

MOBILE TELECOMMUNICATIONS DEVICE TRACKING METHOD, SYSTEM AND APPARATUS

Field of the Invention

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This invention relates to a mobile telecommunications device tracking method, system and apparatus, and refers to such a method, system and apparatus for tracking a lost or stolen mobile telecommunication device, and for data recovery therefrom.

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Definitions

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Throughout this specification a reference to a mobile telecommunications device includes a reference to a mobile device able to communicate or operate over a telecommunications network without requiring an intermediary device such as a modem. As such, a mobile telecommunications device will include a mobile/cellular telephone; and telecommunications-enabled personal digital assistants, notebook computers, laptop computers, tablet computers, portable entertainment devices, and portable communications devices such as those sold under the trademark "BLACKBERRY" by Research In Motion, Inc. of Canada.

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Background of the Invention

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Mobile telecommunications devices are regularly lost or stolen. The trade in lost or stolen mobile telecommunications devices is large. When a mobile telecommunications device is lost or stolen, all the data stored therein is also lost or stolen. Recovery of the mobile telecommunications device, and the data, is normally impossible. Quite often the mobile telecommunications device is used thus incurring cost to the genuine owner, often before the genuine owner becomes aware of the loss or theft of their mobile telecommunications device.

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Because of technologies incorporated in one converged device, mobile telecommunications devices are more than just a communication tool. They are also the devices in which are kept contacts, messages, schedules, emails, images, music, video and even banking information.

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Due to its compact size, large data capacity, longer battery life, better input (keyboard & stylus), larger & better display (larger, color, high resolution) and data transmission capabilities, mobile telecommunications devices are used to keep more information than PC or notebook computers in the office or at home. It is now, for most people, the thing that they can't live without.

10 **Summary of the Invention**

In accordance with a first preferred aspect there is provided a system for tracking a mobile telecommunications device, the mobile telecommunications device having a subscriber identification module containing data of a valid owner, and a memory; the system comprising:

 a module for writing to the memory, the data of the valid owner and a profile of the valid owner;

 wherein, upon the subscriber's identification module being replaced with a new subscriber identification module, the data of the valid owner as written to the memory is compared with corresponding data in the new subscriber identification module and, if the data of the valid owner is different to the corresponding data, an alert is raised by the module.

In accordance with a second preferred aspect there is provided a method for tracking a mobile telecommunications device, the mobile telecommunications device having a subscriber identification module containing data of a valid owner, and a memory; the method comprising:

 writing to the memory the data of the valid owner and a profile of the valid owner;

 upon the subscriber's identification module being replaced with a new subscriber identification module, comparing the data of the valid owner as written to the memory with corresponding data in the new subscriber identification module; and

 if the data of the valid owner is different to the corresponding data, raising an alert.

For both aspects the alert may be raised without consent or verification by a user of the mobile telecommunications device. The alert may comprise displaying on a

screen of the mobile telecommunications device information obtained from the profile and/or sending a message to a notify number that forms a part of the profile. The message may comprise information retrieved from the profile and from the new subscriber identification module. After the message is sent, a remote
 5 command may be received, the remote command being selected from the group consisting of: delete data, backup, and query.

Delete data may comprise deleting data from the memory, the data being pre-set during a set-up procedure. Backup may comprise backing up data from the
 10 memory to a remote server, the data being pre-set during a set-up procedure. Query may comprise retrieving data from the memory and from the mobile telecommunications device and sending the data to a command centre, the data being pre-set during a set-up procedure.

15 The data may be at least one of: contact information; calendar entries; messages in, draft and sent; images; emails in, draft and sent; call log, call records, notes voicemail, and phonebook. Alternatively, the data may comprise at least one of: call log or records; messages in, draft and out; and an identifier of a telecommunications cell in which the mobile telecommunications device is located.

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The set up procedure may comprise receiving the profile of the valid owner; the writing to the memory of the data of the valid owner and the profile of the valid owner; and setting the module as an auto-start application.

25 The profile of the valid owner may comprise at least one of: password, name, contact details, address, alternative telephone number, a notify number of a second telephonic device to be notified of the alert, and settings on how the module is to behave when the alert is to be generated and responses thereto.

30 The data of the valid owner may comprise an International Mobile Subscriber Identifier. The corresponding data may comprise an International Mobile Subscriber Identifier. The information retrieved from the new subscriber identifier module may comprise a new contact number for the mobile telecommunications device, and an identity of a telecommunications cell in which the mobile
 35 telecommunications device is located.

In accordance with a third preferred aspect there is provided a software arrangement that is operable on a processor, the software arrangement comprising a computer program that configures the processor to perform one or more functions of the above method.

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In accordance with a fourth preferred aspect there is provided a mobile telecommunications device for performing the above method.

In accordance with a fifth preferred aspect there is provided a mobile telecommunications device including a software arrangement as described above.

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Brief Description of the Drawings

In order that the present invention may be fully understood and readily put into practical effect, there shall now be described by way of non-limitative example only preferred embodiments of the present invention, the description being with reference to the accompanying illustrative drawings.

20 In the drawings:

Figure 1 is a schematic illustration of the system architecture;

Figure 2 is a flow chart for system set-up;

Figure 3 is a flow chart for system authentication;

25 Figure 4 is a flow chart for alert generation;

Figure 5 is a flow chart for a first remote command;

Figure 6 is a flow chart for a second remote command; and

Figure 7 is a flow chart for a third remote command;

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Detailed Description of the Preferred Embodiments

Mobile telecommunications devices run under a mobile telecommunication network such as, for example, GSM and UMTS (3G) both of which require a Subscriber Identification Module (SIM) card to uniquely identify subscribers (the user of the mobile telecommunications devices) for communication (mobile 'phone number) and billing purposes. Each SIM card contains a unique International Mobile Subscriber Identity (IMSI) number that is used to identify the owner of the mobile

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telecommunications devices. Each subscriber is assigned to a unique mobile number (MSISDN - Mobile Subscriber Integrated Service Digital Network). This is the number on which the owner can be contacted on their mobile telecommunications device.

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To refer to Figure 1 there is shown a first mobile telecommunications device 101 that, as shown, is a mobile/cellular telephone. It has a display screen 102, input keys 103, an antenna 104, memory 105 and a Subscriber Identification Module ("SIM") card 106. The device 101 communicates directly with a telecommunications network 110 comprising cellular antenna(s) 111 and network(s) 112. A second telephonic device 120 is also able to communicate with the network(s) 110. The device 120 may be a hard-wired telephone or a mobile telecommunications device.

15 Stored in the memory 105 is a system module 107 for tracking the device 101. The nature and operation of the system 107 is described below with reference to Figures 2 to 7.

Figure 2 shows the system set-up. This is the process to be run the first time the mobile telecommunications device is operated. This creates the link between the mobile telecommunications device and the SIM card.

The module 107 may be stored in memory 105 at the time of manufacture or sale of device 101, or may be downloaded to device 101 over the network 110. The module 107 operates in a processor 108 and is normally set-up the first time the device 101 is used or when module 107 is downloaded and installed. This is the start (201).

The SIM card 106 includes an International Mobile Subscriber Identity (IMSI) code that is a unique code associated with the subscriber and is entered into the SIM card 106 when the SIM card 106 is activated. During the setup, the IMSI is read from the SIM card 106 (202). This will be considered as the identity of the valid owner.

35 Using the keys 103, the profile of the valid owner is then entered (203). The profile may include, for example one or more of: password, name, contact details (e.g. address and/or alternative telephone number), a notify number of the second

telephonic device 120 to be notified in the event of an alert, and settings on how the module 107 is to behave when an alert is to be generated and responses thereto. An example of the settings is shown in Table 1 below.

Delete	➤ Contacts ➤ Calendar ➤ Messages (Inbox, Sent, Draft) ➤ Images (in Gallery) ➤ Email (Inbox, Outbox, Draft) ➤ Notes
Back-up	➤ Contacts ➤ Calendar ➤ Messages (Inbox, Sent, Draft) ➤ Images (in Gallery) ➤ Email (Inbox, Outbox, Draft) ➤ Notes
Alert Greeting	This phone belongs to Name: Contact: If found, please contact the above. Reward provided

Table 1

The profile and the IMSI are then encrypted and written to the memory 105 (204). The module 107 is then set as an auto-start application (205) so that the module 107 will run whenever the device 101 is switched on. When the module 107 runs, it will do so in the background and will be invisible to a user. The set-up then ends (206).

Whenever the device 101 is started, an authentication procedure is activated. This is shown in Figure 3.

At the starting of the device 101 (301) the profile and IMSI are read from the memory 105 (302) and the IMSI is read from the SIM card 106. A query is raised (304) comparing the two IMSI codes. If they are the same (305), the authentication ends (306). If they are different (307) an alert is operated (308) and the authentication process ends (306). The IMSI codes will be different if the SIM card 106 has been changed, as is often the case for stolen or lost devices 101. The operation of the alert 308 will be silent, and no consent or verification is performed or sought.

The nature of the alert 308 is shown in Figure 4 and is in accordance with the settings of Table 1. At the start 401 (which is at 308), the module 107 will cause to be displayed on screen 102 (402) information obtained from the profile such as, for example, the name of the valid owner and the notify number. The module 107
 5 then reads the new contact number of the device 101 in the replaced SIM card 106 and a message is sent to the notify number (403). The message will contain information obtained from the profile and may include one or more of: name, the valid contact number of device 101, make and International Mobile Equipment Identity (IMEI) code of the device 101, the IMSI, the new contact number and the
 10 identity of the cell in which the device 101 is located.

The module 107 then waits (404) for instructions from the valid owner. Instructions should contain a remote command and the correct password as entered in the profiles (405). The remote command may be from a pre-set list sent as part of the
 15 message and may include, for example: to delete (406) data stored in memory 105, to backup (407) data stored in memory 105 to a server 113 connected to the network 110, and a query (408) as to the status of device 101, or as required or desired (409) including a "help" function. The alert process then ends (410).

20 The remote command to delete (406) is shown in Figure 5. Upon this option being selected (501), pre-determined data is deleted from memory 105. That data may be one or more of: contact information, calendar entries, messages (in, draft and sent), images, emails (in, draft and sent), call log or records, notes voicemail, phonebook, and so forth. This will be in accordance with the entered settings as
 25 shown in Table 1. Upon the deletion taking place, the device 101 returns to its previous state.

The remote command of backup (407) is shown in Figure 6. Upon being selected (601), the module 107 establishes a connection to the sever 113 (602) then
 30 uploads to server 113 all the data in the fields as pre-set in the settings shown in Table 1. This may be one or more of: contact information, calendar entries, messages (in, draft and sent), images, emails (in, draft and sent), call log or records, notes, voicemail, phonebook, and so forth. The data backed up may subsequently be recovered.

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Figure 7 shows the remote command of query (408). When this option is selected (701) a query is sent (702) to check on the status of device 101 and the pre-set

information as set in settings of Table 1 is requested of the device 101. This is by use of an SMS to the remote command centre. This may be, for example, to retrieve and send data of the identifier of the cell in which device 101 is located; to retrieve the data of the cell records or log (received, missed and dialed), and/or to
5 retrieve messages (in, draft and out). The data may be sent as one or more SMS or MMS messages to the device from which the query was raised – such as, for example, the second device 120.

By using module 107, it is possible to track and communicate with the lost device
10 101. The module 107 will inform the owner of the number of the new SIM card used in the lost device 101. Every time the SIM card 106 is changed, module 107 will inform the owner of the new number. Knowing the number of the new user (or thief) of the lost device 101, it is possible to establish contact and to request the return of device 101. If this attempt fails, it is possible to control the lost device 101
15 to perform certain tasks without the knowledge and consent of the new user (or thief).

Whilst there has been described in the foregoing description preferred embodiments of the present invention, it will be understood by those skilled in the
20 technology concerned that many variations or modifications in details of design or construction may be made without departing from the present invention.

THE CLAIMS

1. A system for tracking a mobile telecommunications device, the mobile telecommunications device having a subscriber identification module containing data of a valid owner, and a memory; the system comprising:
 5 a module for writing to the memory, the data of the valid owner and a profile of the valid owner;
 wherein, upon the subscriber's identification module being replaced with a new subscriber identification module, the data of the valid owner as written to the memory is compared with corresponding data in the new subscriber identification module and, if the data of the valid owner is different to the corresponding data, an alert is raised by the module.
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2. A system as claimed in claim 1, wherein the alert is raised without consent or verification by a user of the mobile telecommunications device.
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3. A system as claimed in claim 1 or claim 2, wherein the alert comprises displaying on a screen of the mobile telecommunications device information obtained from the profile.
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4. A system as claimed in any one of claims 1 to 3, wherein the alert comprises sending a message to a notify number that forms a part of the profile.
5. A system as claimed in claim 4, wherein the message comprises information retrieved from the profile and from the new subscriber identification module.
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6. A system as claimed in claim 4 or claim 5, wherein after the message is sent, a remote command is received, the remote command being selected from the group consisting of: delete data, backup, and query.
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7. A system as claimed in claim 6, wherein delete data comprises deleting data from the memory, the data being pre-set during a set-up procedure.
8. A system as claimed in claim 6, wherein backup comprises backing up data from the memory to a remote server, the data being pre-set during a set-up procedure.
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9. A system as claimed in claim 6, wherein query comprises retrieving data from the memory and from the mobile telecommunications device and sending the data to a command centre, the data being pre-set during a set-up procedure.

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10. A system as claimed in claim 7 or claim 8, wherein the data is at least one selected from the group consisting of: contact information; calendar entries; messages in, draft and sent; images; emails in, draft and sent; call log, call records, notes voicemail, and phonebook.

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11. A system as claimed in claim 9, wherein the data comprises at least one selected from the group consisting of: call log or records; messages in, draft and out; and an identifier of a telecommunications cell in which the mobile telecommunications device is located.

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12. A system as claimed in any one of claims 7 to 11, wherein the set up procedure comprises receiving the profile of the valid owner; the writing to the memory of the data of the valid owner and the profile of the valid owner, and setting the module as an auto-start application.

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13. A system as claimed in any one of claims 1 to 12, wherein the profile of the valid owner comprises at least one selected from the group consisting of: password, name, contact details, address, alternative telephone number, a notify number of a second telephonic device to be notified of the alert, and settings on how the module is to behave when the alert is to be generated and responses thereto.

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14. A system as claimed in any one of claims 1 to 13, wherein the data of the valid owner comprises an International Mobile Subscriber Identifier.

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15. A system as claimed in any one of claims 1 to 13, wherein the corresponding data comprises an International Mobile Subscriber Identifier.

16. A system as claimed in claim 5, wherein the information retrieved from the new subscriber identifier module comprises a new contact number for the mobile telecommunications device, and an identity of a telecommunications cell in which the mobile telecommunications device is located.

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17. A method for tracking a mobile telecommunications device, the mobile telecommunications device having a subscriber identification module containing data of a valid owner, and a memory; the method comprising:

5 writing to the memory the data of the valid owner and a profile of the valid owner;

upon the subscriber's identification module being replaced with a new subscriber identification module, comparing the data of the valid owner as written to the memory with corresponding data in the new subscriber identification module; and

10 if the data of the valid owner is different to the corresponding data, raising an alert.

18. A method as claimed in claim 17, wherein the alert is raised without consent or verification by a user of the mobile telecommunications device.

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19. A method as claimed in claim 17 or claim 18, wherein the alert comprises displaying on a screen of the mobile telecommunications device information obtained from the profile.

20 20. A method as claimed in any one of claims 17 to 19, wherein the alert comprises sending a message to a notify number that forms a part of the profile.

21. A method as claimed in claim 20, wherein the message comprises information retrieved from the profile and from the new subscriber identification module.

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22. A method as claimed in claim 20 or claim 21, wherein after the message is sent, a remote command is received, the remote command being selected from the group consisting of: delete data, backup, and query.

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23. A method as claimed in claim 22, wherein delete data comprises deleting data from the memory, the data being pre-set during a set-up procedure.

24. A method as claimed in claim 22, wherein backup comprises backing up data from the memory to a remote server, the data being pre-set during a set-up procedure.

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25. A method as claimed in claim 22, wherein query comprises retrieving data from the memory and from the mobile telecommunications device and sending the data to a command centre, the data being pre-set during a set-up procedure.
- 5 26. A system as claimed in claim 23 or claim 24, wherein the data is at least one selected from the group consisting of: contact information; calendar entries; messages in, draft and sent; images; emails in, draft and sent; call log, call records, notes voicemail, and phonebook.
- 10 27. A method as claimed in claim 25, wherein the data comprises at least one selected from the group consisting of: call log or records; messages in, draft and out; and an identifier of a telecommunications cell in which the mobile telecommunications device is located.
- 15 28. A method as claimed in any one of claims 23 to 27, wherein the set up procedure comprises receiving the profile of the valid owner; the writing to the memory of the data of the valid owner and the profile of the valid owner; and setting the module as an auto-start application.
- 20 29. A method as claimed in any one of claims 17 to 28, wherein the profile of the valid owner comprises at least one selected from the group consisting of: password, name, contact details, address, alternative telephone number, a notify number of a second telephonic device to be notified of the alert, and settings on how the module is to behave when the alert is to be generated and responses thereto.
- 25 30. A method as claimed in any one of claims 17 to 29, wherein the data of the valid owner comprises an International Mobile Subscriber Identifier.
- 30 31. A method as claimed in any one of claims 17 to 30, wherein the corresponding data comprises an International Mobile Subscriber Identifier.
32. A method as claimed in claim 21, wherein the information retrieved from the new subscriber identifier module comprises a new contact number for the mobile telecommunications device, and an identity of a telecommunications cell in which the mobile telecommunications device is located.
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33. A software arrangement that is operable on a processor, the software arrangement comprising a computer program that configures the processor to perform one or more functions of the method of any one of claims 17 to 32.

5 34. A mobile telecommunications device for performing the method of any one of claims 17 to 32.

35. A mobile telecommunications device including a software arrangement as claimed in claim 33.