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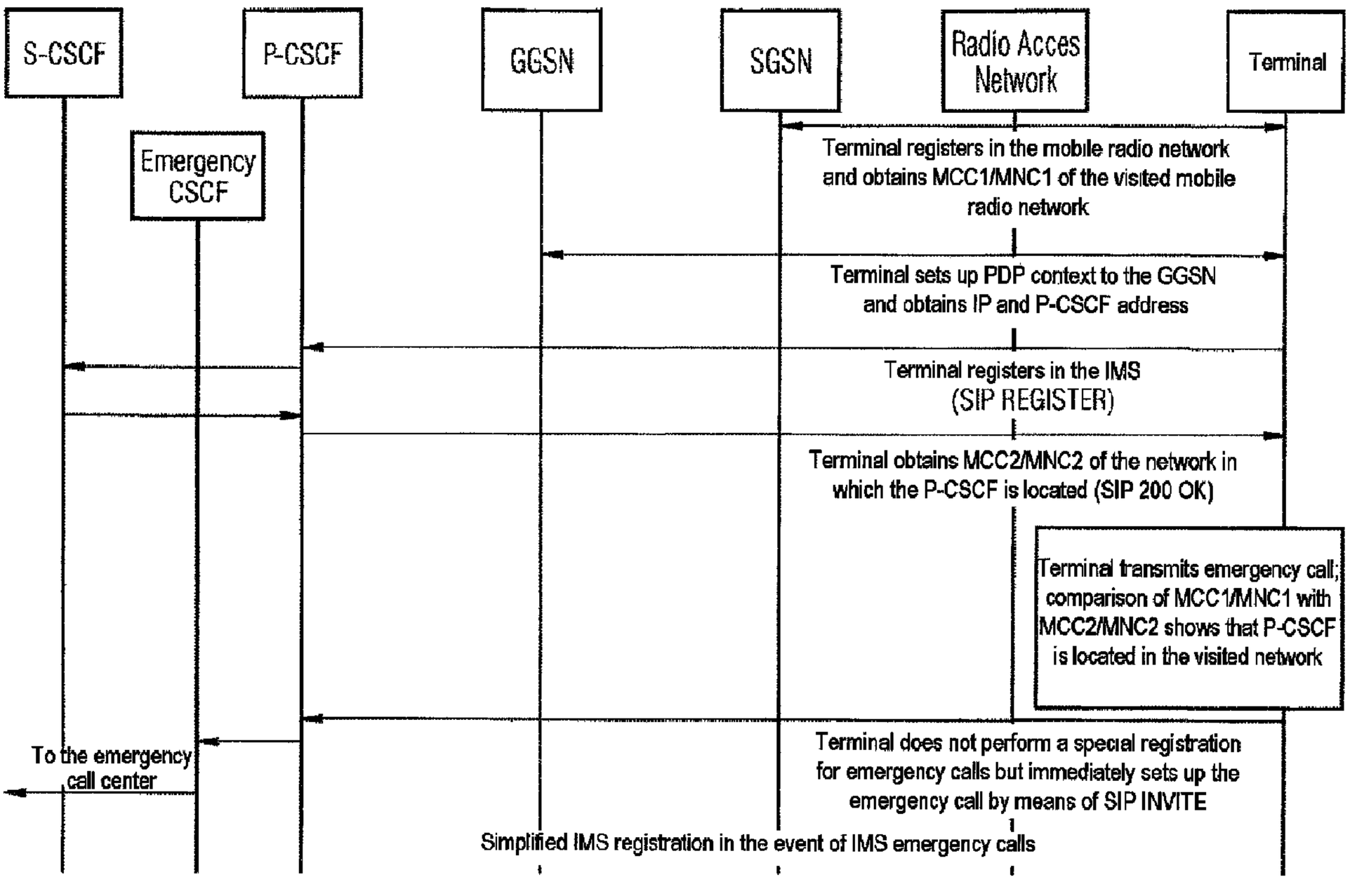
(54) Title: SIMPLIFIED METHOD FOR IMS REGISTRATION IN THE EVENT OF EMERGENCY CALLS



Simplified IMS registration in the event of IMS emergency calls

(57) Abrégé/Abstract:
Simplification of IMS registration in the event of emergency calls is made possible by apparatuses and a method for setting up an emergency-call connection from a terminal (Figure 1: "terminal") to an IMS via a network (Figure 1: "S-CSCF", "P-CSCF", "GGSN", "SGSN", "Radio Access Network"...) visited by the terminal, where, if the terminal is already registered in the IMS, setup of an emergency-call connection dispenses with IMS registration of the terminal in the IMS for this emergency-call connection if a comparison between a network identification ("network identifier", Figure 1: "MCC1"/"MNC1") for the visited network, of which the terminal was notified when it registered in the visited network, and a network identification for the terminal's home network reveals a match between these network identifications.

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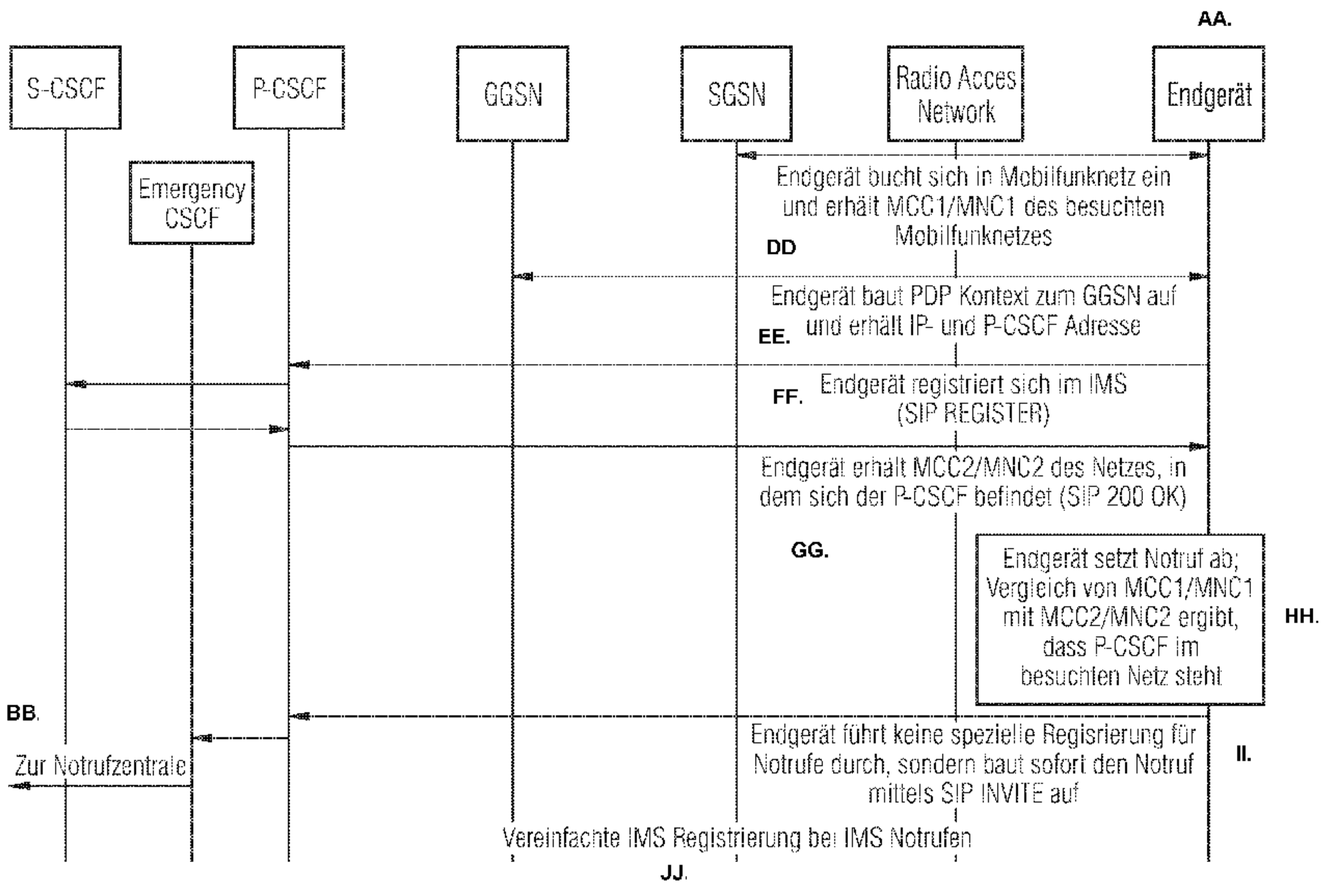
[Fortsetzung auf der nächsten Seite]

(54) Title: SIMPLIFIED METHOD FOR IMS REGISTRATION IN THE EVENT OF EMERGENCY CALLS

(54) Bezeichnung: VEREINFACHTES VERFAHREN ZUR IMS REGISTRIERUNG BEI NOTRUFEN



AA... Terminal
BB... To emergency centre
DD... Terminal registers in mobile radio network and receives visited mobile radio network' s MCC1/MNC1
EE... Terminal sets up PDP context to GGSN and receives IP and P-CSCF address
FF... Terminal registers in IMS (SIP REGISTER)
GG... Terminal receives MCC2/MNC2 of the network which contains the P-CSCF (SIP 200 OK)
HH... Terminal sends emergency call; comparison between MCC1/MNC1 and MCC2/MNC2 reveals that P-CSCF is in the visited network
II... Terminal performs no special registration for emergency calls but rather immediately sets up the emergency call using SIP INVITE
JJ... Simplified IMS registration in the event of IMS emergency calls

(57) Abstract: Simplification of IMS registration in the event of emergency calls is made possible by apparatuses and a method for setting up an emergency-call connection from a terminal (Figure 1: "terminal") to an IMS via a network (Figure 1: "S-CSCF", "P-CSCF", "GGSN", "SGSN", "Radio Access Network"...) visited by the terminal, where, if the terminal is already registered in the IMS, setup of an emergency-call connection dispenses with IMS registration of the terminal in the IMS for this emergency-call connection if a comparison between a network identification ("network identifier", Figure 1: "MCC1"/"MNC1") for the visited network, of which the terminal was notified when it registered in the visited network, and a network identification for the terminal's home network reveals a match between these network identifications.

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— *vor Ablauf der für Änderungen der Ansprüche geltenden Frist; Veröffentlichung wird wiederholt, falls Änderungen eintreffen*

Zur Erklärung der Zweibuchstaben-Codes und der anderen Abkürzungen wird auf die Erklärungen ("Guidance Notes on Codes and Abbreviations") am Anfang jeder regulären Ausgabe der PCT-Gazette verwiesen.

(57) Zusammenfassung: Eine Vereinfachung der IMS Registrierung bei Notrufen wird ermöglicht durch Vorrichtungen und ein Verfahren zum Aufbau einer Notrufverbindung von einem Endgerät (Fig. 1:„Endgerät") über ein vom Endgerät besuchtes Netz (Fig. 1:„S-CSCF"„P-CSCF"„GGSN"„SGSN"„Radio Access Network"...) mit einem IMS, wobei, falls das Endgerät bereits im IMS registriert ist, beim Aufbau einer Notrufverbindung auf eine IMS-Registrierung des Endgerätes im IMS für diese Notrufverbindung verzichtet wird, falls ein Vergleich zwischen einer dem Endgerät beim Einbuchen in das besuchte Netz mitgeteilten Netzidentifikation („network identifier", Fig. 1:„MCC1"/"MNC1") des besuchten Netzes mit einer Netzidentifikation des Heimat-Netzes des Endgerätes eine Übereinstimmung dieser Netzidentifikationen ergibt.

SIMPLIFIED METHOD FOR IMS REGISTRATION IN THE EVENT OF EMERGENCY CALLS

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

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.3gppp.org.

TS 23.167 Release 7 of the 3GPP Standardization Organization 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 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 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 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 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.

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 described herein.

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 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 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 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 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. 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-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 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 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 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.

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 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

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.

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

In one aspect of the invention there is provided a method comprising: receiving, at a terminal, a network identifier of a visited network, the network identifier of the visited network notified to the terminal when the terminal is registered in the visited network; comparing the received network identifier of the visited network with a network identifier of a home network of the terminal; and setting up an emergency call connection, wherein an IP multimedia subsystem registration of the terminal in an IP multimedia subsystem for the emergency call connection is dispensed with when the terminal is already registered in the IP multimedia subsystem and the comparing reveals a match between the network identifiers.

In another aspect of the invention there is provided a terminal comprising: receiving means for receiving a network identifier of a visited network notified to the terminal when the terminal is registered in the visited network; comparison means for comparing the received network identifier of the visited network with a network identifier of a home network of the terminal; and connection means for setting-up an emergency call connection, wherein an IP multimedia subsystem registration of the terminal in the IP multimedia subsystem

for the emergency call connection is dispensed with when the terminal is already registered in an IP multimedia subsystem and the comparison means reveals a match between the network identifiers.

In yet another aspect of the invention there is provided a terminal comprising: a receiver configured to receive a network identifier of a visited network notified to the terminal when the terminal is registered in the visited network; a comparator configured to compare the received network identifier of the visited network with a network identifier of a home network of the terminal; and a connection unit configured to set up an emergency call connection, wherein an IP multimedia subsystem registration of the terminal in an IP multimedia subsystem for the emergency call connection is dispensed with when the terminal is already registered in the IP multimedia subsystem and the comparator reveals a match between the network identifiers.

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 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.

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.3gppp.org.

A terminal (fig. 1, "terminal") registers in a mobile radio 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-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

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

In one embodiment, the emergency connection is set-up over an already existing IP Multimedia Subsystem registration if the comparison means reveals the match between the network identifiers.

In another embodiment, the network identifier of the visited network is received during an authentication of the terminal with the visited network.

In yet another embodiment, further comprising: a Subscriber Identity Module (SIM) / Universal Subscriber Identity Module (USIM) card storing the identifier of the home network of the device.

In still yet another embodiment, the network identifier comprises at least one of a Mobile Country Code (MCC) and a Mobile Network Code (MNC).

In still yet another embodiment, the visited network from which the network identifier is received from is one of a cellular network, a wireless local area network, a WIMAX network and a fixed network.

In still yet another embodiment, the network identifier is received from a Proxy Call State Control Function (P-CSCF) of a mobile radio network in a response to an IP Multimedia Subsystem registration request of the terminal identifying the network in which the Proxy Call State Control Function (P-CSCF) is located itself comprising a 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 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 Protocol (SIP) session 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 before the Session Initiation Protocol (SIP) session is set up for the emergency call connection. In a further embodiment, the Session Initiation Protocol (SIP) session for the emergency session is set-up by means of an "SIP INVITE" message.

In still yet another embodiment, the terminal further comprises: 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 Proxy Call State Control Function (P-CSCF) is not able to handle the emergency call.

In still yet another embodiment, the network comprises one of a General Packet Radio Service (GPRS) and a Universal Mobile Telecommunications System (UMTS) access system and where setting-up of a separate Packet Data Protocol (PDP) context can be dispensed with together with the IMS registration of the terminal in the IMS for the emergency call connection.

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 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.

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.3gppp.org.

A terminal (fig. 1, "terminal") registers in a mobile radio 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-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 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:
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.

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.

What is claimed is:

1. A method comprising:

receiving, at a terminal, a network identifier of a visited network, the network identifier of the visited network notified to the terminal when the terminal is registered in the visited network;

comparing the received network identifier of the visited network with a network identifier of a home network of the terminal; and

setting up an emergency call connection, wherein an IP multimedia subsystem registration of the terminal in an IP multimedia subsystem for the emergency call connection is dispensed with when the terminal is already registered in the IP multimedia subsystem and the comparing reveals a match between the network identifiers.

2. The method as claimed in claim 1, wherein the match between the network identifiers specifies that the terminal or a mobile radio subscriber identity module located therein is located in its home network.

3. The method as claimed in claim 1 or 2, further comprising, when the comparison reveals the match of the network identifiers, transmitting the emergency call via an IP multimedia subsystem registration which already exists.

4. The method as claimed in any one of claims 1 to 3, wherein the comparison is made in the terminal.

5. The method as claimed in any one of claims 1 to 4, wherein the network identifier at the visited network comprises at least one of a mobile country code and a mobile network code.

6. The method as claimed in any one of claims 1 to 5, wherein the visited network is one of a cellular mobile radio network, a wireless local area network, a WIMAX network, and a fixed network.

7. The method as claimed in any one of claims 1 to 6, wherein the network identifier of the visited network is conveyed to the terminal during the authentication of the terminal to the visited network.

8. The method as claimed in any one of claims 1 to 7, wherein. for the emergency call connection, a session initiation protocol session is set up by an "SIP INVITE" message.

9. The method as claimed in claim 1, wherein, if a proxy call state control function is not capable of dealing with emergency calls, the proxy call state control function sends back related information to the terminal in a response to a registration request by the terminal, and the terminal then takes the related information into consideration in a decision of whether it must perform a special emergency call registration or not.

10. The method as claimed in claim 1, wherein, if the visited network comprises one of a general packet radio service and a universal mobile telecommunications system access system, setting-up of a separate packet data protocol context can be dispensed together with the IP multimedia subsystem registration of the terminal in the IP multimedia subsystem for the emergency call connection.

11. A terminal comprising:

receiving means for receiving a network identifier of a visited network notified to the terminal when the terminal is registered in the visited network;

comparison means for comparing the received network identifier of the visited network with a network identifier of a home network of the terminal; and

connection means for setting-up an emergency call connection, wherein an IP multimedia subsystem registration of the terminal in the IP multimedia subsystem for the emergency call connection is dispensed with when the terminal is already registered in an IP multimedia subsystem and the comparison means reveals a match between the network identifiers.

12. A terminal comprising:

a receiver configured to receive a network identifier of a visited network notified to the terminal when the terminal is registered in the visited network;

a comparator configured to compare the received network identifier of the visited network with a network identifier of a home network of the terminal; and

a connection unit configured to set up an emergency call connection, wherein an IP multimedia subsystem registration of the terminal in an IP multimedia subsystem for the emergency call connection is dispensed with when the terminal is already registered in the IP multimedia subsystem and the comparator reveals a match between the network identifiers.

13. The terminal according to claim 12, wherein the connection unit is configured to set up the emergency connection over an already existing IP multimedia subsystem registration if the comparator reveals the match between the network identifiers.

14. The terminal according to claim 12 or 13, wherein the network identifier of the visited network is received during an authentication of the terminal with the visited network.

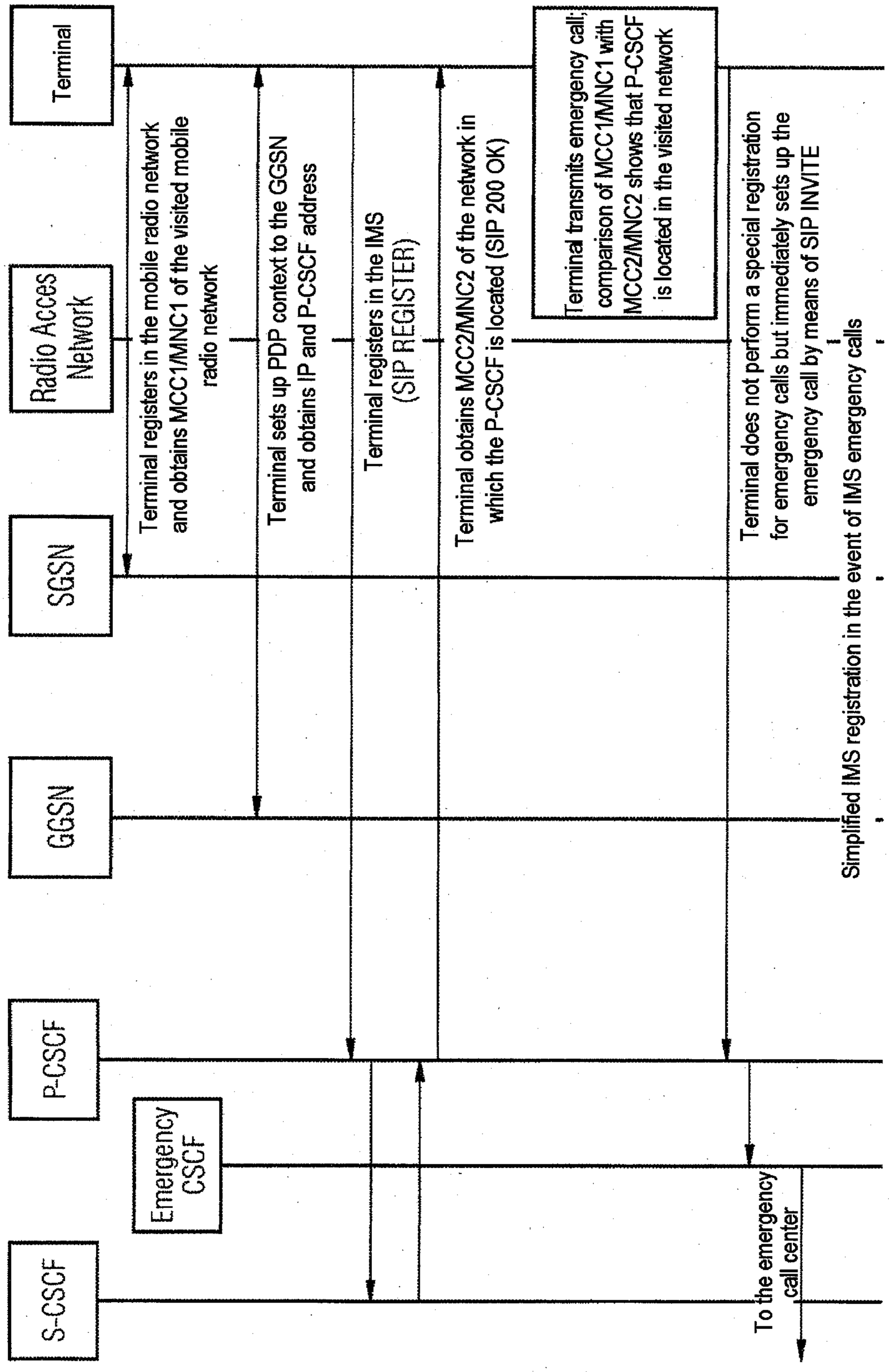
15. The terminal according to any one of claims 12 to 14, further comprising a subscriber identify module card configured to store the network identifier of the home network of the terminal.

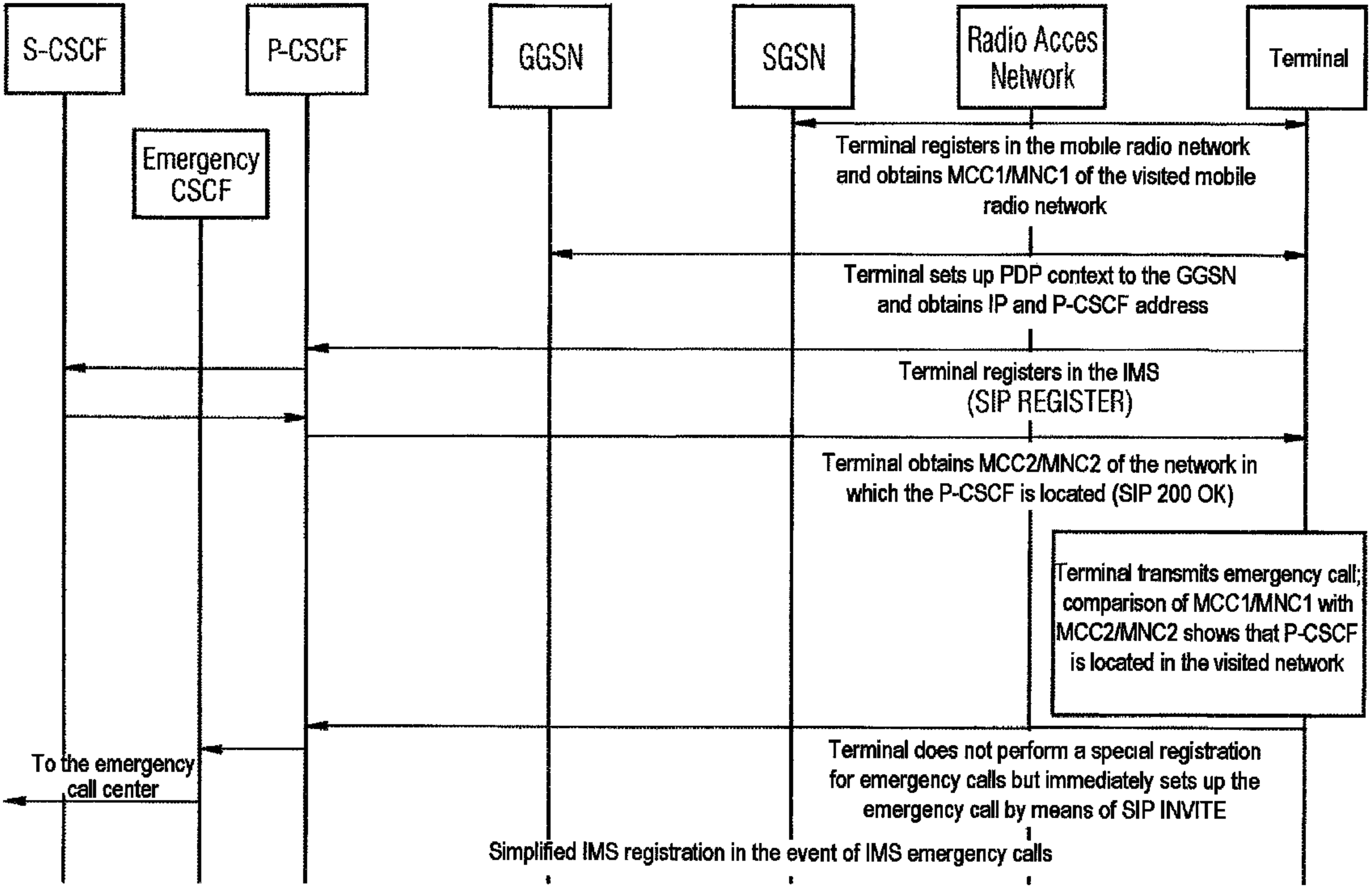
16. The terminal according to any one of claims 12 to 15, wherein the receiver is configured to receive the network identifier of the visited network which comprises at least one of a mobile country code and a mobile network code.

17. The terminal according to any one of claims 12 to 16, wherein the receiver is configured to receive the network identifier from the visited network, wherein the visited network comprises one of a cellular network, a wireless local area network, a WIMAX network, and a fixed network.

18. The terminal according to claim 12, wherein the visted network comprises one of a general packet radio service and a universal mobile telecommunications system access system and where setting-up of a separate packet data protocol context can be dispensed with together with the IP multimedia subsystem registration of the terminal in the IP multimedia subsystem for the emergency call connection.

19. The terminal according to claim 18, further comprising a decision unit configured to decide if a special emergency call registration is needed or not, after receiving information from a proxy call state control function that the proxy call state control function is not able to handle the emergency call connection.


Terminal
Radio Acces Network
SGSN
GGSN
P-CSCF
Emergency CSCF
S-CSCF
Terminal registers in the mobile radio network and obtains MCC1/MNC1 of the visited mobile radio network
Terminal sets up PDP context to the GGSN and obtains IP and P-CSCF address
Terminal registers in the IMS (SIP REGISTER)
Terminal obtains MCC2/MNC2 of the network in which the P-CSCF is located (SIP 200 OK)
Terminal transmits emergency call; comparison of MCC1/MNC1 with MCC2/MNC2 shows that P-CSCF is located in the visited network
Terminal does not perform a special registration for emergency calls but immediately sets up the emergency call by means of SIP INVITE
Simplified IMS registration in the event of IMS emergency calls
To the emergency call center


S-CSCF
P-CSCF
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Terminal sets up PDP context to the GGSN and obtains IP and P-CSCF address
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To the emergency call center
Simplified IMS registration in the event of IMS emergency calls