

Description

Simplified method for IMS registration in the event of
5 emergency calls

The invention relates to methods and devices for IMS registration in the event of emergency calls.

10 Networks such as, e.g. cellular mobile radio networks, are known per se to the expert from, e.g. specifications in www.etsi.org or www.3gpp.org.

TS 23.167 Release 7 of the 3GPP Standardization Organization
15 specifies emergency calls in the IMS (IP Multimedia Subsystem).

This 3GPP Technical Specification TS 23.167 also relates to Next Generation Fixed Networks as standardized, e.g. in ETSI TISPAN and CableLabs. An important basic principle
20 for IMS emergency calls is the special "IMS emergency call registration". TS 23.167 is currently based on the fact that a terminal which wishes to transmit an emergency call in the IMS first registers in the IMS by means of an emergency call SIP URI (also called emergency call Public
25 User Identity). This SIP URI (Session Initiation Protocol Uniform Resource Identifier) is either preconfigured in the terminal or the terminal generates it from an existing SIP URI which is stored, e.g. on the UICC (Universal Integrated Circuit Card), if present. In the case of GPRS/UMTS, the
30 registration in the IMS is preceded by the setting-up of an emergency PDP (Packet Data Protocol) context. A PDP context sets up a session between the terminal and a GGSN and allocates an IP and a P-CSCF address to the terminal. This PDP context uses its own APN (Access Point Name), with the
35 aid of which a GGSN and a P-CSCF (Proxy Call Session Control Function) are determined in the visited mobile radio network (VPLMN). This is necessary, since the emergency call must be routed in the VPLMN

to the emergency call center, but in the case of roaming, the GGSN, and thus also the P-CSCF, may well be located in the home network of the subscriber (and usually are since the APNs are preconfigured in the terminal by the home network operator). However, this procedure has the disadvantage that the setting-up of a PDP context and the subsequent IMS registration can consume a great amount of time (easily within the range of seconds). For this reason, the 3GPP is currently considering how the special IMS registration can be dispensed with in the case of emergency calls if the terminal is already registered in the IMS. The situation is made more difficult by the fact that a terminal can register in a foreign network but P-CSCF and GGSN can still be located in the home network (so-called GPRS roaming, in contrast to IMS roaming, where P-CSCF and GGSN are both in the visited network). The invention describes possible methods of how a special IMS registration can be dispensed with in the case of emergency calls in order to thus significantly accelerate the setting up of the call. In the case of GPRS/UMTS networks, this also makes it possible to dispense with the setting up of an emergency call PDP context.

The current TS 23.167 Standard specifies that the terminal must always perform a registration in the IMS by means of the special emergency SIP URI.

In the case of GPRS/UMTS, this IMS registration is preceded by the setting-up of a special PDP context in the visited network by means of the special emergency APN.

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The object of the invention is simplification of the setting-up of an emergency call connection.

The object is achieved in each case by the subject matters of the patent claims.

The invention describes methods of how the special IMS emergency call registration, and in the case of GPRS/UMTS, the setting-up of a special PDP context, can be dispensed with. In this context, it is assumed that the terminal has
5 locally stored an identifier (network identifier) which identifies its home network (e.g. that of its mobile radio subscriber identification card). In mobile networks , this identifier is stored as MCC/MNC (Mobile Country Code/Mobile Network Code) of the home network on the SIM/USIM
10 card.

If the terminal, when registering in the visited network, is informed by the latter about the network identifier of the visited network (in the case of GPRS/UMTS, this information
15 is broadcasted, e.g. by the radio network, in 3GPP WLAN, this information is transmitted to the terminal during the access authentication, in Next Generation Fixed Networks, a similar method could be used as in the case of 3GPP WLAN), it can dispense with the special IMS registration for
20 emergency calls if the terminal is already registered in the IMS and the comparison between the stored identifier of the home network and the received identifier of the visited network has revealed that both networks are identical, that is to say the terminal is not moving in a foreign network.
25 Since the subscribers are predominantly located in their home network and the terminal must always be registered in the IMS in order to be "always on", and thus reachable , this method dispenses in most cases with a special IMS registration for emergency calls with the associated setting-
30 up of a PDP context in the case of GPRS/UMTS.

According to one embodiment of the general method, the invention proposes that the P-CSCF sends the identifier of the network, in which it is located itself, to the terminal
35 in the response to the registration request of the terminal (SIP 200 OK

as response to the SIP REGISTER message). If, as previously described, the terminal determines that it is located in a visited network and not in the home network, it can determine, by means of the information which it has obtained
5 from the P-CSCF during the registration, whether the P-CSCF is also located in the visited network. If this is the case, a special IMS registration for emergency calls is no longer necessary. In the case of emergency calls, the terminal can immediately set up the SIP session by means of an SIP INVITE
10 message. In all other cases, emergency call registration is required. This alternative method also covers the scenarios in which the method described before is applicable, but is more generally applicable.

15 If not every P-CSCF is capable of dealing with emergency calls, the P-CSCF can send back related information also in the response to the registration request from this terminal. The terminal must then take this information into consideration in the decision whether
20 it must perform a special emergency call registration or not.

The invention describes methods by means of which a special IMS registration for emergency calls, and in the case of GPRS/UMTS access systems, the setting-up of a separate PDP
25 context, can be dispensed with in most cases. Since setting-up of a PDP context and IMS registration are time-consuming procedures, this results in considerable time saving which is a significant requirement particularly in the case of emergency calls.

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In particular, the invention can be used in cellular mobile radio networks but also in WLAN/WIMAX networks and fixed networks.

Further features and advantages of the invention are obtained from the further patent claims and the subsequent description of an exemplary embodiment by means of the drawing. The exemplary embodiment shows in

5 figure 1 a flowchart which represents how a terminal, after successful IMS registration, can transmit an emergency call via a mobile radio access network without first having to perform a special emergency call registration in the IMS.

10 Figure 1 shows some components "S-CSCF", "P-CSCF", "GGSN", "SGSN", "Radio Access Network" of a mobile radio network known per se to the expert from, e.g. specifications in www.etsi.org or www.3gpp.org.

A terminal (fig. 1, "terminal") registers in a mobile radio
15 network and obtains a network identifier ("MCC1/MNC1") of the mobile radio network visited by it.

The terminal then sets up a PDP context to a GGSN of the mobile radio network and is assigned an IP address and a P-
20 CSCF address for the communication with the P-CSCF.

Following this, the terminal registers with the P-CSCF in the IMS (with a "SIP REGISTER" message). From the P-CSCF, the terminal obtains the network identifier "MCC2/MNC2" of the
25 network in which this P-CSCF is located (with a "SIP 200 OK" message).

If the terminal should transmit an emergency call later, this is possible, e.g. in the following way:

30 a comparison of the network identifier "MCC1/MNC1" (stored in the terminal after its registration/authentication etc. in the mobile radio network visited by it) of the network visited by the terminal with the network identifier "MCC2/MNC2"

of the network in which the P-CSCF is located, reveals that the P-CSCF is located in the network visited by the terminal.

5 For this reason, the terminal does not perform a special (separate/further) registration for the emergency call desired by it but immediately sets up the emergency call by means of a "SIP INVITE" message. This saves time.

Patent claims

1. A method for setting up an emergency call connection from a terminal (fig. 1: "terminal") to an IP Multimedia Subsystem (IMS) via a network (fig. 1: "S-CSCF", "P-CSCF", "GGSN", "SGSN", Radio Access Network"...) visited by the terminal,
wherein, if the terminal is already registered in the IP Multimedia Subsystem (IMS), an IP Multimedia Subsystem (IMS) registration of the terminal in the IMS for the emergency call connection is dispensed with during the setting-up of the emergency call connection,
if a comparison between a network identifier (fig. 1: "MCC1"/"MNC1") for the visited network, about which the terminal was notified when it registered in the visited network, and a network identifier of the home network of the terminal reveals a match between these network identifiers.
2. The method as claimed in claim 1, characterized in that a match of these network identifiers specifies that the terminal and/or a mobile radio subscriber identity module located therein is located in its home network.
3. The method as claimed in claim 1, characterized in that, if the comparison reveals a match of the network identifiers, the terminal transmits the emergency call via an IMS registration which already exists.
4. The method as claimed in claim 1,

characterized in that the comparison is made in the terminal.

5. The method as claimed in any one of the preceding claims,
characterized in that the network identifier comprises at least one of a
5 Mobile Country Code (MCC) and a Mobile Network Code (MNC).

6. The method as claimed in any one of the preceding claims,
characterized in that the network is one of a cellular mobile radio
network, a Wireless Local Area Network (WLAN), a WIMAX network and a
10 fixed network.

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7. The method as claimed in any one of the preceding claims,
characterized in that the network identifier of the visited mobile radio
network is conveyed to the terminal during the authentication of the
20 terminal to the visited mobile radio network.

8. The method as claimed in any one of the preceding claims,
characterized in that a Proxy Call State Control Function (P-CSCF) of a
mobile radio network sends the network identifier (fig. 1: "MCC1"/"MNC1")
25 of the network, in which the Proxy Call State Control Function (P-
CSCF) is located itself, to the terminal in a response ("SIP 200 OK") to
an IP Multimedia Subsystem (IMS) registration request ("SIP REGISTER") of
the terminal,
whereupon the terminal, when it recognizes that the visited network
30 is not the home network, determines by means of a network
identifier (fig. 1: "MCC2"/"MNC2") obtained from the Proxy Call State
Control Function (P-CSCF) during the registration, whether the Proxy Call
State Control Function (P-CSCF) is also located in the mobile radio
network visited by the terminal, in which case, when the emergency call
35 connection is set up, a special IP Multimedia Subsystem (IMS)
registration of the terminal in the IP Multimedia Subsystem (IMS) is
dispensed with for the emergency call connection and the terminal sets
up a Session Initiation Protocol (SIP) session (fig. 1: SIP INVITE)
for the emergency call connection,

whereas otherwise, when the emergency call connection is set up, the special IP Multimedia Subsystem (IMS) registration of the terminal in the IP Multimedia Subsystem (IMS) is first effected for the emergency call connection
 5 before the Session Initiation Porotocl (SIP) session (fig. 1: SIP INVITE) is set up for the emergency call connection.

9. The method as claimed in the preceding claim, characterized in that for the emergency call connection,
 10 the Session Initiation Protocol (SIP) session is set up by means of an "SIP INVITE" message.

10. The method as claimed in any one of the preceding claims, characterized in that, if the Proxy Call State
 15 Control Function (P-CSCF) is not capable of dealing with emergency calls, the Proxy Call State Control Function (P-CSCF) sends back related information to the terminal in a response to a registration request by this terminal, and the terminal then takes this information into consideration
 20 in the decision whether it must perform a special emergency call registration or not.

11. The method as claimed in any one of the preceding claims, characterized in that if the network comprises one of a
 25 General Packet Radio Service (GPRS) and a Universal Mobile Telecommunications System (UMTS) access system, setting-up of a separate PDP context can be dispensed together with the IMS registration of the terminal in the IMS for the emergency call connection.

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1 2.

A terminal for setting-up an emergency call connection from the terminal to an IP
 35 Multimedia Subsystem via a network visited by the terminal, comprising

a means for receiving a network identifier of the visited network notified to the terminal during the registration of the terminal in the visited network,

5 a means for comparing the received network identifier of the visited network with a network identifier of a home network of the terminal,

a means for setting-up the emergency call connection wherein an IP Multimedia Subsystem (IMS) registration of the terminal in the IMS for the emergency call connection is
10 dispensed with, if the terminal is already registered in the IP Multimedia Subsystem (IMS) and if the comparison means reveals a match between the network identifiers.

13. A terminal according to claim 12 where the emergency
15 connection is set-up over an already existing IP Multimedia Subsystem registration if the comparison means reveals a match between the network identifiers.

14. A terminal according to claim 12 or 13 where the network
20 identifier of the visited network is received during an authentication of the terminal with the visited network.

15. A terminal according to any of claims 12 to 14 comprising
a Subscriber Identity Module (SIM) / Universal
25 Subscriber Identity Module (USIM) card storing the identifier of the home network of the device.

16. A terminal according to any of claims 12 to 15 where the
network identifier comprises at least one of a Mobile
30 Country Code (MCC) and a Mobile Network Code (MNC).

17. A terminal according to any of claims 12 to 16 where the visited network from which the network identifier is received
5 from is one of a cellular network, a wireless local area network, a WIMAX network and a fixed network.

18. A terminal according to any of claims 12 to 17 where the network identifier is received from a Proxy Call State
10 Control Function (P-CSCF) of a mobile radio network in a response („SIP 200 OK“) to an IP Multimedia Subsystem registration request („SIP REGISTER“) of the terminal identifying the network in which the Proxy Call State Control
Function (P-CSCF) is located itself comprising a

15 determining means determining, when the visited network is not the home network, by means of the network identifier obtained from the Proxy Call State Control Function (P-CSCF) during the registration whether the Proxy Call State Control
Function (P-CSCF) is also located in the mobile radio network
20 visited by the terminal, in which case, when the emergency call connection is set-up, a special IP Multimedia Subsystem (IMS) registration of the terminal in the IP Multimedia Subsystem (IMS) is dispensed with for the emergency call
connection and the terminal sets up a Session Initiation
25 Protocol (SIP) session (fig. 1: SIP INVITE) for the emergency call connection,

whereas otherwise, when the emergency call connection is set-up, the special IP Multimedia Subsystem (IMS)
registration of the terminal in the IP Multimedia Subsystem
30 (IMS) is first effected for the emergency call connection before the Session Initiation Porotocl (SIP) session (fig. 1: SIP INVITE) is set up for the emergency call connection.

19. A terminal according to claims 18 where the Session Initiation Protocol (SIP) session for the emergency session is set up by means of an "SIP INVITE" message.

5 20. A terminal according to any of claims 18 or 19 comprising

a decision means deciding if a special emergency call registration is needed or not, after receiving information from the Proxy Call State Control Function (P-CSCF) that the
10 Proxy Call State Control Function (P-CSCF) is not able to handle the emergency call.

21. A terminal according to any of claims 12 to 20 where the network comprises one of a General Packet Radio Service
15 (GPRS) and a Universal Mobile Telecommunications System (UMTS) access system and where setting-up of a separate PDP context can be dispensed with together with the IMS registration of the terminal in the IMS for the emergency call connection.

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