According to a third aspect of invention, a wireless communication module for a card is described, the wireless communication module comprising a card processor to facilitate conventional functionalities associated with the card, including data storage, network authentication and basic communication; a data processing module to manage data communication to and from the card processor; and a wireless transceiver module to facilitate communications with a least one external or attached device over a wireless medium.

CLAIMS

1. A method of authenticating a mobile station on an alternate communications network, the use of the mobile station being associated with a default communications network, the mobile station comprising a baseband processor to manage the antenna-related functions of the mobile station and a SIM card to accommodate a default SIM associated with the default communications network for receiving network credentials from the baseband processor, the method comprising:

providing a SIM card device to intercept communications between the baseband processor and the SIM card, the SIM card device being located between the baseband processor and the SIM card for intercepting communications between the baseband processor and the SIM card so as to authenticate the mobile station on the alternate communications network;

monitoring the network credentials in respect of the network that the mobile station is actively in communication with;

determining whether the mobile station needs to switch to an alternate network, comprising either receiving a request from the user to switch to the alternate network or determining that the mobile station is deemed to be roaming, and identifying or receiving from a user the alternate network;

consulting a SIM bank, comprising at least one alternate SIM, and selecting an alternate SIM having a mobile station identification variable compatible with the alternate network;

receiving a network authentication request on the mobile station from the alternate network; and

in response to the mobile station being authenticated on the alternate network, allocating the selected mobile station identification variable to the mobile station so as to identify the user of the mobile station on the alternate network.

2. The method of claim 1, wherein, once authenticated on the alternate network, the method further comprises:

receiving network credentials for the default network;

logging onto the default network to receive incoming calls and/or data intended for the default SIM; and

forwarding the received incoming calls and/or data to the alternate SIM via the alternate network.

~~3. The method of either claim 1 or claim 2, wherein the step of determining whether the mobile station needs to switch to an alternate network comprises either receiving a request from the user to switch to the alternate network or determining that the mobile station is deemed to be roaming.~~

4.3. The method of any one of the preceding claims, wherein the step of receiving a network authentication request on the mobile station from the alternate network includes the steps of:

the SIM bank relaying the mobile station~~device~~ identification variable to the SIM card device/module;

the alternate network issuing a device authentication request to the mobile station in the form of a random number;

relaying the random number to the SIM bank;

running the random number against an integer stored in the SIM bank to produce a decryption variable;

transmitting the decryption variable to the SIM card device/module and to the alternate network;

the alternate network then comparing the received decryption variable with an internally stored decryption variable to determine whether there is a match,

in response to the received decryption variable matching with said internally stored decryption variable, authenticating the mobile station on the alternate network.

5.4. The method of any one of the preceding claims, wherein the SIM bank is an external SIM bank on a SIM server.

~~6.~~5. The method of claim ~~5~~4, wherein the SIM card device comprises:

a pseudo-SIM card that can be fitted to a conventional SIM card receiver within the mobile station;

a SIM receiver to accommodate the default SIM;

a first communications module and associated antenna to enable the SIM card device/module to communicate with the SIM bank; and

a processor to monitor the network credentials and determine whether the mobile station needs to switch to the alternate network.

~~7.~~6. The method of ~~any either~~ one of claims 1 or ~~2to 4~~, wherein the SIM bank is integrated into the mobile station, with the SIM card device comprising:

a body having an alternate SIM embedded therein, the alternate SIM being associated with the alternate network;

a SIM receiver for receiving or accommodating the default SIM associated with the default network, the default SIM comprising network credentials;

circuitry to connect the alternate and default SIMs to each other, either physically or wirelessly, and to the rest of the mobile station; and

a second communications module to extract the network credentials from the default SIM and to transmit the credentials to a remote gateway.

~~8.~~7. The method of claim ~~7~~6, wherein the SIM receiver is integral or separate from the body.

~~9.~~8. The method of either of claims ~~7~~ 6 or ~~8~~7, wherein the SIM receiver is arranged to receive or accommodate at least one further default SIM associated with further default networks and with each further default SIM also comprising network credentials for the further default networks, with the second communications module being arranged to extract the network credentials from the further default and to transmit these credentials to the remote gateway.

~~10.~~9. The method of any one of the preceding claims, wherein the network credentials include, IMSI numbers, K_i or other authentication credentials and serial information in respect of the at least one alternate SIM.

~~11.~~10. The method of any one of the preceding claims, further comprising detecting when a network orientated message has arrived on the user's default SIM, reading the network orientated message, storing the message in a database, and then sending the message to the user's alternate SIM at a designated "message sending" time.

~~12. The method of any one of the preceding claims, wherein the SIM card device is located between the baseband processor and the SIM card for intercepting communications between the baseband processor and the SIM card so as to authenticate the mobile device on the alternate communications network.~~

~~13.~~11. The method of any one of the preceding claims ~~12~~, wherein the SIM card device comprises an overlay that can be secured to the SIM card, the overlay comprising:

a communications processor, in which firmware is embedded;

a substrate upon which the communications processor is mounted and wires are routed; and

pads that allow for the communications processor to send/receive information to/from the mobile station.

~~14.~~12. The method of claim ~~13~~11, wherein the method comprises the step of updating the firmware on the communications processor, the communications processor comprising a plurality of memory blocks, each memory block governing an instruction or function associated with the overlay, the method comprising:

receiving an update message from a remote communications module, the update message comprising the address of the memory block in the communications processor to be updated and a matching list of replacement data that is to replace the existing data in the respective memory block;

stalling the baseband processor by requesting more processing time;

instructing the communications processor to erase the data at the address in the memory block that is to be updated;

instructing the communications processor to write the replacement data into the address of the memory block; and

once the replacement data has been written into the relevant memory block, instructing the baseband processor to return to normal operating state.

~~15.~~13. A SIM card device for authenticating a mobile station on an alternate communications network, the use of the mobile station being associated with a default communications network, the mobile station comprising a baseband processor to manage the antenna-related functions of the mobile station and a SIM card to accommodate a default SIM associated with the default communications network for receiving network credentials from the baseband processor, the SIM card device being located between the baseband processor and the SIM card for intercepting communications between the baseband processor and the SIM card so as to authenticate the mobile station on the alternate communications network, the SIM card device comprising a processor to:

monitor the network credentials in respect of the network that the mobile station is actively in communication with;

determine whether the mobile station needs to switch to an alternate network, and identifying or receiving from a user the alternate network;

consult a SIM bank, comprising at least one alternate SIM, and selecting an alternate SIM having a mobile station identification variable compatible with the alternate network;

receive a network authentication request on the mobile station from the alternate network; and

in response to the mobile station being authenticated on the alternate network, allocate the selected mobile station identification variable to the mobile station so as to identify the user of the mobile station on the alternate network.

~~16~~14. The SIM card device of claim ~~15~~13, wherein, once authenticated on the alternate network, the processor is arranged to:

receive network credentials for the default network;

log onto the default network to receive incoming calls and/or data intended for the default SIM; and

forward the received incoming calls and/or data to the alternate SIM via the alternate network.

~~17~~15. The SIM card device of either claim ~~15~~ 13 or claim ~~16~~14, wherein the SIM bank is an external SIM bank on a SIM server.

~~18~~16. The SIM card device of claim ~~17~~15, wherein the SIM card device comprises:

a pseudo-SIM card that can be fitted to a conventional SIM card receiver within the mobile station;

a SIM receiver to accommodate the default SIM;

a first communications module and associated antenna to enable the SIM card device/module to communicate with the SIM bank; and

a processor to monitor the network credentials and determine whether the mobile station needs to switch to the alternate network.

~~19~~17. The SIM card device of either claim ~~15~~ 13 or claim ~~16~~14, wherein the SIM bank is integrated into the mobile station, with the SIM card device comprising:

a body having an alternate SIM embedded therein, the alternate SIM being associated with the alternate network;

a SIM receiver for receiving or accommodating the default SIM associated with the default network, the default SIM comprising network credentials;

circuitry to connect the alternate and default SIMs to each other, either physically or wirelessly, and to the rest of the mobile station; and

a second communications module to extract the network credentials from the default SIM and to transmit the credentials to a remote gateway.

~~20~~18. The SIM card device of claim ~~19~~17, wherein the SIM receiver is integral or separate from the body.

~~21~~19. The SIM card device of either claim ~~19~~ 17 or claim ~~20~~18, wherein the SIM receiver is arranged to receive or accommodate at least one further default SIM associated with further default networks and with each further default SIM also comprising network credentials for the further default networks, with the second communications module being arranged to extract the network credentials from the further default and to transmit these credentials to the remote gateway.

~~22~~20. The SIM card device of any one of claims ~~15~~ 13 to ~~21~~19, wherein the network credentials include IMSI numbers, K_i or other authentication credentials and serial information in respect of the at least one alternate SIM.

~~23. The SIM card device of any one of claims 15 to 22, wherein the SIM card device is located between the baseband processor and the SIM card for intercepting communications between the baseband processor and the SIM card so as to authenticate the mobile device on the alternate communications network.~~

~~24~~21. The SIM card device of any one of claims 13 to 20 ~~claim 23~~, wherein the SIM card device comprises an overlay that can be secured to the SIM card, the overlay comprising:

a communications processor, in which firmware is embedded;

a substrate upon which the communications processor is mounted and wires are routed; and

pads that allow for the communications processor to send/receive information to/from the mobile station.

~~25~~22. The SIM card device of claim ~~24~~21, wherein the SIM card device comprises a local communications manager (LCM) to receive an update message from a remote communications module (RCM) to update the communications processor's firmware.

~~26~~23. The SIM card device of claim ~~25~~22, wherein the communications processor comprises a plurality of memory blocks, each memory block governing an instruction or function associated with the overlay.

~~27~~24. The SIM card device of claim ~~26~~23, wherein each update message sent by the RCM comprises the address of the memory block in the communications processor to be updated and a matching list of replacement data that is to replace the existing data in the respective memory block.

~~28~~25. The SIM card device of claim ~~27~~24, wherein the LCM, upon receiving the update message, determines the address of the memory block in the communications processor to be updated and prepares the overlay for the update.

~~29~~26. The SIM card device of claim ~~28~~25, wherein the LCM is arranged to:

stall the baseband processor by requesting more processing time;

instruct the communications processor to erase the data at the address in the memory block that is to be updated;

instruct the communications processor to write the replacement data into the address of the memory block; and

once the replacement data has been written into the relevant memory block, instruct the baseband processor to return to normal operating state.

~~30~~27. The SIM card device of claim ~~29~~26, wherein if the communications processor does not allow for the erasing of a single byte, the LCM is arranged to first back up the extra data that is erased.

~~31~~28. The SIM card device of claim ~~30~~27, wherein the RCM comprises a SMS/USSD gateway or system capable of relaying the update message to the LCM via either the mobile device's baseband processor or the SIM card.

~~32~~29. The SIM card device of claim ~~24~~21, which includes a wireless communication module to facilitate wireless communication with at least one external or attached device.

~~33. A wireless communication module for a card, the wireless communication module comprising:~~

~~a card processor to facilitate conventional functionalities associated with the card, including data storage, network authentication and basic communication;~~

~~a data processing module to manage data communication to and from the card processor; and~~

~~a wireless transceiver module to facilitate communications with a least one external or attached device over a wireless medium.~~

~~34. The wireless communication module of claim 33, wherein the card is a SIM card or a smart card, including a bank and/or credit card.~~

~~35. The wireless communication module according to either claim 33 or claim 34, wherein the wireless communication module takes the form of an external module that latches onto an existing card.~~

~~36. The wireless communication module according to claim 35, wherein the external module is connected to pads on the card, either directly or through a flexible PCB.~~

~~37. The wireless communication module according to either claim 33 or claim 34, wherein the wireless communication module is directly embedded onto the card itself.~~

~~38. The wireless communication module according to claim 35, wherein the card processor and the data processing module are combined into a single processing component.~~

~~39. The wireless communication module according to any one of claims 33 to 38, wherein the wireless transceiver module comprises a bluetooth radio to communicate over the wireless medium with a virtual SIM residing on a separate computer.~~

~~40. The wireless communication module according to claim 39, wherein the wireless communication module acts as a communications conduit between a mobile station housing the wireless communication module and the card, so that all communications from a baseband processor in the mobile station gets captured by the wireless communication module and forwarded to the separate computer, which can then determine an appropriate response and relay this information back to the wireless communication module.~~

~~41. The wireless communication module according to any one of claims 33 to 39, wherein the wireless communication module can be used purely for data transfer from a default network to an alternate network, in which case the wireless communication module is encapsulated in a hardware module.~~