ERICSSON

IMS Emergency Session

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Contents

1 Introduction

This document describes support for the IP Multimedia Subsystem (IMS) emergency sessions in the EPG.

1.1 Scope

This document provides an overview of IMS emergency sessions in the EPG.

For information and instructions about how to configure support for IMS emergency sessions in the EPG, see IMS Emergency Session Configuration.

1.2 Target Groups

This document is intended for network operators, network and service planners, as well as system engineers and administrators. The target group must have basic knowledge of EPS networks.

2 Concepts

This section presents important concepts related to IMS emergency sessions in the EPG.

IMS

The IMS is a generic framework that supports a wide range of IP-based services over packet switched networks. Within the context of emergency calls, the IMS is used to provide VoIP services to the subscriber.

IMS Emergency Session

An IMS emergency session provides a UE device with access to an emergency APN. An IMS emergency session is established with a UE-initiated PDN connection creation procedure.

Emergency APN

An emergency APN is configured to be used exclusively for handling IMS emergency sessions.

3 General Description

An IMS emergency session enables a UE to connect to emergency services.

The EPG provides support for establishing IMS emergency sessions from the E-UTRAN or the untrusted WLAN networks. In accordance with national regulations, emergency calls are routed to the emergency services in the same PLMN where the UE is located.

The EPG supports IMS emergency sessions for UE devices with an International Mobile Subscriber Identity (IMSI) that have been authenticated by the MME. The EPG also supports IMS emergency sessions for unauthenticated users.

Note: The unauthenticated user of emergency call indicates that the user is without IMSI or the user is with unauthenticated IMSI.

When the UE moves from an E-UTRAN network to a UTRAN or GERAN network, the IMS emergency session is assumed to be terminated by the MME, and the emergency service is provided by a circuit switched network.

Note: The IMS emergency session with L2TP is not supported.

Note: Emergency calls are always put through. For more information on emergency call handling on the CPB, refer to Overload Protection.

3.1 IMS Emergency Session

An IMS emergency session begins with a PDN connection creation procedure initiated by the UE. The PGW receives a `Create Session Request` message requesting an emergency APN, and initiates a Policy and Charging Control (PCC) session with the PCRF.

A PDN connection that is used for an IMS emergency session includes one bearer that is used for Session Initiation Protocol (SIP) signaling, and one bearer that is used for VoIP. The bearer that is used for VoIP is a dedicated Guaranteed Bit Rate (GBR) bearer. The bearer that is used for SIP signaling is the default bearer.

3.2 Emergency APN

To enable support for IMS emergency sessions, one or more emergency APNs must be configured in the EPG. For information about configuring emergency APNs, see IMS Emergency Session Configuration.

3.2.1 APN Access Based on Selection Mode

When UE initiates a PDN connection request for emergency use, the UE must provide an MME with an emergency indicator. An MME receiving such an

emergency indicator uses configured parameters such as an emergency APN to find a suitable SGW and PGW and set the selection mode to a specific value indicating that the emergency APN is provided by the MME. The PGW can be configured to allow access to an APN according to the configured selection mode. For an emergency APN, the APN access must always be configured as `From-network`.

4 IMS Emergency Session

This section describes the signaling during the establishment and termination of an IMS emergency session.

4.1 Establishment

The establishment of an IMS emergency session for a UE involves the following actions:

1. A default bearer is created as part of a PDN connection creation procedure (for example, when an UE performs an emergency attach), or an additional PDN connection creation procedure for SIP signaling.

2. A dedicated bearer is created with a dedicated bearer activation procedure for VoIP.

For detailed information about the PDN connection creation procedure, the additional PDN connection creation procedure, and the dedicated bearer activation procedure, see Session Management.

4.2 Callback

If the dedicated bearer used for VoIP is deactivated, the default bearer (the bearer used for SIP signaling) is not immediately deactivated. This deactivation delay enables the emergency services to re-establish voice calls to the UE devices. The PGW waits for a PCC rule from the PCRF to activate a dedicated GBR bearer until the configured timer (`InactivityTimeout`) expires. If the PCC rule is received before the inactivity timer expires, a dedicated bearer is established for VoIP. For information about configuring the `InactivityTimeout` timer, see IMS Emergency Session Configuration.

Figure 1 shows the signaling involved in this scenario for LTE access.

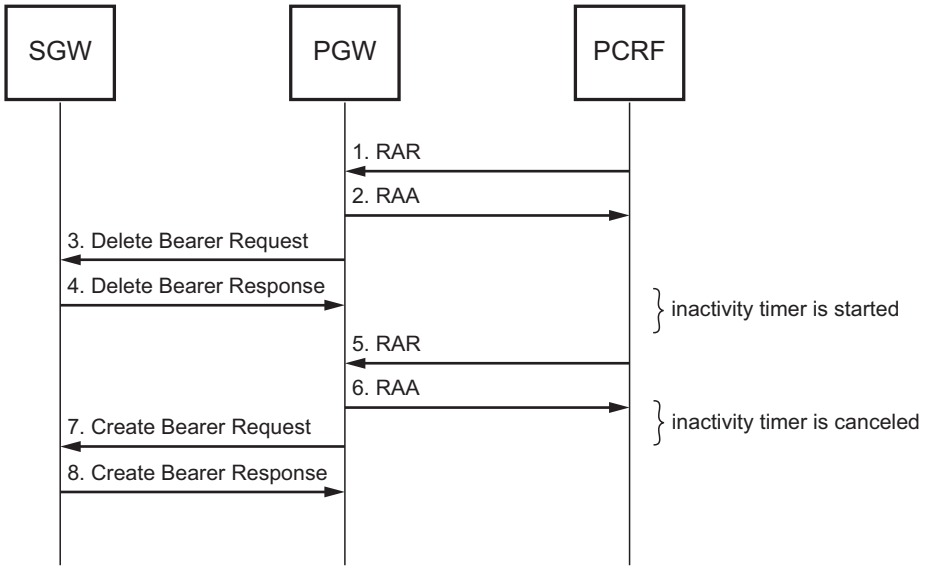

Figure 1 Emergency Callback

The following steps are involved in an emergency callback:

1. The PCRF sends a `Re-Authorization Request (RAR)` message to the PGW, indicating the removal of the last PCC rule for the dedicated bearer. This message includes the following information:

   - Session Identifier (ID)
   - Charging-Rule-Remove AVP

2. The PGW sends a `Re-Authorization Answer (RAA)` message to the PCRF, and immediately deactivates the PCC rules previously activated for the PDN connection. The RAA message contains the following information:

   - Session ID
   - Result indication (success or failure)

3. The PGW sends a `Delete Bearer Request` message to the SGW. This message includes information about the dedicated bearer that must be deleted, including the EBI for the dedicated bearer.

   The SGW forwards the `Delete Bearer Request` message to the MME, and receives a `Delete Bearer Response` message from the MME.

4. The SGW deletes the bearer contexts related to the deactivated bearer, and sends a `Delete Bearer Response` message to the PGW.

   When no more GBR bearers exist, the PGW starts the `InactivityTimeout` timer.

5. When the voice call needs to be re-established, the PCRF sends a RAR message to the PGW, indicating that the PCRF has added the PCC rules for a dedicated bearer. Since this message is received before the InactivityTimeout timer expires, the timer is canceled.

6. The PGW sends an RAA message to the PCRF to acknowledge the new PCC rules.

7. The PGW sends a Create Bearer Request to the SGW to activate a dedicated bearer. The SGW forwards this message to the MME, and in return receives a Create Bearer Response message from the MME.

8. The SGW acknowledges the bearer activation, and sends a Create Bearer Response message to the PGW.

4.3 Termination

An IMS emergency session can be terminated in one of the following ways:

— The PCRF initiates a PDN disconnection procedure to terminate the IMS emergency session.
— The MME initiates a PDN disconnection procedure with a Delete Session Request message.
— The PCRF sends a rule to the PGW that deactivates the dedicated bearer used for VoIP, and the PGW does not receive a request to activate a new dedicated GBR bearer before the inactivity timer (InactivityTimeout) expires.

This section describes the signaling involved when an IMS emergency session is terminated due to the inactivity timer expiring. For information about the PDN disconnection procedures, see Session Management.

When an IMS emergency session is terminated due to inactivity, the PGW removes the PDN connection from the emergency APN.

Figure 2 shows the signaling involved when an IMS emergency session is terminated for LTE access.

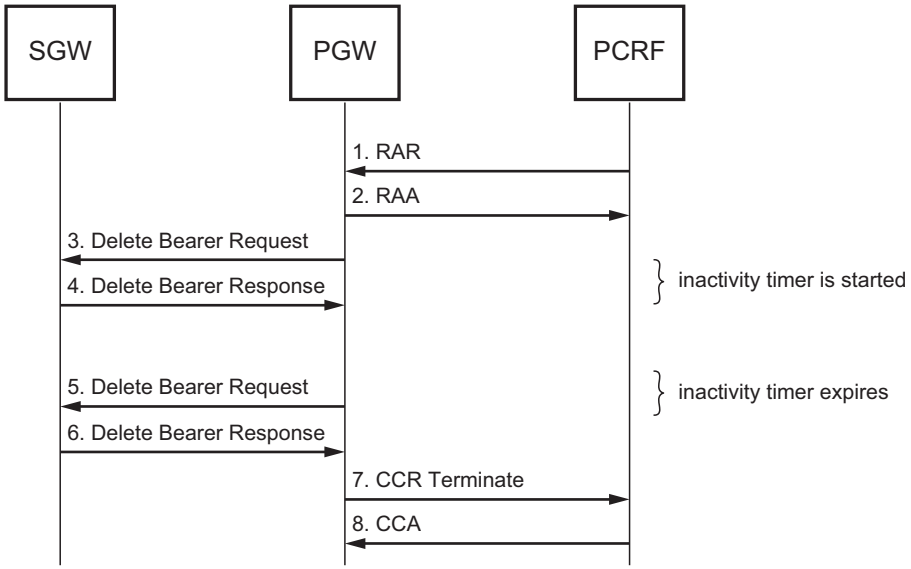

Figure 2 Termination of an IMS Emergency Session

The following steps are involved in the termination of an IMS emergency session:

1. The PCRF initiates a PCC session termination by sending a `RAR` message to the PGW. This message contains information about the session to be terminated, including the following:

   - Session ID
   - Charging-Rule-Remove AVP

2. The PGW sends an `RAA` message to the PCRF, and immediately deactivates the PCC rules previously activated for the PDN connection. The `RAA` message contains the following information:

   - Session ID
   - Result indication (success or failure)

3. The PGW initiates a dedicated bearer deactivation procedure by sending a `Delete Bearer Request` message to the SGW. This message includes the EBI for the dedicated bearer to be removed.

   The SGW forwards the `Delete Bearer Request` message to the MME, and in return receives a `Delete Bearer Response` message from the MME.

4. The SGW deletes the bearer context related to the deactivated EPS bearer, and acknowledges the bearer deactivation by sending a `Delete Bearer Response` message to the PGW. The VoIP channel is now deactivated.

   When no more GBR exists, the inactivity timer is started.

5. The inactivity timer expires, and the PGW does not receive PCC rules for establishing a dedicated GBR bearer for callback. The PGW sends a `Delete Bearer Request` to the SGW to remove the remaining bearers used for the IMS emergency session. This message includes the Linked EPS Bearer Identifier (LBI) for the default bearer, and the cause code `PDN connection inactivity timer expires`.

   The SGW forwards the `Delete Bearer Request` message to the MME, and in return receives a `Delete Bearer Response` message from the MME.

6. The SGW deletes the bearer contexts related to the deactivated PDN connection, and sends a `Delete Bearer Response` message to the PGW.

7. The PGW initiates a PCC session termination procedure by sending a `Credit-Control-Request-terminate (CCR-terminate)` message to the PCRF.

8. The PCRF terminates the PCC session, and sends a `Credit-Control-Answer -terminate (CCA-terminate)` message to the PGW.

5 Traffic Filtering for IMS Emergency Sessions

The PDN connection associated with the emergency APN is dedicated exclusively for IMS emergency sessions, and does not allow any other type of traffic.

To filter the traffic on a default bearer, the PGW is configured on an emergency APN with static rules that only allows the following traffic:

— SIP messages sent to or received from the P-CSCF

— Traffic forwarded to or received from the Secure User Plane Location (SUPL) servers if an SUPL is used

— Traffic sent to or received from the DNS servers

To filter the traffic on a dedicated bearer for an IMS emergency call using an emergency APN, the PCRF must install the dynamic PCC charging rules, such as filters identifying traffic from Real Time Protocol (RTP) or Real Time Control Protocol (RTCP). The PGW then only allows forwarding of traffic matching the PCC rules.

For detailed information about configuring the traffic filter for an IMS emergency session, refer to IMS Emergency Session Configuration.

Reference List

Information on the supported version of each 3GPP standard is found in the Network Impact Report.

Standards

[1] GPRS Enhancements for E-UTRAN Access
3GPP TS 23.401

[2] Policy and charging control architecture
3GPP TS 23.203