All-IP Network Emergency Call Support

Stage 1 Requirements
# Revision History

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<thead>
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<th>Date</th>
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</thead>
<tbody>
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</tr>
</tbody>
</table>
# CONTENTS

1 INTRODUCTION ...................................................................................................................... 1
  1.1 REFERENCES .................................................................................................................. 1
  1.2 DEFINITIONS AND ABBREVIATIONS ............................................................................ 1

2 GENERAL DESCRIPTION ........................................................................................................ 2

3 SCOPE .................................................................................................................................... 2
  3.1 CALL ROUTING AND EMERGENCY CALL CENTER CAPABILITY .................................. 2
  3.2 APPLICABLE RADIO INTERFACES .................................................................................. 3
  3.3 NETWORK AUTHORIZATION .......................................................................................... 3
  3.4 MMD FACILITIES .......................................................................................................... 3
  3.5 FUTURE SCOPE EXTENSIONS ....................................................................................... 3

4 SYSTEM REQUIREMENTS ...................................................................................................... 3
  4.1 EMERGENCY CALL ESTABLISHMENT ............................................................................ 3
  4.2 EMERGENCY CALL ROUTING ....................................................................................... 5
  4.3 CALLBACK ....................................................................................................................... 5
  4.4 GEOGRAPHICAL LOCATION OF CALLER ....................................................................... 5
  4.5 EMERGENCY CALL CONTINUITY ................................................................................... 5
  4.6 CALL DETAIL RECORD .................................................................................................. 6
  4.7 INTERACTIONS WITH OTHER WIRELESS SERVICES ............................................... 6
1 INTRODUCTION

This document specifies the system requirements for All-IP Network Emergency Call Support as described in [1]. With the introduction of VoIP in HRPD [2], WLAN [6], or other air interfaces, it is important to add support for emergency calls. As described in the Work Item worksheet [1], the intention is to develop the generic emergency call system capability in an All-IP Network which can be used to support the “Emergency Call” in accordance with any regional regulatory requirements, if so desired. It is important to note that the development of such a system capability itself should not be construed as a regional regulatory issue.

The intent of this specification is to provide a general set of functionality with the flexibility needed to support variances in regional regulatory requirements.

Note, that “Emergency Call” can be defined as a call requiring connection to a public safety authority, for example, a “Public Safety Answering Point (PSAP).”

1.1 REFERENCES

[1] 3GPP2 Work Item 3GPP2-00130, HRPD and MMD Emergency Call Support
[4] 3GPP2 X.S0013-003, All-IP Core Network Multimedia Domain; IP Multimedia Session (IMS) Handling; IP Multimedia (IM) Call Model
[5] 3GPP2 S.R0108, HRPD-cdma2000-1X Interoperability for Voice and Data
[7] 3GPP2 X.S0013-000-A, All-IP Core Network Multimedia Domain

1.2 DEFINITIONS AND ABBREVIATIONS

All-IP A wireless network that uses IP transport for all signaling and bearer traffic.
AN Access Network
Authorized UE The originator of an emergency services call using VoIP technology, that has successfully completed all of the following: authentication of the user’s device, access level authentication of the user, and authorization of the user for an emergency services call.
Unauthorized UE  The originator of an emergency services call using VoIP technology, that did not successfully complete one of more of the following: authentication of the user’s device, access level authentication of the user, or authorization of the user for an emergency services call.

cdma2000-1X  A set of radio air interfaces compliant with C.S0001~0006

CS  Circuit-Switched

HRPD  High Rate Packet Data – radio interface complying with C.S0024 specifications

IP  Internet Protocol

MMD  Multi-Media Domain – Core network capable of supporting multimedia services via IP

PSAP  Public Safety Answering Point

Serving System  The network that provides the IP access point for the emergency caller. If the caller is roaming, the serving system is the visited network. If the caller is not roaming, the serving system is the home network.

SIP  Session Initiation Protocol

TEL URI  URI compliant with [8]

UE  User Equipment

URI  Universal Resource Identifier

VoIP  Voice over Internet Protocol

WLAN  Wireless Local Area Network

2  GENERAL DESCRIPTION

Emergency services are not a subscribed service of the caller. Emergency services are provided by the local area, from which the caller accesses the network. Emergency services may require priority treatment such as providing a high quality bearer path regardless of subscription. The initial capability provided by this feature includes support for VoIP emergency calls to emergency call centers accessed via the circuit switched network or the packet switched network. When a VoIP emergency call is initiated, it is routed to an appropriate emergency call center serving the geographic area of the caller.

3  SCOPE

3.1 CALL ROUTING AND EMERGENCY CALL CENTER CAPABILITY

Within the limitations of current positioning technology, emergency calls should be routed to the emergency call center that has jurisdiction over the area that the call is coming from and that is best able to process the call.
For the current phase of emergency call support as represented in this
document, it is assumed that emergency call centers support only voice calling
capability, i.e., they can receive circuit switched voice calls or packet switched
VoIP calls. In the future, IP-capable emergency call centers may come into
being which will have the capability to send and receive other types of media
(e.g., pictures with escape routes, video). This may be the subject of a future
revision of this and other associated documents.

Although the subject of the current set of requirements supports VoIP
emergency calls to emergency call centers, this should not preclude forward
compatibility to support other media and multimedia emergency calls.

3.2 APPLICABLE RADIO INTERFACES

Emergency call access via the following radio interfaces is supported:

- HRPD [2]
- cdma2000-1X [3]
- WLAN [6]

Definition of the air interface for WLAN is out of scope for 3GPP2.

3.3 NETWORK AUTHORIZATION

The network is required to support emergency calls from both Authorized and
Unauthorized UEs, subject to local regulation.

3.4 MMD FACILITIES

MMD core network facilities (see [4] and [7]) can be reused and/or enhanced for
VoIP emergency call support.

3.5 FUTURE SCOPE EXTENSIONS

Considerations for future extension of this document include:

- Support for additional media during an emergency call (e.g., text
  messaging, sending and receiving pictures and video signals).
- Support for improved voice quality enabled by means of a wideband
  codec over VoIP.

4 SYSTEM REQUIREMENTS

4.1 EMERGENCY CALL ESTABLISHMENT

[EC-1] The All-IP Network SHALL support the ability to indicate to the UE
that it supports emergency calls.
Emergency calls from Authorized and Unauthorized UEs SHALL be supported, subject to local regulation.

A UE SHOULD be able to determine that a caller is attempting to make an emergency call (e.g., by evaluating the SIP-URI or the dialed TEL URI). If the UE is able to determine that a call attempt is for an emergency call, then the UE SHALL explicitly indicate the call’s emergency nature to the network.

When an internationally roaming UE attempts to make an emergency call and the UE explicitly indicates the emergency call [EC-3], the network SHALL correctly route the call even if the dialing procedure of the home country executed by the caller is different than that in the visited country.

If an authorized UE is unable to determine and indicate an emergency call, the network SHALL be able to evaluate the SIP URI or TEL URI and determine the call is an emergency call if the SIP URI or TEL URI represents a valid emergency number in the locality of the caller.

Support of emergency calls is a local service, not a subscriber service and therefore call control signaling and bearer MAY be handled in the serving network without routing through the home network.

Notes:
- It is preferred to have a solution with minimized call setup delay or one with relatively small penalty on call setup delay in return for additional desirable capabilities (e.g., 3-way calling capability).
- If any essential services are required from the home system, this may guide the decision (e.g., Voice Call Continuity).
- Minimization of routing should be considered in determining the solution.

Emergency services SHALL be provided when a UE is roaming.

When an emergency call is established, end-to-end knowledge of an emergency call SHALL be possible and when necessary, intermediate nodes SHALL have this knowledge. Signaling nodes that need to provide different treatment for an emergency call can identify the call as an emergency.

The calling party address sent to a CS-only capable emergency call center SHALL be based on a TEL URI.

It SHALL be possible for the user to remain anonymous to the PSAP (i.e., to prevent the sending of the information of the user such as identification and location information) when explicitly requested by the user on a per call basis. This requirement is subject to local regulations.
4.2 EMERGENCY CALL ROUTING

[EC-10] It SHALL be possible to route to an emergency call center based on the caller’s position information, if available from either the UE or the network.

[EC-11] There may be multiple types of emergency call centers for emergency calls (e.g., police, coast guard, fire, ambulance). The All-IP Network SHALL be able to identify the type of intended emergency call center when the dialing plan provides such identification, and SHALL route accordingly.

4.3 CALLBACK

Once the UE originates and completes the emergency call, a responsible public safety authority (e.g., PSAP) may need to call back to the UE that originated the emergency call.

[EC-12] Callback of an IMS Registered UE with an assigned TEL URI SHALL be supported.

4.4 GEOGRAPHICAL LOCATION OF CALLER

It is important to be able to obtain the location of a UE that initiates an emergency call so that it can be routed to the emergency call center assigned to the geographic area of the caller. Depending on the nature of the emergency or mobility of the caller, it may be necessary to obtain an updated location of the caller during the emergency call.

[EC-13] The caller’s position information SHALL be included in the emergency services request from the UE, if available.

[EC-14] It MAY be possible to route the emergency call to a specific emergency call center based on interim/rough position information of the caller.

[EC-15] The position information format SHALL be one of the following: a cell/sector identification, a geographic location (e.g., latitude/longitude), or a civil address.

[EC-16] When initial position information is requested by an emergency call center, the All IP Network SHOULD provide the initial accurate (i.e., not interim) position information of the UE.

[EC-17] When updated position information is requested by an emergency call center, the All IP Network SHOULD provide position information of the UE’s current position to the emergency call center. The All IP Network SHOULD support updated position information requests throughout the duration of the emergency call.

4.5 EMERGENCY CALL CONTINUITY

UEs that support multiple access technologies and handoffs between the access technologies for non-emergency VoIP sessions, are expected to support the same level of session continuity for emergency calls [5], [6].
If a non-emergency voice call can be transferred across two access technologies, then the All-IP Network SHALL maintain continuity of the emergency call across those access technologies.

An emergency call SHALL be identified as such during and after a handoff.

If position information update request is received from the emergency call center after a handoff, including a handoff to another access technology, the All IP Network SHOULD provide the updated position information of the UE to the emergency call center.

**4.6 CALL DETAIL RECORD**

The creation of call detail records for emergency calls SHALL be supported.

**4.7 INTERACTIONS WITH OTHER WIRELESS SERVICES**

Once a UE has initiated an emergency call, the call SHALL NOT be placed on hold (i.e., any attempt of a call hold, 3-way call, call waiting or any service that would cause the emergency call to be put on hold SHALL be ignored).

An emergency call SHALL take precedence over any other services a UE may be engaged in.