100 2:101 3:102
!
!
ephone  41
mac-address 0012.0034.82CD
type 7912
button  1:105
!
!
ephone  42
mac-address 0014.F237.E000
 emergency response location 2
type 7940
button  1:107 2:108
!
!
ephone  43
mac-address 000F.90B0.BE0B
type 7960
button  1:110 2:111
!
!
line con 0
exec-timeout 0 0
line aux 0
line vty 0 4
login
!
scheduler allocate 20000 1000
!
end
```

Feature Information for Enhanced 911 Services

The following table provides release information about the feature or features described in this module. This table lists only the software release that introduced support for a given feature in a given software release train. Unless noted otherwise, subsequent releases of that software release train also support that feature.

Use Cisco Feature Navigator to find information about platform support and Cisco software image support. To access Cisco Feature Navigator, go to https://cfnng.cisco.com/. An account on Cisco.com is not required.

Table 5: Feature Information for Enhanced 911 Services

Feature Name	Cisco Unified CME Version	Feature Information
Enhanced 911 Services for Cisco Unified CME	4.2	• Assigns ERLs to zones to enable routing to the PSAP that is closest to the caller • Customizes E911 by defining a default ELIN, identifying a designated number if the 911 caller cannot be reached on callback, specifying the expiry time for data in the Last Caller table, and enabling syslog messages that announce all emergency calls • Expands the E911 location information to include name and address • Uses templates to assign ERLs to a group of phones • Adds new permanent call detail records
Enhanced 911 Services	4.1	Enhanced 911 Services was introduced for Cisco Unified CME in SRST Fallback Mode.