

# E-CSCF MI SIP Interface

## Call Session Control Function

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### INTERWORK DESCRIPTION

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# 1 Introduction

This document specifies the SIP-based MI interface used by the Emergency Call Session Control Function (E-CSCF) between the E-CSCF and the Location Repository Function (LRF).

Status codes generated by the CSCF are no longer part of this document, instead refer to *CSCF Fault Codes Catalogue*.

This document is based on the CSCF Mw Interface. It only describes the details that are relevant to the MI interface. SIP headers that are not mentioned in this document are sent transparently to the LRF if received. For these and other details, refer to the *CSCF Mw Interface*.

Unless otherwise indicated, SIP headers are handled transparently by the E-CSCF in the MI interface.





## 2 Interface Overview

This section describes the interface between the E-CSCF and the LRF as shown in Figure 1.

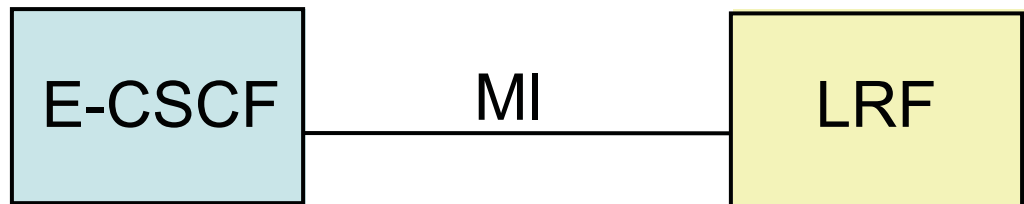


Figure 1 Interface Entities

### 2.1 Interface Role

This section describes the role of the MI interface in the E-CSCF.

### 2.2 Services

The services offered by the E-CSCF are shown in Table 1.

Table 1 Offered Services

Offered Service	Description
PSAP Address Retrieval	The E-CSCF offers inquiry to the LRF for Public Safety Answering Point (PSAP) addresses retrieval.
Network Monitoring	The E-CSCF offers network monitoring of unreachable SIP interfaces by sending of SIP <code>OPTIONS</code> requests. For details, refer to <i>CSCF Mw Interface</i> .
Dialog Event Package Subscription	The E-CSCF offers a dialog event package for emergency calls which can be subscribed to by the LRF.

### 2.3 Encapsulation and Addressing

The E-CSCF supports SIP on User Datagram Protocol (UDP) and Transmission Control Protocol (TCP) on IPv4 and IPv6.

The E-CSCF follows the procedures for SIP routing as specified in the following specifications:

- [RFC 3261 Session Initiation Protocol](#)



- [RFC 3263 Session Initiation Protocol \(SIP\): Locating SIP Servers](#)
- [RFC 4235 An INVITE-Initiated Dialog Event Package for the Session Initiation Protocol \(SIP\)](#)
- [RFC 3265 Session Initiation Protocol \(SIP\)-Specific Event Notification](#)



### 3 Procedures

This section describes the procedures used with the offered and used interfaces of the E-CSCF.

An overview of the dynamics on Public Safety Answering Point (PSAP) address retrieval is shown in Figure 2.

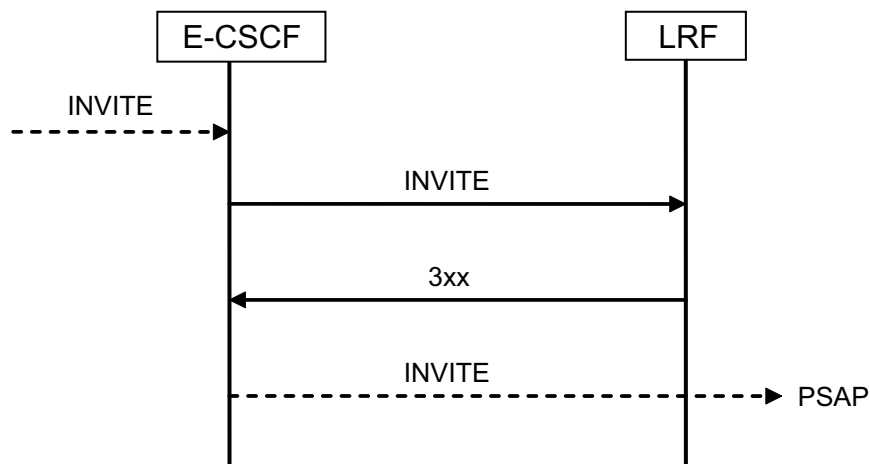


Figure 2 Offered Procedures on PSAP Address Retrieval

An overview of initial subscription on dialog event is shown in Figure 3.

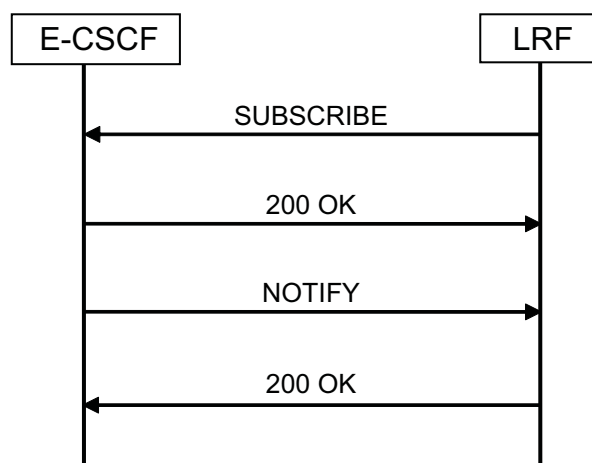


Figure 3 Initiating SUBSCRIBE Dialog

## 3.1 PSAP Address Retrieval

### 3.1.1 Initial INVITE Request

When a SIP `INVITE` is received, the E-CSCF sends an `INVITE` to the LRF, which includes information listed in Table 2.

*Table 2 SIP INVITE from E-CSCF to LRF*

Header	Procedure-Specific Values of the Parameter
Request-URI	Dialed digits in SIP URI or tel URI, or emergency service Uniform Resource Name (URN), refer to <a href="#">RFC 5031 A Uniform Resource Name (URN) for Emergency and Other Well-Known Services</a> .
Route	Contains the LRF address.
P-Asserted-Identity (PAI)	May be received, see Section 4.2.2 P-Asserted-Identity on page 17.
P-Preferred-Identity (PPI)	May be received, see Section 4.2.3 P-Preferred-Identity on page 18.

When a 3xx is received from the LRF, the important information expected is listed in Table 3.



*Table 3 3xx Response from LRF to E-CSCF*

Header	Procedure-Specific Values of the Parameter
Contact	<p>Includes one or more addresses of PSAP, which is used in the <code>INVITE</code> request. Any PSAP SIP URI addresses may include SIP URI header components. The following header components may be included:</p> <ul style="list-style-type: none"> <li>• P-Asserted-Identity (PAI)</li> <li>• P-Preferred-Identity (PPI)</li> <li>• User-to-User Information (UUI)</li> <li>• Geolocation</li> <li>• Geolocation Routing</li> <li>• “body” header component carrying the geolocation XML<sup>®</sup> encoded Presence Information Data Format Location Object (PIDF-LO) value and the Session Description Protocol (SDP) of the original <code>INVITE</code> request message body.</li> <li>• Other standard or proprietary SIP headers, or both.</li> </ul> <p>See Section 9 on page 29 for examples of <code>Contact</code> headers that include SIP URI header components.</p>
P-Asserted-Identity (PAI)	May be received.

### 3.1.2 CANCEL INVITE Request

The `CANCEL` procedure is shown in Figure 4.

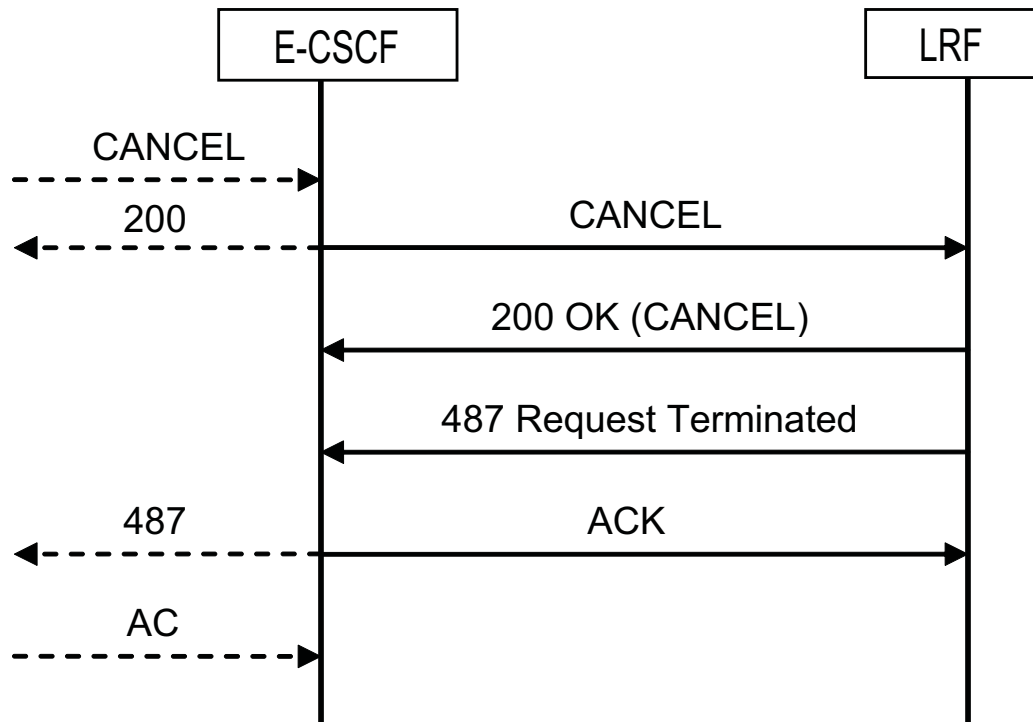


Figure 4 CANCEL Procedure

On receipt of a `CANCEL`, the E-CSCF sends the SIP `CANCEL` request to the LRF and it includes the mandatory parameters defined in [RFC 3261 SIP: Session Initiation Protocol](#) and relevant extensions to the RFCs.

The LRF sends the SIP `200 (OK)` response to the E-CSCF.

### 3.1.3

#### Unsuccessful Cases at INVITE

The unsuccessful cases for PSAP address retrieval are shown in Figure 5 and Figure 6.

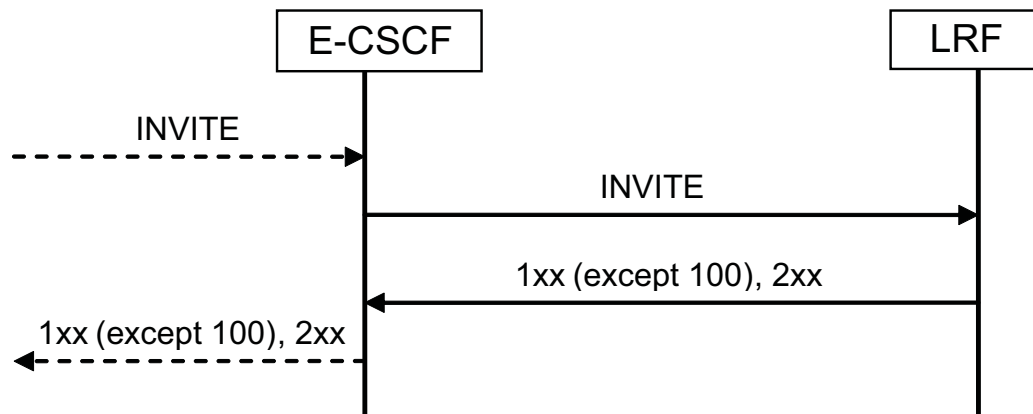


Figure 5 1xx (Expect 100) or 2xx Response from LRF

The provisional responses 1xx (except 100), and 2xx received from the LRF are proxied back to the Proxy Call Session Control Function (P-CSCF). This is if an LRF is not compliant to 3GPP® TS 24.229.

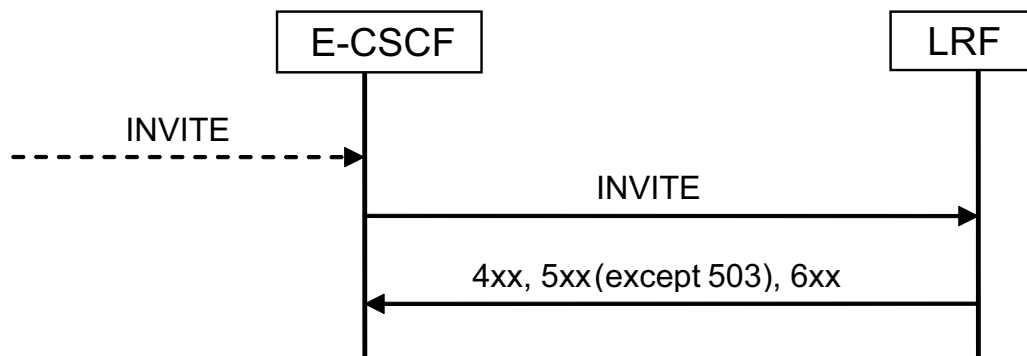


Figure 6 4xx, 5xx (Except 503), or 6xx Response from LRF

The 4xx, 5xx (except 503), and 6xx received from the LRF are dropped.

### 3.1.4 Alternative LRF

For 503 received or no response received before transaction time-out, if there are still alternative LRFs available, the E-CSCF routes the INVITE to the available alternative LRF.

## 3.2 Dialog Event Subscription

### 3.2.1 Initial Subscription Request

When a SIP SUBSCRIBE is received from the LRF in the E-CSCF, the important information that is expected is listed in Table 4.

Table 4 Initial SIP SUBSCRIBE from LRF to E-CSCF

Header	Procedure-Specific Values of the Parameter
Request-URI	Identifies the subscriber for which notifications are requested.
Event	Event=dialog; call-id; to-tag <sup>(1)</sup>
Expires	Subscription expiry time.
Contact	A URI where LRF expects to receive the requests.

(1) The from-tag may be received but it is ignored.

*Table 5 2xx Response from E-CSCF to LRF*

Header	Procedure-Specific Values of the Parameter
Expires	Subscription expiry time.
Contact	E-CSCF address in FQDN.

A SIP NOTIFY is sent from the E-CSCF to the LRF, which includes information listed in Table 6.

*Table 6 SIP NOTIFY for Initial Subscribe to LRF from E-CSCF*

Header	Procedure-Specific Values of the Parameter
Request-URI	Identifies the LRF node. Contact header value received in SUBSCRIBE request from LRF.
Event	Event=dialog; call-id; to-tag.
Subscription-State	Subscription-State=active.
Contact	E-CSCF address in FQDN.

SIP NOTIFY includes an XML document with the following information:

- `version = 0`
- `state (attribute) = full`.
- `entity` is set to the identity of the calling party, fetched from the Request-URI in the SUBSCRIBE request.
- `dialog id` is set to a single unique string.
- `call-id` = the value of Event header call-id parameter received.
- `local-tag` = the value of Event header to-tag parameter received.
- `direction = initiator`.
- `state (element)` is set to the current state of Finite-State Machine (FSM). Supported states are proceeding, early, confirmed, and terminated.

### 3.2.2 Subscription Refresh Request

When a SIP SUBSCRIBE is received from the LRF in the E-CSCF, the important information expected is listed in Table 7.



*Table 7 Refresh SIP SUBSCRIBE from LRF to E-CSCF*

Header	Procedure-Specific Values of the Parameter
Request-URI	Identifies the subscriber for which notifications are requested.
Event	Event=dialog; call-id; to-tag.
Expires	Extended subscription expiry time.
Contact	A URI where LRF expects to receive the requests.

*Table 8 2xx Response from E-CSCF to LRF*

Header	Procedure-Specific Values of the Parameter
Expires	Subscription expiry time.
Contact	E-CSCF address in FQDN.

A SIP NOTIFY is sent from the E-CSCF to the LRF, which includes information listed in Table 9.

*Table 9 SIP NOTIFY for Refresh Subscribe*

Header	Procedure-Specific Values of the Parameter
Request-URI	Identifies the LRF node. Contact header value received in SUBSCRIBE request from LRF.
Event	Event=dialog; call-id; to-tag.
Subscription-State	Subscription-State=active.
Contact	E-CSCF address in FQDN.

SIP NOTIFY includes an XML document with the following information:

- `version` = stepped by 1 compared to previously sent XML document.
- `state` (attribute) = full.
- `entity` is set to the identity of the calling party, fetched from the Request-URI in the SUBSCRIBE request.
- `dialog id` is set to a single unique string.
- `call-id` = the value of Event header call-id parameter received.
- `local-tag` = the value of Event header to-tag parameter received.

- `direction` = initiator.
- `state` (element) is set to the current state of FSM. Supported states are proceeding, early, confirmed, and terminated.

**Note:** If the request for subscription refresh is received after the `INVITE` dialog has terminated, no XML document is included in the `SIP NOTIFY` request.

### 3.2.3 Subscription Termination Request

When a `SIP SUBSCRIBE` is received from the LRF in the E-CSCF, the important information expected is listed in Table 10.

Table 10 Terminate SIP SUBSCRIBE from LRF to E-CSCF

Header	Procedure-Specific Values of the Parameter
Request-URI	Identifies the subscriber for which notifications are requested.
Event	Event=dialog; call-id; to-tag.
Expires	Expires=0.
Contact	A URI where LRF expects to receive the requests.

Table 11 2xx Response from E-CSCF to LRF

Header	Procedure-Specific Values of the Parameter
Expires	Subscription expiry time.
Contact	E-CSCF address in FQDN.

A `SIP NOTIFY` is sent from the E-CSCF to the LRF, which includes information listed in Table 12.

Table 12 SIP NOTIFY for Subscribe Termination

Header	Procedure-Specific Values of the Parameter
Request-URI	Identifies the LRF node. <code>Contact</code> header value received in <code>SUBSCRIBE</code> request from LRF.
Event	Event=dialog; call-id; to-tag.
Subscription-State	Subscription-State=terminated, reason = "timeout".
Contact	E-CSCF address in FQDN.





SIP NOTIFY includes an XML document with the following information:

- `version` = stepped by 1 compared to previously sent XML document.
- `state (attribute)` = full.
- `entity` is set to the identity of the calling party, fetched from the `Request-URI` in the `SUBSCRIBE` request.
- `dialog id` is set to a single unique string.
- `call-id` = the value of `Event` header `call-id` parameter received.
- `local-tag` = the value of `Event` header `to-tag` parameter received.
- `direction` = initiator.
- `state (element)` is set to the current state of FSM. Supported states are proceeding, early, confirmed, and terminated.

**Note:** If the request for subscription termination is received after the `INVITE` dialog has terminated, no XML document is included in the `SIP NOTIFY` request.

### 3.2.4 Event Notification on INVITE Dialog State Change

A `SIP NOTIFY` is sent from the E-CSCF to the LRF when the `INVITE` dialog state changes. The `SIP NOTIFY` includes information listed in Table 13.

Table 13 *SIP NOTIFY from E-CSCF to LRF*

Header	Procedure-Specific Values of the Parameter
Request-URI	Identifies the LRF node. Contact header value received in <code>SUBSCRIBE</code> request from LRF.
Event	<code>Event=dialog; call-id; to-tag.</code>
Subscription-State	<code>Subscription-State=active.</code>
Contact	E-CSCF address in FQDN.

SIP NOTIFY includes an XML document with the following information:

- `version` = stepped by 1 compared to previously sent XML document.
- `state (attribute)` = partial.
- `entity` is set to the identity of the calling party, fetched from the `Request-URI` in the `SUBSCRIBE` request.
- `dialog id` is set to a single unique string.

- `call-id` = the value of `Event` header `call-id` parameter received.
- `local-tag` = the value of `Event` header `to-tag` parameter received.
- `direction` = `initiator`.
- `state` (element) is set to the current state of FSM. Supported states are `proceeding`, `early`, `confirmed`, and `terminated`. When the state is changed to “terminated”, the event attribute and code attribute are included.

### 3.2.5 Event Notification on Subscription Expiry

A SIP `NOTIFY` is sent from the E-CSCF to the LRF when the subscription expires, which includes information listed in Table 14.

Table 14 SIP `NOTIFY` from E-CSCF to LRF

Header	Procedure-Specific Values of the Parameter
Request-URI	Identifies the LRF node. <code>Contact</code> header value received in <code>SUBSCRIBE</code> request from LRF.
Event	<code>Event=dialog; call-id; to-tag</code> .
Subscription-State	<code>Subscription-State=terminated, reason = “timeout”</code> .
Contact	E-CSCF address in FQDN.

SIP `NOTIFY` includes an XML document with the following information:

- `version` = stepped by 1 compared to previously sent XML document.
- `state` (attribute) = `partial`.
- `entity` is set to the identity of the calling party, fetched from the `Request-URI` in the `SUBSCRIBE` request.
- `dialog id` is set to a single unique string.
- `call-id` = the value of `Event` header `call-id` parameter received.
- `local-tag` = the value of `Event` header `to-tag` parameter received.
- `direction` = `initiator`.
- `state` (element) is set to the current state of FSM. Supported states are `proceeding`, `early`, `confirmed`, and `terminated`.



### 3.2.6 Event Notification on Locked E-CSCF

A SIP NOTIFY is sent for each subscribe dialog from the E-CSCF to the LRF when the E-CSCF goes into administrative state `LOCKED`, which includes information listed in Table 15.

Table 15 SIP NOTIFY from E-CSCF to LRF

Header	Procedure-Specific Values of the Parameter
Request-URI	Identifies the LRF node. Contact header value received in SUBSCRIBE request from LRF.
Event	Event=dialog; call-id; to-tag.
Subscription-State	Subscription-State=terminated, reason = "noresource".
Contact	E-CSCF address in FQDN.

SIP NOTIFY includes an XML document with the following information:

- `version` = stepped by 1 compared to previously sent XML document.
- `state` (attribute) = partial.
- `entity` is set to the identity of the calling party, fetched from the Request-URI in the SUBSCRIBE request.
- `dialog id` is set to a single unique string.
- `call-id` = the value of Event header call-id parameter received.
- `local-tag` = the value of Event header to-tag parameter received.
- `direction` = initiator
- `state` (element) is set to the current state of FSM. The event attribute and code attribute is to be included.

### 3.2.7 Unsuccessful Case at SUBSCRIBE

In the 489 (Bad Event) response to SUBSCRIBE sent by the E-CSCF to the LRF, the information included is listed in Table 16:

Table 16 SIP NOTIFY from E-CSCF to LRF

Header	Procedure-Specific Values of the Parameter
Allow-Events	dialog.





## 4 Information Model

This section describes supported SIP methods and gives information about SIP headers.

### 4.1 Supported SIP Methods

The following supported SIP methods are listed in Table 17.

Table 17 Supported SIP Methods

SIP Method	E-CSCF -> LRF	LRF -> E-CSCF	Reference
ACK Request	Supported		<a href="#">RFC 3261 SIP: Session Initiation Protocol</a>
CANCEL Request	Supported		<a href="#">RFC 3261 SIP: Session Initiation Protocol</a>
INVITE Request	Supported		<a href="#">RFC 3261 SIP: Session Initiation Protocol</a>
OPTIONS Request <sup>(1)</sup>	Supported		<a href="#">RFC 3261 SIP: Session Initiation Protocol</a>
SUBSCRIBE Request		Supported	<a href="#">RFC 3265 Session Initiation Protocol (SIP)-Specific Event Notification</a>
NOTIFY Request	Supported		<a href="#">RFC 3265 Session Initiation Protocol (SIP)-Specific Event Notification</a>

(1) SIP OPTIONS is only used for network monitoring, refer to CSCF Mw Interface.

### 4.2 SIP Header Information

#### 4.2.1 Request-URI

The value of incoming Request-URI received is included in the Request-URI in the INVITE request to the LRF; it may be an emergency service URN (refer to [RFC 5031 A Uniform Resource Name \(URN\) for Emergency and Other Well-Known Services](#)) or dialed string in SIP URI or tel URI.

#### 4.2.2 P-Asserted-Identity

The E-CSCF includes a P-Asserted-Identity (PAI) header in the INVITE request to the LRF in the following scenarios:

- When there is PAI received in the original request from the P-CSCF.

- When there is a `P-Preferred-Identity` (PPI) header but no PAI received in the original request from the P-CSCF, if the `ecscfNonRegAssertedCallerIdPreLrfEnabled` is set to `true`, and a PAI can be created from the PPI successfully.

### 4.2.3 P-Preferred-Identity

The E-CSCF includes a `P-Preferred-Identity` (PPI) header in the `INVITE` request to the LRF in the following scenarios:

- When there is a PPI received together with a PAI in the original request from the P-CSCF.
- When there is a PPI received without a PAI in the original request from the P-CSCF, if the `ecscfNonRegAssertedCallerIdPreLrfEnabled` is set to `false`.
- When there is a PPI received without a PAI in the original request from the P-CSCF, if the `ecscfNonRegAssertedCallerIdPreLrfEnabled` is set to `true`, but a PAI cannot be created successfully.

### 4.2.4 Event

The `Event` header is received in the `SUBSCRIBE` request. The `Event` header value must be set to `dialog` and the `call-id` and `to-tag` parameters must be included.

The E-CSCF includes `Event` in the `NOTIFY` request. The `id` parameter is included if it was received in the `SUBSCRIBE` request.

### 4.2.5 Expires

The E-CSCF includes `Expires` in the `200` response to the `SUBSCRIBE` request to LRF. If the received value of `Expires` in the `SUBSCRIBE` request is greater than the system defined maximum (`CscfDialogEventRefreshMax`) or the `Expires` header was not received, then the configured maximum value is sent in the `Expires` header to the LRF. If the received value of `Expires` header in the `SUBSCRIBE` request is between the configured `CscfDialogEventRefreshMin` value and `CscfDialogEventRefreshMax` value, the same value that was received is returned to the LRF in the `Expires` header. If the received value of `Expires` header in the `SUBSCRIBE` request is less than the configured `CscfDialogEventRefreshMin`, the request is rejected.

### 4.2.6 Subscription State

The E-CSCF includes `Subscription State` in the `NOTIFY` request to LRF. The subscription state is either `active` or `terminated`. The subscription state is



terminated either when LRF terminates the subscription (reason code is set to `timeout`), the subscription expires (reason code is set to `timeout`) or when the E-CSCF goes into administrative state `LOCKED` (reason code is set to `noresource`).

#### **4.2.7 Allow-Events**

The `Allow-Events` header includes a list of tokens which indicates the event packages supported by the E-CSCF, for example, `dialog`.







## 5 Formal Syntax

Not applicable.





## 6 Security Considerations

Not applicable.





## 7 Related Standards

This section states the related standards and explains any deviations from them.

The main related standards are [3GPP TS 24.229 IP Multimedia call control protocol based on Session Initiation Protocol \(SIP\) and Session Description Protocol \(SDP\)](#), [RFC 3261 Session Initiation Protocol](#), and [ATIS-0700015.v003 ATIS Standard for Implementation of 3GPP Common IMS Emergency Procedures for IMS Origination and ESI-net/Legacy Selective Router Termination](#).

Other applicable standards:

- [RFC 3263 Session Initiation Protocol \(SIP\): Locating SIP Servers](#)
- [RFC 3265 Session Initiation Protocol \(SIP\)-Specific Event Notification](#)
- [RFC 3455 Private Header Extensions to the SIP for the 3GPP](#)
- [RFC 4235 An INVITE-Initiated Dialog Event Package for the Session Initiation Protocol \(SIP\)](#)
- [RFC 5031 A Uniform Resource Name \(URN\) for Emergency and Other Well-Known Services](#)

The main deviations from the standards are as follows:

- SIPS URI is not supported,
- TLS is not supported.





## 8 Example of SIP NOTIFY Body

An example of the SIP NOTIFY body is as follows:

```
<?xml version="1.0"?>
<dialog-info xmlns="urn:ietf:params:xml:ns:dialog-info"
  version="2"
  state="full"
  entity="sip:alice@myvsp.com">
  <dialog id="as7d900as8" call-id="a84b4c76e66710"
    local-tag="192831234" direction="initiator">
    <state event="rejected" code="486">terminated</state>
  </dialog>
</dialog-info>
```







## 9 Examples of Contact SIP URI Header Components

This section shows examples of `Contact` headers including SIP URI header components returned in the 3XX response from the LRF.

The first SIP URI header component of the set is indicated with the “?” mechanism within the URI. Subsequent header names and values are encoded in ampersand (“&”) separated `hname = hvalue` pairs. The special `hname` “body” indicated that the associated `hvalue` is the message-body of the outgoing SIP request.

```
Contact: sip:9981005003449@bgcf.one.att.net?P-Asserted-Identity= \⇒  
sip:+11005003554%40bgcf.one.att.net&User-to-User=\⇒  
001D4252807322943584000038A42064FF62F2101080939A%3Bencoding%3Dhex\⇒  
%3Bpurpose%3Disdn-uii%3Bcontent%3Disdn-uii&X-Carrier-Info=\⇒  
02fb05fe03000560&X-AUTH=fd01fc06
```

### *Example 1 Contact URI*

**Note:** To follow the syntax of SIP URI header component, the following characters have been escaped:

%3B is the escaped character for “,”

%40 is the escaped character for “@”

%3D is the escaped character for “=”