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(54) Title: SUBSCRIBER IDENTITY MODULE (SIM)-BASED FILTERING OF INCOMING/OUTGOING CALLS /TEXT MESSAGES

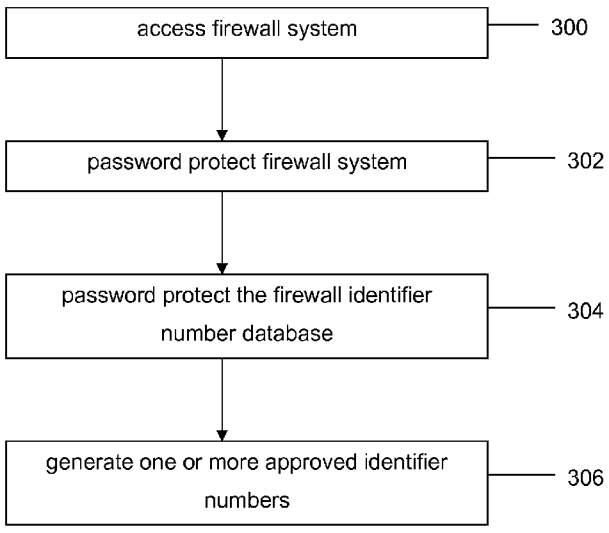

Fig 3

(57) Abstract: The application relates to filtering of incoming and outgoing events such as calls, texts or e-mails. Filtering is performed by a so-called firewall system which is based on a SIM which comprises the SIM application toolkit. The firewall system (5) comprises an incoming call filtering module (20), an outgoing call filtering module (22), an incoming text message filtering module (24), and an outgoing text message filtering module (2S). The firewall system (5) uses the incoming call filtering module (20) to filter incoming calls. A comparison module of the incoming call filtering module (20) compares the identifier number of an incoming call with one or more approved identifier numbers (406). If the identifier number of the incoming call does not match at least one of the one or more approved identifier numbers, a termination module of the incoming call filtering module (20) instructs the SIM (3) to send a command to the telephone (1) which causes it to be disconnected from the telecommunication network (410). In this embodiment of the invention, the command which the termination module instructs the SIM (3) to send to the telephone (1) comprises a REFRESH command provided as part of the SIM application toolkit application (9).The parameters of the REFRESH command are set to cause the telephone 1 to be disconnected from the telecommunication network.

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SUBSCRIBER IDENTITY MODULE (SIM)-BASED FILTERING OF INCOMING/OUTGOING CALLS /TEXT MESSAGES

Field of the invention:

The present invention relates to improvements in firewalls, which are based on subscriber identity modules (SIMs) of mobile telecommunication devices.

Background to the invention:

Various mobile telecommunication devices, such as mobile telephones, PDAs, and Blackberry (RTM) devices, are provided with SIMs, used primarily to identify the person using the device. SIMs can also be used to provide firewall-type services, for example filtering of incoming and outgoing events such as calls, texts or e mails. Such services are desirable in a number of areas.

Today many children and teenagers use mobile telephones. Parents can have little control over the calls their children make and receive, and the text messages their children send and receive. The safety of children and teenagers is jeopardised by this potential open access, which allows strangers to contact the child or teenager.

It is common in business for an employee to use a business mobile telephone provided by the employer. The employer usually pays for the calls the employee makes and receives using the business mobile telephone. Often the use of the business mobile telephone is restricted in the employee's employment contract to work-related matters, however, many employees nevertheless use their business mobile telephone to make and receive personal calls.

Firewall-type services can be used in both these areas to control the events which a mobile telephone processes. In particular, there is a need to be able to disconnect certain events, such as certain incoming calls.

Summary of the invention:

According to a first aspect of the invention there is provided a firewall system based on a SIM of a mobile telecommunication device, the system comprising an incoming call filtering module, which comprises
a notification module which receives notification that the device has received an incoming call from a telecommunication network,
an interrogation module which causes interrogation of the incoming call to search for an identifier number of the call, and, if an identifier number is found, receives the identifier number of the incoming call,
a comparison module which compares the identifier number of the incoming call with one or more approved identifier numbers, and
a termination module which, if the identifier number of the incoming call does not match at least one of the one or more approved identifier numbers, instructs the SIM to send a command to the device which causes the device to be disconnected from the telecommunication network which, in turn, causes the incoming call to terminate.

It will be appreciated that the firewall system carries out the above-described functions in a sufficiently short time such that a user of the device is not able to access the incoming call. Thus the firewall system filters incoming calls to the device, disconnecting certain calls and allowing other calls to continue, i.e. be processed by the device.

If an identifier number of the incoming call is not found, the interrogation module may receive notification that no identifier number has been found,

and that the incoming call is an unidentified incoming call. The termination module may then instruct the SIM to send a command to the device which causes the device to be disconnected from the telecommunication network which, in turn, causes the unidentified incoming call to terminate.

The command which the termination module instructs the SIM to send to the device may activate a global system for mobile communications (GSM) session termination procedure. Carrying out such a procedure causes the device to be disconnected from the telecommunication network. The command which the termination module instructs the SIM to send to the device may cause the device to be reconnected to the telecommunication network. The command which the termination module instructs the SIM to send to the device may cause the device to be reconnected to the telecommunication network, by activating a GSM session start-up procedure. Although the device is reconnected to the telecommunication network, it will not be reconnected to the incoming call, as disconnecting the device from the network has caused the call to terminate. The command which the termination module instructs the SIM to send to the device may cause deactivation of the SIM. The command which the termination module instructs the SIM to send to the device may cause reactivation of the SIM by the device.

The command which the termination module instructs the SIM to send to the device may comprise a refresh command having parameters which are set to cause the device to be disconnected from the telecommunication network. The command which the termination module instructs the SIM to send to the device may comprise a refresh command having parameters which are set to cause the device to be reconnected to the telecommunication network. The command which the termination module instructs the SIM to send to the device may comprise a refresh command

having parameters which are set to cause deactivation of the SIM. The command which the termination module instructs the SIM to send to the device may comprise a refresh command having parameters which are set to cause reactivation of the SIM by the device.

In one embodiment of the invention, the command which the termination module instructs the SIM to send to the device may comprise a refresh command provided as part of a SIM application toolkit application, and which has parameters which are set to cause the device to be disconnected from the telecommunication network, to cause the device to be reconnected to the telecommunication network, and to cause deactivation of the SIM and to cause reactivation of the SIM. SIM application toolkit applications are provided as standard on SIMs, and are used to govern how non-standard applications, such as those provided by parties other than the SIM manufacturer, interact with the device. Use of a command provided by the SIM application toolkit application, can therefore allow the firewall system of the invention to interact with the device.

The firewall system may comprise an advice module which instructs the device to send a message to a display of the device, which message informs a user of the device that an incoming call has been terminated.

The notification module may receive notification that the device has received an incoming call from the SIM. The SIM may comprise a SIM application toolkit application, and may use a function of this to detect receipt of an incoming call, and may use a function of this to notify the notification module of receipt of the incoming call.

The interrogation module may cause interrogation of the incoming call to search for an identifier number of the call by instructing the SIM to

interrogate the call. The SIM may comprise a SIM application toolkit application, and may use a function of this to interrogate the incoming call to search for an identifier number of the call. The SIM may comprise a SIM application toolkit application, and may use a function of this to send an identifier number of the incoming call to the interrogation module. The SIM may comprise a SIM application toolkit application, and may use a function of this to notify the interrogation module that no identifier number of the incoming call has been found.

The firewall system may comprise a firewall identifier number database. This may be located on the SIM of the device. The firewall identifier number database may comprise one or more entries, the or each of which comprises an identifier number and one or more rules for the identifier number. At least one of the rules may be used to determine that the identifier number is an approved identifier number or is not an approved identifier number. Thus, for the or each identifier number, it can be determined whether or not to terminate incoming calls having the identifier number.

The firewall system may control access to the firewall identifier number database. This will allow prevention of access to the firewall identifier number database by an unauthorised person via only the SIM. The firewall identifier number database may be accessible without using the firewall system. Such access may be restricted to authorised persons only. The firewall identifier number database may be password-protected, to restrict access to the database to a password holder or holders.

The firewall system may comprise an approved identifier number creation module. The approved identifier number creation module may create an approved identifier number by entering an identifier number into an entry

of the firewall identifier number database and entering one or more rules into the entry which determine that the identifier number is an approved identifier number. Additionally or alternatively, the approved identifier number creation module may create an approved identifier number by accessing an entry of the firewall identifier number database in which an identifier number has already been stored, and entering one or more rules into the entry which determine that the identifier number is an approved identifier number. The SIM of the device may comprise a SIM identifier number database in which a user of the device has stored one or more contact identifier numbers. The approved identifier number creation module may create an approved identifier number by copying one or more of the contact identifier numbers into one or more entries of the firewall identifier number database, accessing an entry of the firewall identifier number database in which a contact identifier number has been stored, and entering one or more rules into the entry which determine that the contact identifier number is an approved identifier number. In one embodiment of the invention, the approved identifier number creation module creates one or more approved identifier numbers by copying the or each contact identifier number into one or more entries of the firewall identifier number database, accessing one or more entries of the firewall identifier number database in which a contact identifier number has been stored, and entering one or more rules into the or each entry which determine that the contact identifier number is an approved identifier number.

The comparison module may compare an identifier number of the incoming call with one or more approved identifier numbers which are stored in the firewall identifier number database. The comparison module may access the or each entry in the firewall identifier number database, interrogate the one or more rules of each entry which determine if the

identifier number of the entry is an approved identifier number or is not an approved identifier number, and, if the identifier number is an approved identifier number, compare the identifier number of the incoming call with the approved identifier number, or, if the identifier number is not an approved identifier number, end its comparison function.

The firewall system may comprise a recording module which records identifier numbers of the or each incoming call which has been terminated. The recording module may record the identifier numbers of the or each terminated call in an entry of a firewall terminated identifier number database. Alternatively, the recording module may record the identifier numbers of a number of terminated calls in entries of the firewall terminated identifier number database, for example the identifier numbers of the last ten calls which have been terminated. The recording module may record data comprising the date and time of termination of a call in the entry of the identifier number of the call.

The firewall system may comprise an outgoing call filtering module. This may comprise a notification module which receives notification that the device is making an outgoing call, an interrogation module which causes interrogation of the outgoing call to search for an identifier number of the call and receives the identifier number of the outgoing call, a comparison module which compares the identifier number of the outgoing call with one or more approved identifier numbers, and a blocking module which, if the identifier number of the outgoing call does not match at least one of the one or more approved identifier numbers, instructs the SIM to send a command to the device which causes the device to discontinue the outgoing call.

The firewall system may comprise an incoming text message filtering module. This may comprise a notification module which receives notification that the device has received an incoming text message, an interrogation module which causes interrogation of the text message to search for an identifier number of the text message and, if an identifier number is found, receives the identifier number of the text message, a comparison module which compares the identifier number of the text message with one or more approved identifier numbers, and a blocking module which, if the identifier number of the text message does not match at least one of the one or more approved identifier numbers, instructs the SIM to delete the text message from a SIM text message database and to send a command to the device which causes the device to update a device text message database by copying contents of the SIM text message database into the device text message database, which, in turn, results in deletion of the text message from the device.

If an identifier number of the incoming text message is not found, the interrogation module may receive notification that no identifier number has been found, and that the incoming text message is an unidentified incoming text message. The blocking module may then instruct the SIM to delete the unidentified text message from a SIM text message database and to send a command to the device which causes the device to update a device text message database by copying contents of the SIM text message database into the device text message database, which, in turn, results in deletion of the unidentified text message from the device.

The firewall system may comprise an outgoing text message filtering module. This may comprise a notification module which receives notification that the device is sending an outgoing text message, an interrogation module which causes interrogation of the outgoing text

message to search for an identifier number of the text message and receives the identifier number of the outgoing text message, a comparison module which compares the identifier number of the outgoing text message with one or more approved identifier numbers, and a blocking module which, if the identifier number of the outgoing text message does not match at least one of the one or more approved identifier numbers, instructs the SIM to send a command to the device which causes the device to discontinue sending of the outgoing text message.

The firewall system may comprise a set-up module which activates and deactivates the firewall system. The set-up module may password-protect the firewall system, to restrict access to the system to a password holder or holders. Thus the firewall system can be accessed by, for example, only a parent or a business manager, and activated by these persons. Children and employees can therefore be denied access to the firewall system, and cannot deactivate the system. The set-up module may allow setting of one or more operation parameters of the firewall system.

According to a second aspect of the invention there is provided a method of filtering incoming calls to a mobile telecommunication device, the method comprising the steps of

receiving notification that the device has received an incoming call from a telecommunication network,

interrogating the incoming call to search for an identifier number of the call, and, if an identifier number is found, receiving the identifier number of the incoming call,

comparing the identifier number of the incoming call with one or more approved identifier numbers, and

if the identifier number of the incoming call does not match at least one of the one or more approved identifier numbers, instructing a SIM of the

device to send a command to the device which causes the device to be disconnected from the telecommunication network which, in turn, causes the incoming call to terminate.

If an identifier number of the incoming call is not found, the method may comprise receiving notification that no identifier number has been found and that the incoming call is an unidentified incoming call, and instructing the SIM to send a command to the device which causes the device to be disconnected from the telecommunication network which, in turn, causes the unidentified incoming call to terminate.

The command which the SIM is instructed to send to the device may activate a global system for mobile communications (GSM) session termination procedure. Carrying out such a procedure causes the device to be disconnected from the telecommunication network. The command which the SIM is instructed to send to the device may cause the device to be reconnected to the telecommunication network. The command which the termination module instructs the SIM to send to the device may cause the device to be reconnected to the telecommunication network, by activating a GSM session start-up procedure. Although the device is reconnected to the telecommunication network, it will not be reconnected to the incoming call, as disconnecting the device from the network has caused the call to terminate. The command which the SIM is instructed to send to the device may cause deactivation of the SIM. The command which the SIM is instructed to send to the device may cause reactivation of the SIM.

The command which the SIM is instructed to send to the device may comprise a refresh command having parameters which are set to cause the device to be disconnected from the telecommunication network. The command which the SIM is instructed to send to the device may comprise

a refresh command having parameters which are set to cause the device to be reconnected to the telecommunication network. The command which the SIM is instructed to send to the device may comprise a refresh command having parameters which are set to cause deactivation of the SIM. The command which the SIM is instructed to send to the device may comprise a refresh command having parameters which are set to cause reactivation of the SIM.

In one embodiment of the invention, the command which the SIM is instructed to send to the device may comprise a refresh command provided as part of an application toolkit application of the SIM, and which has parameters which are set to cause the device to be disconnected from the telecommunication network, to cause the device to be reconnected to the telecommunication network, to cause deactivation of the SIM and to cause reactivation of the SIM. SIM application toolkit applications are provided as standard on SIMs, and are used to govern how non-standard applications, such as those provided by parties other than the SIM manufacturer, interact with the device. Use of a command provided by the SIM application toolkit application, can therefore allow the firewall system of the invention to interact with the device.

The method may comprise instructing the device to send a message to a display of the device, which message informs a user of the device that an incoming call has been terminated.

Notification that the device has received an incoming call may be received from the SIM. The SIM may comprise a SIM application toolkit application, and the method may comprise using a function of this to detect receipt of an incoming call, and may use a function of this to notify the notification module of receipt of the incoming call.

Interrogation of the incoming call to search for an identifier number of the call may comprise instructing the SIM to interrogate the call. The SIM may comprise a SIM application toolkit application, and may use a function of this to interrogate the incoming call to search for an identifier number of the call.

The method may comprise using a firewall identifier number database. This may be located on the SIM of the device. The firewall identifier number database may comprise one or more entries, the or each of which comprises an identifier number and one or more rules for the identifier number. At least one of the rules may be used to determine that the identifier number is an approved identifier number or is not an approved identifier number. Thus, for the or each identifier number, it can be determined whether or not to terminate incoming calls having the identifier number.

The method may comprise creating an approved identifier number by entering an identifier number into an entry of the firewall identifier number database and entering one or more rules into the entry which determine that the identifier number is an approved identifier number. Additionally or alternatively, the method may comprise creating an approved identifier number by accessing an entry of the firewall identifier number database in which an identifier number has already been stored, and entering one or more rules into the entry which determine that the identifier number is an approved identifier number. The SIM of the device may comprise a SIM identifier number database in which a user of the device has stored one or more contact identifier numbers. The method may comprise creating an approved identifier number by copying one or more of the contact identifier numbers into one or more entries of the firewall identifier number database, accessing an entry of the firewall identifier number database in

which a contact identifier number has been stored, and entering one or more rules into the entry which determine that the contact identifier number is an approved identifier number. In one embodiment of the invention, the method comprises creating one or more approved identifier numbers by copying the or each contact identifier number into one or more entries of the firewall identifier number database, accessing one or more entries of the firewall identifier number database in which a contact identifier number has been stored, and entering one or more rules into the or each entry which determine that the contact identifier number is an approved identifier number.

Comparing an identifier number of the incoming call with one or more approved identifier numbers may comprise comparing the incoming call identifier number with one or more approved identifier numbers stored in the firewall identifier number database. This may comprise accessing the or each entry in the firewall identifier number database, interrogating the one or more rules of each entry which determine if the identifier number of the entry is an approved identifier number or is not an approved identifier number, and, if the identifier number is an approved identifier number, comparing the identifier number of the incoming call with the approved identifier number, or, if the identifier number is not an approved identifier number, ending the comparison step.

The method may comprise recording identifier numbers of the or each incoming call which has been terminated. The or each identifier number may be recorded in an entry of a firewall terminated identifier number database. Alternatively, the identifier numbers of a number of terminated calls may be recorded in entries of the firewall terminated identifier number database, for example the identifier numbers of the last ten calls which

have been terminated. Data comprising the date and time of termination of a call may be recorded in the entry of the identifier number of the call.

The method may comprise filtering outgoing calls. This may comprise receiving notification that the device is making an outgoing call, interrogating the outgoing call to search for an identifier number of the call and receiving the identifier number of the outgoing call, comparing the identifier number of the outgoing call with one or more approved identifier numbers, and if the identifier number of the outgoing call does not match at least one of the one or more approved identifier numbers, instructing the SIM to send a command to the device which causes the device to discontinue the outgoing call.

The method may comprise filtering incoming text messages. This may comprise receiving notification that the device has received an incoming text message, interrogating the text message to search for an identifier number of the text message and, if an identifier number is found, receiving the identifier number of the text message, comparing the identifier number of the text message with one or more approved identifier numbers, and if the identifier number of the text message does not match at least one of the one or more approved identifier numbers, instructing the SIM to delete the text message from a SIM text message database and to send a command to the device which causes the device to update a device text message database by copying contents of the SIM text message database into the device text message database, which, in turn, results in deletion of the text message from the device.

If an identifier number of the incoming text message is not found, the method may comprise receiving notification that no identifier number has been found that the incoming text message is an unidentified incoming

text message, and instructing the SIM to delete the unidentified text message from a SIM text message database and to send a command to the device which causes the device to update a device text message database by copying contents of the SIM text message database into the device text message database, which, in turn, results in deletion of the unidentified text message from the device.

The method may comprise filtering outgoing text messages. This may comprise receiving notification that the device is sending an outgoing text message, interrogating the outgoing text message to search for an identifier number of the text message and receiving the identifier number of the outgoing text message, comparing the identifier number of the outgoing text message with one or more approved identifier numbers, and if the identifier number of the outgoing text message does not match at least one of the one or more approved identifier numbers, instructing the SIM to send a command to the device which causes the device to discontinue sending of the outgoing text message.

The firewall system may comprise a set-up module which activates and deactivates the firewall system. The set-up module may password-protect the firewall system, to restrict access to the system to a password holder or holders. Thus the firewall system can be accessed by, for example, only a parent or a business manager, and activated by these individuals. Children and employees can therefore be denied access to the firewall system, and cannot deactivate the system. The set-up module may allow setting of one or more operation parameters of the firewall system.

According to a third aspect of the invention there is provided a computer program product stored in a medium readable by a computer, the product

comprising computer-readable program means which cause the computer to perform the method according to the second aspect of the invention.

According to a fourth aspect of the invention there is provided a mobile telecommunication device comprising a firewall system according to the first aspect of the invention.

The mobile telecommunication device may comprise any of a mobile telephone, a PDA, a Blackberry (RTM) device.

Brief description of the drawings:

Embodiments of the invention will now be described by way of example only, with reference to the accompanying drawings in which:

Figure 1 is a schematic representation of a mobile telecommunication device comprising a SIM-based firewall system according to the first aspect of the invention;

Figure 2 is a schematic representation of the firewall system of Figure 1;

Figure 3 is a flow diagram illustrating setting-up of the firewall system of Figures 1 and 2;

Figure 4 is a flow diagram illustrating a method of filtering incoming calls carried out by the firewall system of Figures 1 and 2;

Figure 5 is a flow diagram illustrating a method of filtering outgoing calls carried out by the firewall system of Figures 1 and 2;

Figure 6 is a flow diagram illustrating a method of filtering incoming text messages carried out by the firewall system of Figures 1 and 2, and

Figure 7 is a flow diagram illustrating a method of filtering outgoing text messages carried out by the firewall system of Figures 1 and 2.

Detailed description of the drawings:

Figure 1 shows a schematic representation of a mobile telecommunication device which is a mobile telephone 1, and comprises a SIM 3, a firewall system 5 which is based on the SIM, and a telephone operating system 7. The SIM 3 comprises a SIM application toolkit application 9, a SIM identifier number database 11 and a SIM text message database 13. The SIM identifier number database 11 is used to store one or more telephone numbers of a user of the telephone 1. The SIM text message database 13 is used to store one or more text messages received by the mobile telephone 1. The phone operating system 7 comprises a phone text message database 15, in which one or more text messages received by the mobile telephone 1 are stored.

The phone operating system 7, the SIM application toolkit application 9 and the firewall system 5 are in communication with each other. The firewall system 5 can communicate with the phone operating system 7 directly, or via the SIM 3 using the SIM application toolkit application 9. SIM application toolkit applications are provided as standard on SIMs, and are used to govern how non-standard applications, such as those provided by parties other than the SIM manufacturer, interact with the SIM and the mobile telecommunication device. The firewall system 5 must comply with the standard defined for the SIM application toolkit application 9, in order

to be able to communicate with the SIM 3 and the phone operating system 7 via the SIM 3.

Figure 2 is a schematic representation of the firewall system 5 of Figure 1. The firewall system 5 comprises an incoming call filtering module 20, an outgoing call filtering module 22, an incoming text message filtering module 24, and an outgoing text message filtering module 26. The firewall system 5 further comprises a set-up module 28, an approved identifier number creation module 30, an advice module 32, a recording module 34, a firewall identifier number database 36, and a firewall terminated identifier number database 38. Each of the modules may be in communication with one or more of the other modules and may be in communication with the or each database, as required. Each of the incoming call filtering module 20, the outgoing call filtering module 22, the incoming text message filtering module 24, and the outgoing text message filtering module 26, comprises a number of modules as will be referred to later, but which, for clarity, are not shown in Figure 2.

The firewall system 5 can be implemented in software, hardware, or a combination of software and hardware. It will be appreciated that although the firewall system 5 is shown as comprising a number of separate modules, these need not be physically separate modules in hardware, or separate modules in software.

The firewall system 5 is installed on the SIM 3 of the mobile telephone 1. This may done by a manufacturer or a retailer of the SIM 3. Figure 3 is a flow diagram illustrating setting-up of the firewall system 5. A person such as a parent or a business manager who wishes to control usage of the telephone 1, accesses the firewall system 5, step 300. Access may be via an application menu provided on the telephone 1 using a keypad of the

telephone 1, or the firewall system may be accessed remotely. The set-up module 28 of the firewall system 5 acts to password -protect the firewall system 5, step 302, by asking the person to enter a password on the keypad of the telephone 1, and to confirm the password. The password may comprise letters, numbers or a combination of both. Once the password has been established, it is stored by the set-up module 28, for future use when the firewall system 5 is to be accessed.

The approved identifier number creation module 30 then acts to password-protect the firewall identifier number database 36, step 304, by asking the person to enter a password on the keypad of the telephone 1, and to confirm the password. The password may again comprise letters, numbers or a combination of both. Once the password has been established, it is stored by the approved identifier number creation module 30, for future use when the firewall identifier number database 36 is to be accessed.

The approved identifier number creation module 30 then prompts the person to generate one or more approved identifier numbers, in the firewall identifier number database 36, step 306. This can be done in a number of different ways. The person may use the approved identifier number creation module 30 to create an approved identifier number, by entering an identifier number into an entry of the firewall identifier number database 36 and entering one or more rules into the entry which determine that the identifier number is an approved identifier number. Additionally or alternatively, the person may use the approved identifier number creation module 30 to create an approved identifier number by accessing an entry of the firewall identifier number database 36 in which an identifier number has already been stored, and entering one or more rules into the entry which determine that the identifier number is an

approved identifier number. The SIM identifier number database 11 may be used by a user of the telephone 1 to store contact identifier numbers. The person may use the approved identifier number creation module 30 to copy the contact identifier numbers from the SIM identifier number database 11 into entries of the firewall identifier number database 36. The person may then use the approved identifier number creation module 30 to create approved identifier numbers by accessing the entries of the firewall identifier number database 36 in which a contact identifier number has been stored, and entering one or more rules into the entries which determine that the contact identifier number is an approved identifier number.

With the firewall system 5 activated and with one or more approved identifier numbers stored in the firewall identifier number database 36 (or no approved identifier numbers stored in the database), the firewall system 5 can operate to carry out the methods of filtering incoming calls, filtering outgoing calls, filtering incoming text messages and filtering outgoing text messages. (When no approved identifier numbers are stored in the firewall identifier number database 36, the firewall system 5 will act to terminate all incoming calls). The methods are illustrated in Figures 4 to 6.

Figure 4 is a flow diagram that illustrates the steps taken by the firewall system 5 in the method of filtering incoming calls to the device comprising the mobile telephone 1. The firewall system 5 uses the incoming call filtering module 20 to filter incoming calls. A notification module of the incoming call filtering module 20 receives notification that the telephone 1 has received an incoming call from a telecommunication network, step 400. The notification module receives the notification from the SIM 3, which uses a function of the SIM application toolkit application 9 to detect

receipt of the incoming call, and uses a function of the SIM application toolkit application 9 to notify the notification module of receipt of the incoming call.

An interrogation module of the module 20 then causes interrogation of the incoming call to search for an identifier number of the call, step 402. The interrogation module causes interrogation of the incoming call by instructing the SIM 3 to interrogate the call, which uses a function of the SIM application toolkit application 9 to interrogate the incoming call to search for the identifier number of the call.

If an identifier number is found, the notification module receives the identifier number of the incoming call, step 404. The SIM 3 uses a function of the SIM application toolkit application 9 to send the identifier number of the incoming call to the interrogation module.

A comparison module of the incoming call filtering module 20 then compares the identifier number of the incoming call with one or more approved identifier numbers, step 406. The comparison module accesses the or each entry in the firewall identifier number database 36, and interrogates the one or more rules of each entry which determine if the identifier number of the entry is an approved identifier number or is not an approved identifier number. If the identifier number of an entry is an approved identifier number, the comparison module compares the identifier number of the incoming call with the approved identifier number. If the identifier number of an entry is not an approved identifier number, the comparison module ends its comparison function.

If the identifier number of the incoming call matches at least one of the one or more approved identifier numbers, the incoming call is continued, step 408.

If the identifier number of the incoming call does not match at least one of the one or more approved identifier numbers, a termination module of the incoming call filtering module 20 instructs the SIM 3 to send a command to the telephone 1 which causes it to be disconnected from the telecommunication network, step 410. In this embodiment of the invention, the command which the termination module instructs the SIM 3 to send to the telephone 1 comprises a refresh command provided as part of the SIM application toolkit application 9. The parameters of the refresh command are set to cause the telephone 1 to be disconnected from the telecommunication network, to cause the telephone 1 to be reconnected to the telecommunication network, to cause deactivation of the SIM 3 and to cause reactivation of the SIM 3. Disconnection of the telephone 1 from the network is caused by activation of a GSM session termination procedure, and causes the incoming call to terminate. SIM application toolkit applications have no function which allow termination of an incoming call, but do have the refresh command, which is designed to enable a telephone to receive notification of changes to the contents of the SIM of the telephone. The refresh command may achieve this by deactivation and then reactivation of the SIM, which causes the (changed) contents of the SIM to be copied to the telephone. Deactivation of the SIM cannot take place if the telephone is connected to a network, so termination of any network connection is carried out before deactivation of the SIM. The applicant has realised that if this refresh command is used, and hence network connection termination is initiated, it has the heretofore unrecognised effect of disconnecting an incoming call. What a user of the telephone 1 experiences when the telephone 1 is disconnected from and

then reconnected to the network and when the SIM 3 deactivates and then reactivates, will depend on the type of the telephone. The telephone may, for example, send a message to its display to indicate to the user that the SIM 3 is refreshing, or the telephone 1 may momentarily switch off and then switch back on again.

The advice module 32 of the firewall system 5 then instructs the telephone 1 to send a message to a display of the telephone, which message informs a user of the telephone 1 that the incoming call has been terminated, step 412.

If an identifier number of the incoming call is not found, the interrogation module receives notification that no identifier number has been found, and that the incoming call is an unidentified incoming call, step 414. The SIM 3 uses a function of the SIM application toolkit application 9 to notify the interrogation module that no identifier number of the incoming call has been found. The termination module then instructs the SIM 3 to send a command to the telephone 1 which causes the telephone 1 to be disconnected from the telecommunication network by activation of a GSM session termination procedure, which, in turn, causes the unidentified incoming call to terminate, step 410. The advice module 32 then instructs the telephone 1 to send a message to a display of the telephone, which message informs a user of the telephone 1 that the incoming call has been terminated, step 412.

The recording module 34 records identifier numbers of the or each incoming call which has been terminated in an entry of the firewall terminated identifier number database 38. Identifier numbers of the last ten terminated calls may be recorded, along with data comprising the date and time of termination of a call.

Figure 5 is a flow diagram that illustrates the steps taken by the firewall system 5 in the method of filtering outgoing calls to the device comprising the mobile telephone 1. The firewall system 5 uses the outgoing call filtering module 22 to filter outgoing calls. A notification module of the outgoing call filtering module 22 receives notification that the telephone 1 is making an outgoing call, step 500. An interrogation module of the outgoing call filtering module 22 then causes interrogation of the outgoing call to search for an identifier number of the call and receives the identifier number of the outgoing call, step 502. A comparison module of the outgoing call filtering module 22 then compares the identifier number of the outgoing call with one or more approved identifier numbers, step 504. If the identifier number of the outgoing call matches at least one of the one or more approved identifier numbers, the outgoing call is continued, step 506. If the identifier number of the outgoing call does not match at least one of the one or more approved identifier numbers, a blocking module of the outgoing call filtering module 22 instructs the SIM 3 to send a command to the telephone 1 which causes the telephone to discontinue the outgoing call, step 508.

Figure 6 is a flow diagram that illustrates the steps taken by the firewall system 5 in the method of filtering incoming text messages to the device comprising the mobile telephone 1. The firewall system 5 uses the incoming text message filtering module 24 to filter incoming text messages. A notification module of the incoming text message filtering module 24 receives notification that the device has received an incoming text message, step 600. An interrogation module of the incoming text message filtering module 24 then causes interrogation of the text message to search for an identifier number of the text message, step 602. If an identifier number is found, the interrogation module receives the identifier number of the text message, step 604. A comparison module of the

incoming text message filtering module 24 then compares the identifier number of the text message with one or more approved identifier numbers, step 606. If the identifier number of the text message matches at least one of the one or more approved identifier numbers, the text message is kept by the telephone 1. If the identifier number of the text message does not match at least one of the one or more approved identifier numbers, a blocking module of the incoming text message filtering module 24 instructs the SIM 3 to delete the text message from a SIM text message database 13 and to send a command to the telephone 1 which causes the telephone 1 to update the telephone text message database 15 by copying contents of the SIM text message database 13 into the device text message database 15. This in turn, results in deletion of the text message from the telephone 1.

If an identifier number of the incoming text message is not found, the interrogation module receives notification that no identifier number has been found, and that the incoming text message is an unidentified incoming text message, step 612. The blocking module then instructs the SIM 3 to delete the unidentified text message from a SIM text message database 13 and to send a command to the telephone 1 which causes the telephone 1 to update the device text message database 15 by copying contents of the SIM text message database 13 into the device text message database 15. This, in turn, results in deletion of the unidentified text message from the telephone 1.

Figure 7 is a flow diagram that illustrates the steps taken by the firewall system 5 in the method of filtering outgoing text messages to the device comprising the mobile telephone 1. The firewall system 5 uses the outgoing text message filtering module 26 to filter outgoing text messages. A notification module of the outgoing text message filtering module 26

receives notification that the telephone 1 is sending an outgoing text message, step 700. An interrogation module of the outgoing text message filtering module 26 then causes interrogation of the outgoing text message to search for an identifier number of the text message and receives the identifier number of the outgoing text message, step 702. A comparison module of the outgoing text message filtering module 26 then compares the identifier number of the outgoing text message with one or more approved identifier numbers, step 704. If the identifier number of the outgoing text message matches at least one of the one or more approved identifier numbers, the text message is sent, step 706. If the identifier number of the outgoing text message does not match at least one of the one or more approved identifier numbers, a blocking module of the outgoing text message filtering module 26 instructs the SIM 3 to send a command to the telephone 1 which causes the telephone to discontinue sending of the outgoing text message, step 708.

It will be understood that the notification modules, the interrogation modules and the comparison modules of the outgoing call filtering module 22, the incoming text message filtering module 24, and the outgoing text message filtering module 26, may operate in similar fashion to the notification module, the interrogation module and the comparison module of the incoming call filtering module 20.

CLAIMS

1. A firewall system based on a SIM of a mobile telecommunication device, the system comprising an incoming call filtering module, which comprises
a notification module which receives notification that the device has received an incoming call from a telecommunication network,
an interrogation module which causes interrogation of the incoming call to search for an identifier number of the call, and, if an identifier number is found, receives the identifier number of the incoming call,
a comparison module which compares the identifier number of the incoming call with one or more approved identifier numbers, and
a termination module which, if the identifier number of the incoming call does not match at least one of the one or more approved identifier numbers, instructs the SIM to send a command to the device which causes the device to be disconnected from the telecommunication network which, in turn, causes the incoming call to terminate.

2. A firewall system according to claim 1, in which if an identifier number of the incoming call is not found, the interrogation module receives notification that no identifier number has been found, and that the incoming call is an unidentified incoming call, and the termination module instructs the SIM to send a command to the device which causes the device to be disconnected from the telecommunication network which, in turn, causes the unidentified incoming call to terminate.

3. A firewall system according to any preceding claim, in which the command which the termination module instructs the SIM to send to the device activates a global system for mobile communications (GSM) session termination procedure.

4. A firewall system according to any preceding claim, in which the command which the termination module instructs the SIM to send to the device comprises a refresh command having parameters which are set to cause the device to be disconnected from the telecommunication network.

5. A firewall system according any preceding claim, in which the command which the termination module instructs the SIM to send to the device comprises a refresh command provided as part of an application toolkit application of the SIM, and which has parameters which are set to cause the device to be disconnected from the telecommunication network, to cause the device to be reconnected to the telecommunication network, to cause deactivation of the SIM and to cause reactivation of the SIM.

6. A firewall system according to any preceding claim, which comprises a firewall identifier number database which comprises one or more entries, the or each of which comprises an identifier number and one or more rules for the identifier number, at least one of which is used to determine that the identifier number is an approved identifier number or is not an approved identifier number.

7. A firewall system according to claim 6, which comprises an approved identifier number creation module which creates an approved identifier number by copying one or more contact identifier numbers stored on a SIM identifier number database into one or more entries of the firewall identifier number database, accessing an entry of the firewall identifier number database in which a contact identifier number has been stored, and entering one or more rules into the entry which determine that the contact identifier number is an approved identifier number.

8. A firewall system according to any preceding claim which comprises an outgoing call filtering module, which comprises a notification module which receives notification that the device is making an outgoing call, an interrogation module which causes interrogation of the outgoing call to search for an identifier number of the call and receives the identifier number of the outgoing call, a comparison module which compares the identifier number of the outgoing call with one or more approved identifier numbers, and a blocking module which, if the identifier number of the outgoing call does not match at least one of the one or more approved identifier numbers, instructs the SIM to send a command to the device which causes the device to discontinue the outgoing call.

9. A firewall system according to any preceding claim which comprises an incoming text message filtering module, which comprises a notification module which receives notification that the device has received an incoming text message, an interrogation module which causes interrogation of the text message to search for an identifier number of the text message and, if an identifier number is found, receives the identifier number of the text message, a comparison module which compares the identifier number of the text message with one or more approved identifier numbers, and a blocking module which, if the identifier number of the text message does not match at least one of the one or more approved identifier numbers, instructs the SIM to delete the text message from a SIM text message database and to send a command to the device which causes the device to update a device text message database by copying contents of the SIM text message database into the device text message database, which, in turn, results in deletion of the text message from the device.

10. A firewall system according to any preceding claim which comprises an outgoing text message filtering module, which comprises a notification module which receives notification that the device is sending an outgoing text message, an interrogation module which causes interrogation of the outgoing text message to search for an identifier number of the text message and receives the identifier number of the outgoing text message, a comparison module which compares the identifier number of the outgoing text message with one or more approved identifier numbers, and a blocking module which, if the identifier number of the outgoing text message does not match at least one of the one or more approved identifier numbers, instructs the SIM to send a command to the device which causes the device to discontinue sending of the outgoing text message.

11. A method of filtering incoming calls to a mobile telecommunication device, the method comprising the steps of
receiving notification that the device has received an incoming call from a telecommunication network,
interrogating the incoming call to search for an identifier number of the call, and, if an identifier number is found, receiving the identifier number of the incoming call,
comparing the identifier number of the incoming call with one or more approved identifier numbers, and
if the identifier number of the incoming call does not match at least one of the one or more approved identifier numbers, instructing a SIM of the device to send a command to the device which causes the device to be disconnected from the telecommunication network which, in turn, causes the incoming call to terminate.

12. A method according to claim 11, in which if an identifier number of the incoming call is not found, the method comprises receiving notification that no identifier number has been found and that the incoming call is an unidentified incoming call, and instructing the SIM to send a command to the device which causes the device to be disconnected from the telecommunication network which, in turn, causes the unidentified incoming call to terminate.

13. A method according to claim 11 or claim 12, in which the command which the SIM is instructed to send to the device activates a global system for mobile communications (GSM) session termination procedure.

14. A method according to any of claims 11 to 13, in which the command which the SIM is instructed to send to the device comprises a refresh command having parameters which are set to cause the device to be disconnected from the telecommunication network.

15. A method according to any of claims 11 to 14, in which the command which the SIM is instructed to send to the device comprises a refresh command provided as part of an application toolkit application of the SIM, and which has parameters which are set to cause the device to be disconnected from the telecommunication network, to cause the device to be reconnected to the telecommunication network, to cause deactivation of the SIM and to cause reactivation of the SIM.

16. A method according to any of claims 11 to 15 which comprises using a firewall identifier number database which comprises one or more entries, the or each of which comprises an identifier number and one or more rules for the identifier number, at least one of which is used to

determine that the identifier number is an approved identifier number or is not an approved identifier number.

17. A method according to any of claims 11 to 16 which comprises creating an approved identifier number by copying one or more of the contact identifier numbers from a SIM identifier number database into one or more entries of the firewall identifier number database, accessing an entry of the firewall identifier number database in which a contact identifier number has been stored, and entering one or more rules into the entry which determine that the contact identifier number is an approved identifier number.

18. A method according to any of claims 11 to 17 which comprises filtering outgoing calls by receiving notification that the device is making an outgoing call, interrogating the outgoing call to search for an identifier number of the call and receiving the identifier number of the outgoing call, comparing the identifier number of the outgoing call with one or more approved identifier numbers, and if the identifier number of the outgoing call does not match at least one of the one or more approved identifier numbers, instructing the SIM to send a command to the device which causes the device to discontinue the outgoing call.

19. A method according to any of claims 11 to 18 which comprises filtering incoming text messages by receiving notification that the device has received an incoming text message, interrogating the text message to search for an identifier number of the text message and, if an identifier number is found, receiving the identifier number of the text message, comparing the identifier number of the text message with one or more approved identifier numbers, and if the identifier number of the text message does not match at least one of the one or more approved

identifier numbers, instructing the SIM to delete the text message from a SIM text message database and to send a command to the device which causes the device to update a device text message database by copying contents of the SIM text message database into the device text message database, which, in turn, results in deletion of the text message from the device.

20. A method according to any of claims 11 to 19 which comprises filtering outgoing text messages by receiving notification that the device is sending an outgoing text message, interrogating the outgoing text message to search for an identifier number of the text message and receiving the identifier number of the outgoing text message, comparing the identifier number of the outgoing text message with one or more approved identifier numbers, and if the identifier number of the outgoing text message does not match at least one of the one or more approved identifier numbers, instructing the SIM to send a command to the device which causes the device to discontinue sending of the outgoing text message.

21. A computer program product stored in a medium readable by a computer, the product comprising computer-readable program means which cause the computer to perform the method according to any or claims 11 to 20.

22. A mobile telecommunication device comprising a firewall system according to any of claims 1 to 10.

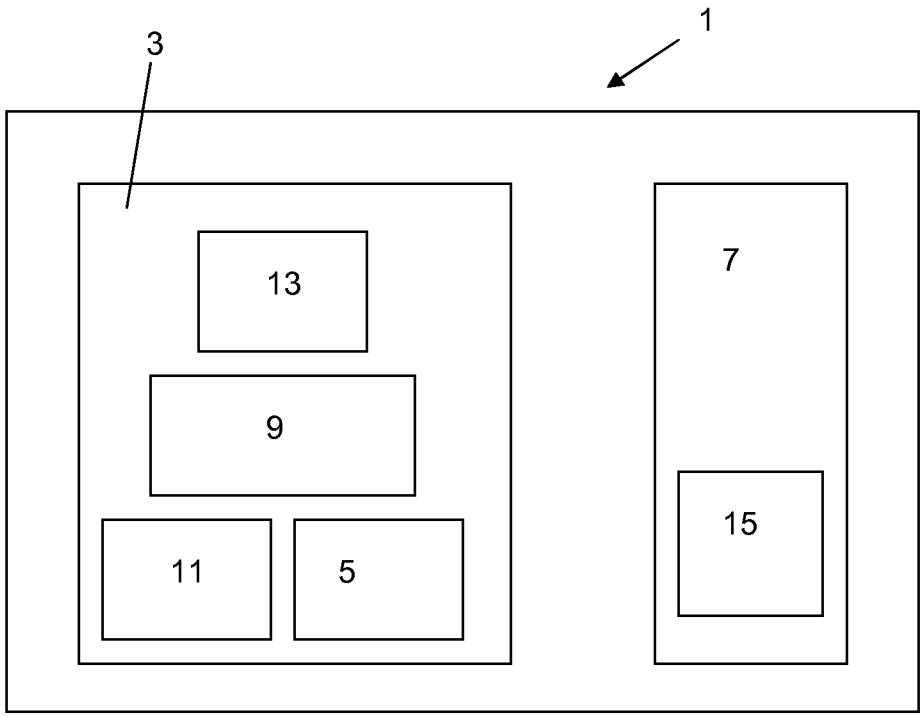

Fig 1

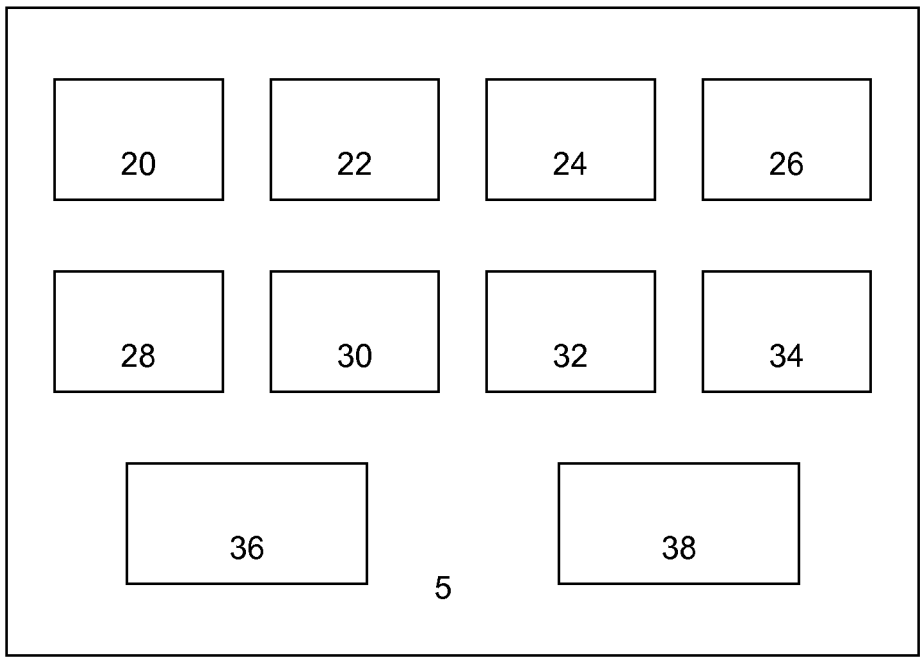

Fig 2

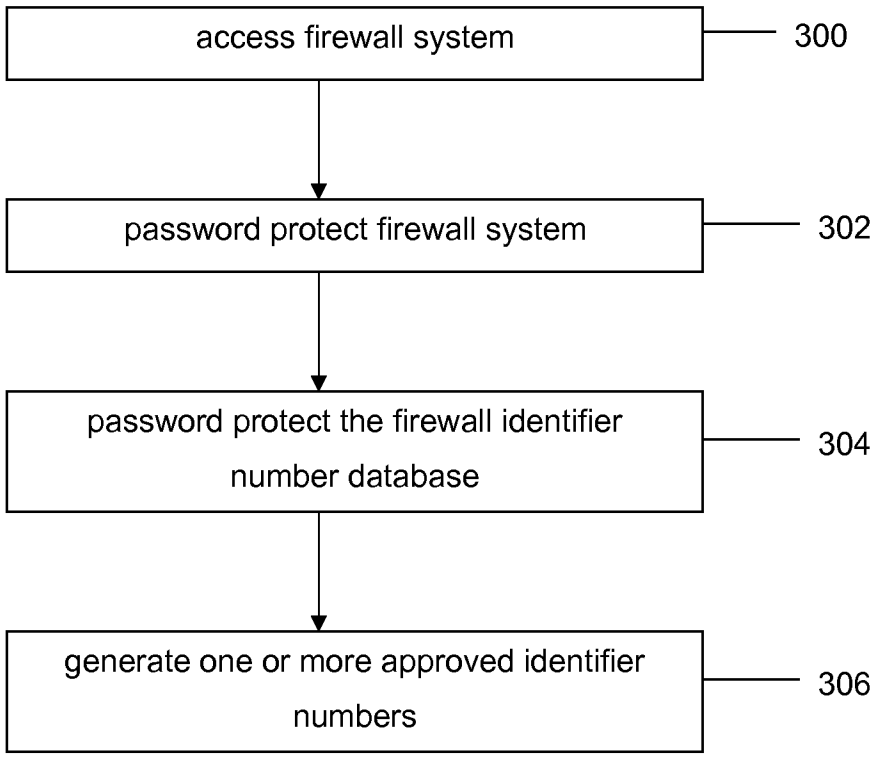
access firewall system
300
password protect firewall system
302
password protect the firewall identifier number database
304
generate one or more approved identifier numbers
306

Fig 3

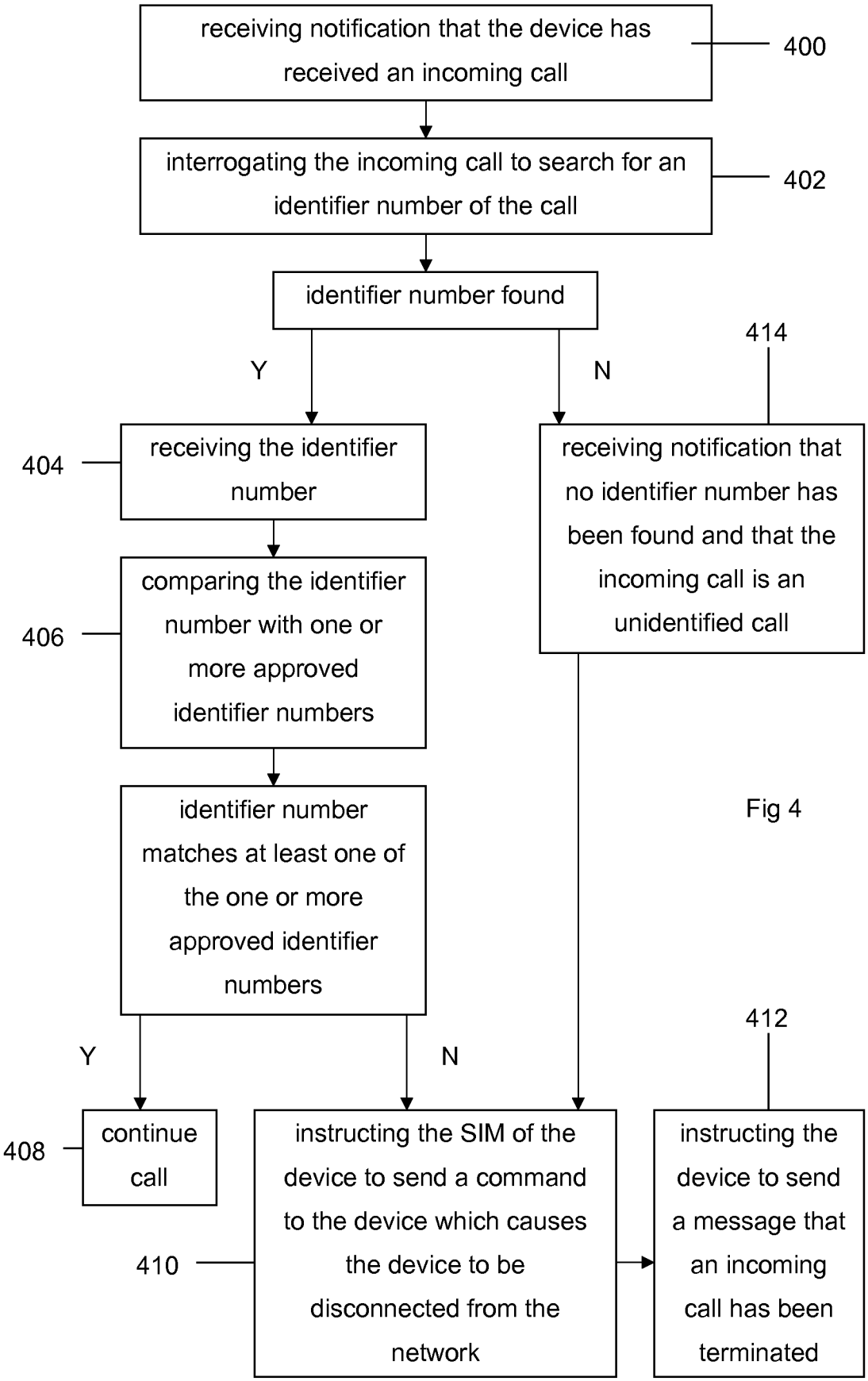
receiving notification that the device has received an incoming call
400
interrogating the incoming call to search for an identifier number of the call
402
identifier number found
Y
N
414
404
receiving the identifier number
receiving notification that no identifier number has been found and that the incoming call is an unidentified call
406
comparing the identifier number with one or more approved identifier numbers
identifier number matches at least one of the one or more approved identifier numbers
Y
N
412
408
continue call
410
instructing the SIM of the device to send a command to the device which causes the device to be disconnected from the network
instructing the device to send a message that an incoming call has been terminated

Fig 4

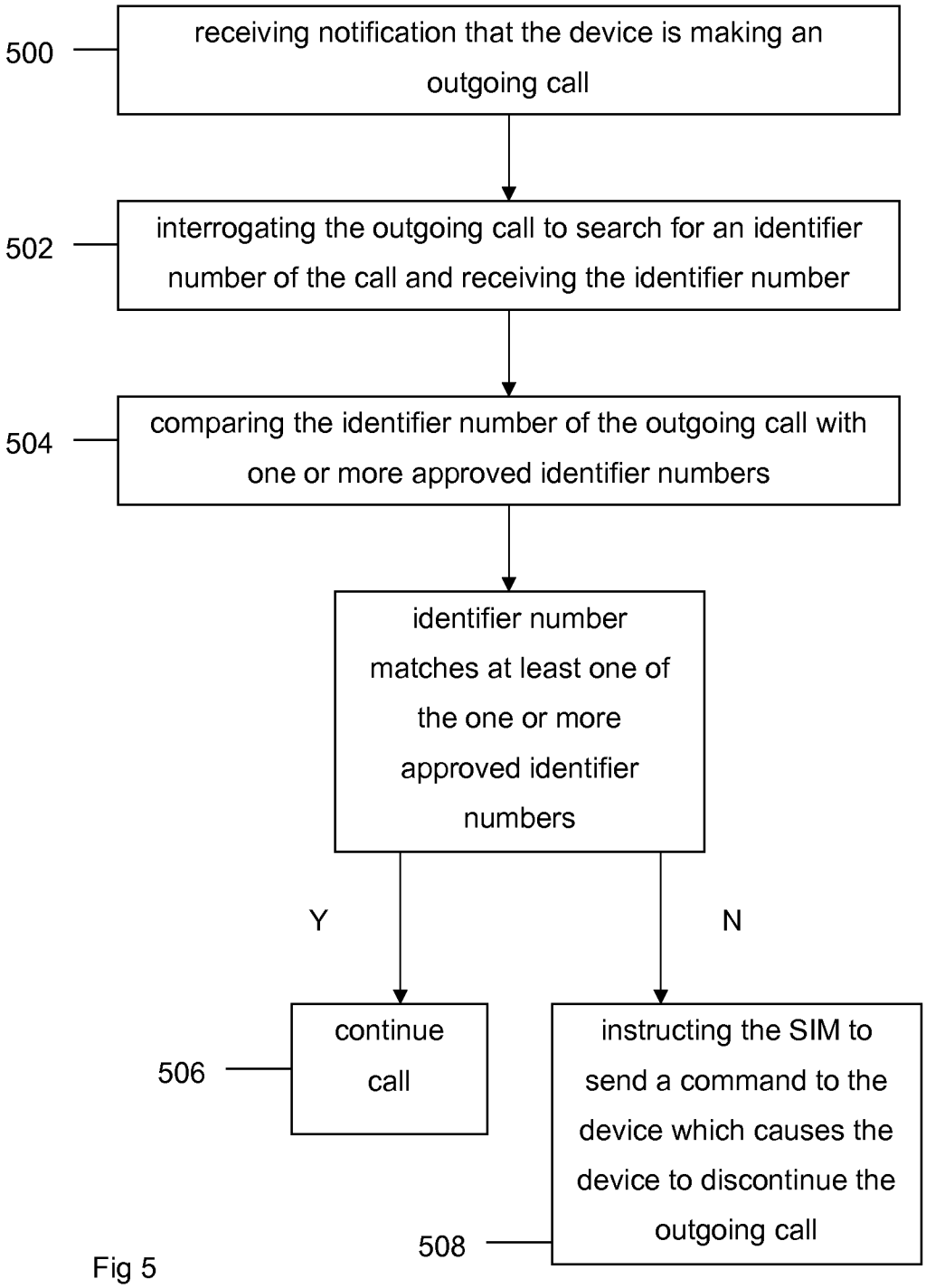
500
receiving notification that the device is making an outgoing call
502
interrogating the outgoing call to search for an identifier number of the call and receiving the identifier number
504
comparing the identifier number of the outgoing call with one or more approved identifier numbers
identifier number matches at least one of the one or more approved identifier numbers
Y
N
506
continue call
508
instructing the SIM to send a command to the device which causes the device to discontinue the outgoing call

Fig 5

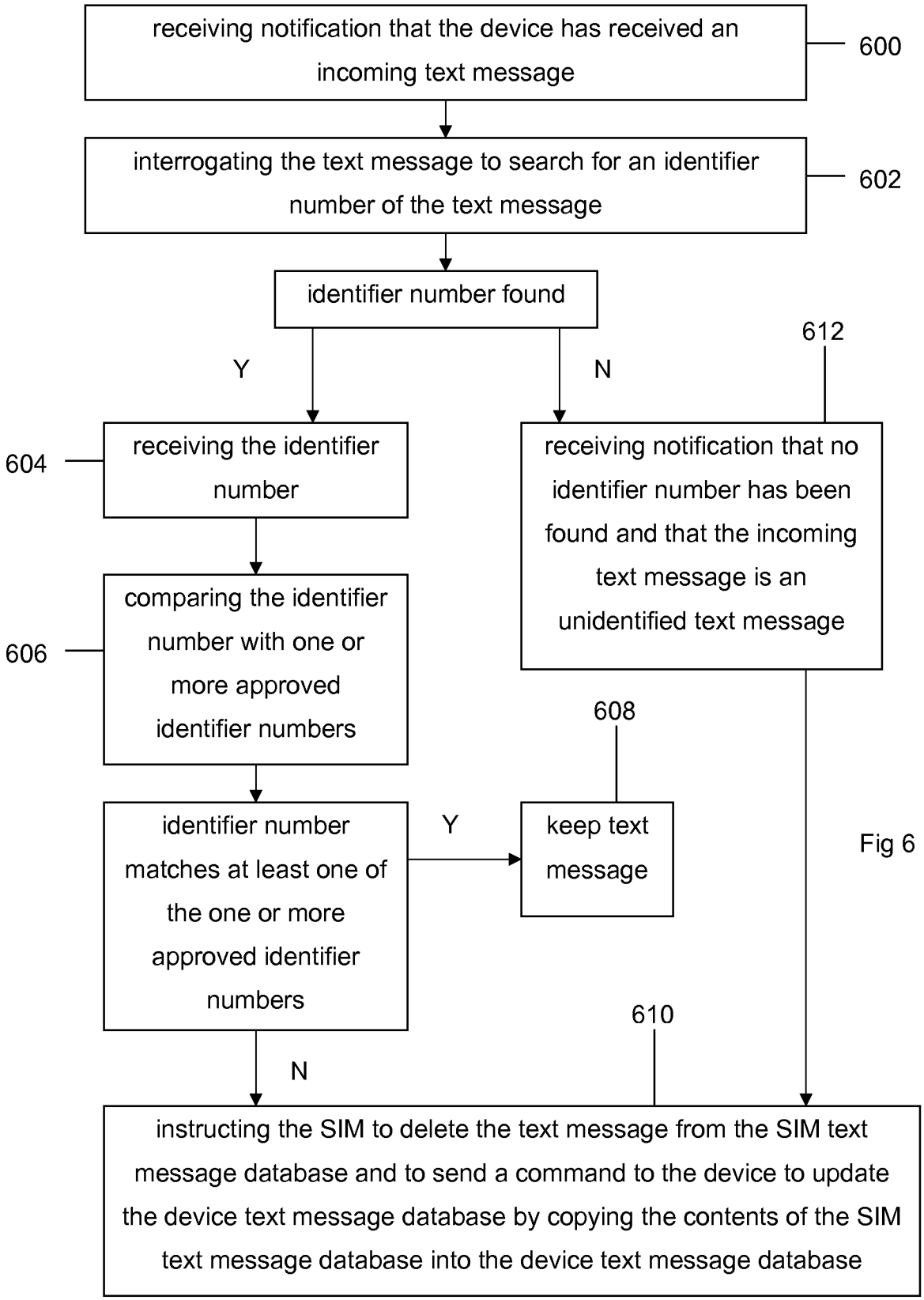
receiving notification that the device has received an incoming text message
600
interrogating the text message to search for an identifier number of the text message
602
identifier number found
Y
N
612
receiving the identifier number
604
receiving notification that no identifier number has been found and that the incoming text message is an unidentified text message
comparing the identifier number with one or more approved identifier numbers
606
608
identifier number matches at least one of the one or more approved identifier numbers
Y
keep text message
610
N
instructing the SIM to delete the text message from the SIM text message database and to send a command to the device to update the device text message database by copying the contents of the SIM text message database into the device text message database

Fig 6

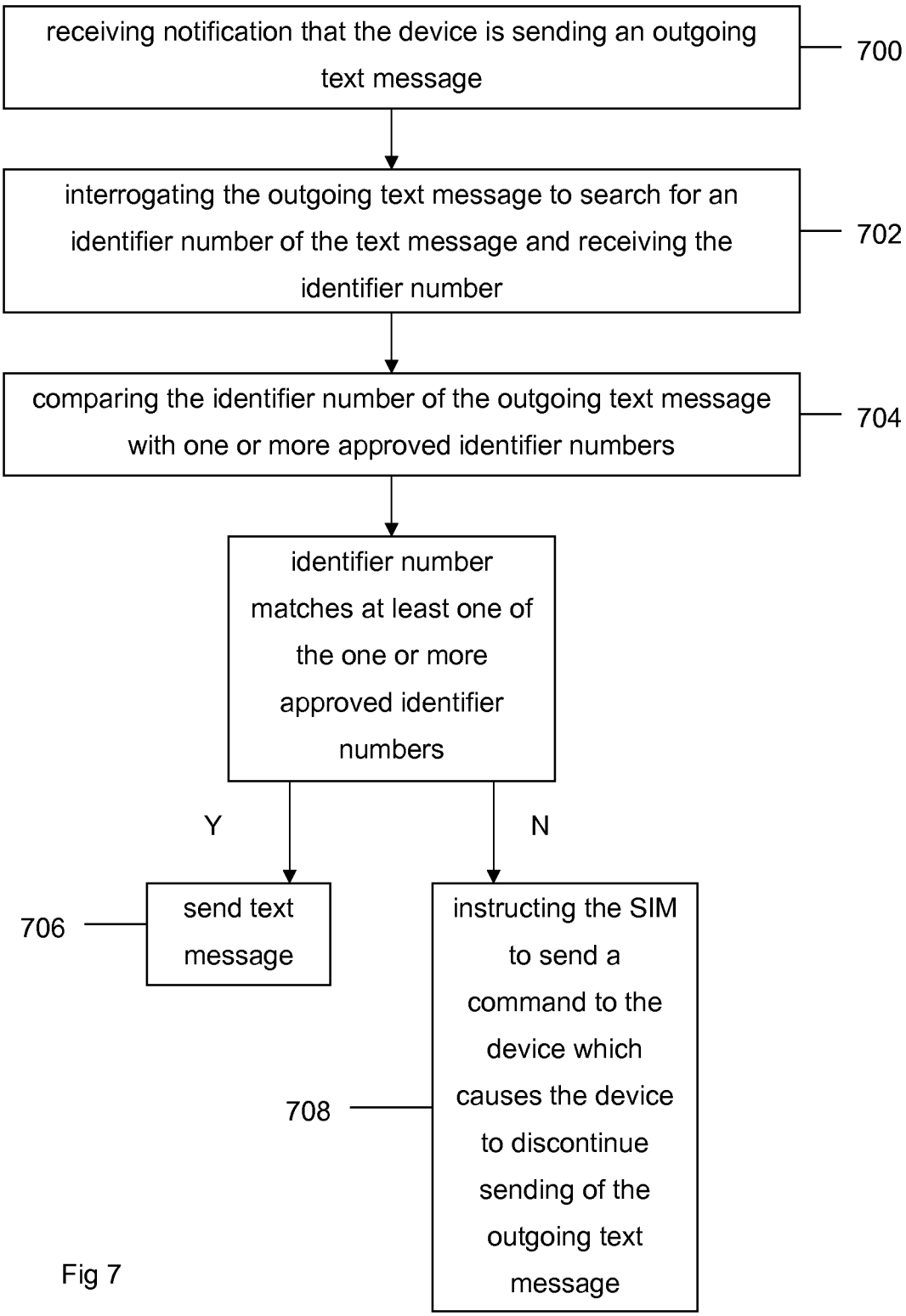
receiving notification that the device is sending an outgoing text message
700
interrogating the outgoing text message to search for an identifier number of the text message and receiving the identifier number
702
comparing the identifier number of the outgoing text message with one or more approved identifier numbers
704
identifier number matches at least one of the one or more approved identifier numbers
Y
N
706
send text message
708
instructing the SIM to send a command to the device which causes the device to discontinue sending of the outgoing text message

Fig 7

INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2009/051375

A. CLASSIFICATION OF SUBJECT MATTER
INV. H04M1/66

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
H04M

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X Y	WO 2007/141607 A (BRADLEY CIARAN [IE]) 13 December 2007 (2007-12-13) page 8, paragraph 2 - page 9, paragraph 1	1-13, 15-22 4,14
Y	US 2006/040642 A1 (BORIS ADAM [US] ET AL) 23 February 2006 (2006-02-23) paragraph [0070]	4,14

-/--

[X] Further documents are listed in the continuation of Box C.

[X] See patent family annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
14 May 2009	29/05/2009

Name and mailing address of the ISA/	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Cremer, Jan

INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2009/051375

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	"Smart Cards; Card Application Toolkit (CAT) (Release 7); ETSI TS 102 223" ETSI STANDARDS, LIS, SOPHIA ANTIPOLIS CEDEX, FRANCE, vol. SCP-WG3, no. V7.10.0, 1 February 2008 (2008-02-01), XP014041612 ISSN: 0000-0001 * 7.3.1.1 Procedure for mobile originated calls * * 7.3.1.5 Support of Barred Dialling Number (BDN) service *	1,8,10, 18,21,22
X	EP 1 420 600 A (SCHLUMBERGER SYSTEMS & SERVICE [FR]) 19 May 2004 (2004-05-19) claims 1-12	1,11,21, 22
X	WO 99/18704 A (ERICSSON GE MOBILE INC [US]) 15 April 1999 (1999-04-15) page 15, line 25 - page 16, line 5; figure 7	1,11,21, 22

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/EP2009/051375

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