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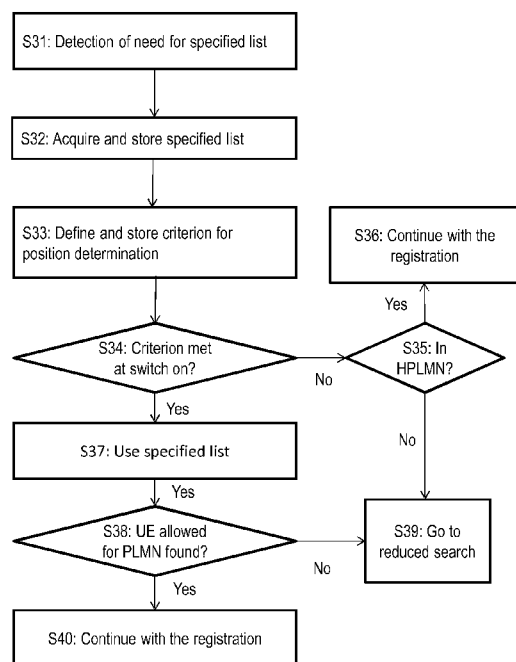


FIG 3

(57) Abstract: The invention relates to the field of mobile network selection in a mobile telecommunication environment, and more particularly selection of visited Public Land Mobile Network (VPLMN) by a wireless terminal when the wireless terminal is away from its home Public Land Mobile Network (HPLMN). More particularly, the invention relates to such methods in a wireless terminal avoiding a full cell search and acquisition procedure as well as devices and computer products therefor. The solution proposes to build up a list of preferred VPLMNs with the corresponding radio access technologies and frequency bands in advance and use this list instead of the conventional pre-defined list of PLMNs to select the proper PLMN and radio access technology RAT during roaming. Further, in addition to search manually for VPLMN with the corresponding RATs and frequency bands for a given destination and time frame, data analytics can be used to run the VPLMN search automatically without the intervention of the user.

VISITED PLMN (VPLMN) SELECTION FOR ROAMING SUBSCRIBERS

Technical Field

The present invention relates generally to the field of mobile network selection in a mobile telecommunication environment, and more particularly selection of
5 visited Public Land Mobile Network (VPLMN) by a wireless terminal when the wireless terminal is away from its home Public Land Mobile Network (HPLMN).

More particularly, the invention relates to methods for mobile network (VPLMN) selection in a wireless terminal avoiding a full cell search and acquisition procedure as well as devices and computer products therefor.

10 Background

Today, when a wireless terminal (also called mobile telephone, user equipment, UE) powers on or moves out of the coverage of a current serving network, it is to find a feasible mobile network to camp on. Normally the wireless terminals use a pre-defined list of PLMNs (Public Land Mobile Network), Home PLMN and equivalent
15 HPLMNs with preferred radio access technologies, RATs, to find the proper PLMN and RAT via cell search and system information acquisition procedure.

A problem occurs when the wireless terminals are on roaming, i.e. away from its home HPLMN, and the applicable VPLMN is not on the list of the pre-defined PLMN. The conventional solution is to perform a full scanning of the radio
20 frequency channels and RATs supported by the wireless terminal.

With the increasing number of frequency bands and radio access technologies, e.g. GSM (2G), CDMA, WCDMA (3G), TD-SCDMA (3G), LTE-FDD (4G), LTE-TDD (4G), it becomes more and more power and processing consuming to find the proper cell outside the HPLMN to camp on. Also there is a high risk that the visited PLMN is not
25 allowed by the home subscriptions of the network operator of the wireless terminal or accompanied with high roaming fees.

Summary

It is an object of some embodiments to solve or mitigate at least some of the above or other disadvantages.

The idea is to improve the performance of a wireless terminal during roaming by using analytics and smart-phone applications, APPs, in association with services and servers provided by an ISP (Information Service Provider) or crowd-sourcing-based services.

5 The solution proposes to build up a list of preferred VPLMNs with the corresponding RATs and frequency bands in advance and use this list instead of the conventional pre-defined list of PLMNs to select the proper PLMN and RAT during roaming. Further, in addition to search manually for VPLMN with the corresponding
10 RATs and frequency bands for a given destination and time frame, data analytics can be used to run the VPLMN search automatically without the intervention of the user. As a result, time and processing can be saved, and the risks for VPLMN rejection and high roaming fees are diminished.

 According to a first aspect, this is achieved by a method for mobile network (VPLMN) selection in a wireless terminal, comprising: detecting a future need for a
15 specified PLMN list valid at a particular location outside the wireless terminal's home network; acquiring and storing said specified PLMN list; creating and storing a criterion for determining the wireless terminal's position at the particular location; detecting the wireless terminal's position at the particular location by means of the criterion; and using the specified PLMN list for mobile network (VPLMN) selection.

20 The detection of the future need for a specified PLMN list may comprise analyzing data received and accessible in the wireless terminal, e.g. an email or calendar application or receiving an input of a future destination location and time data.

 Suitably, the acquisition of said specified PLMN list comprises cooperating with
25 a roaming (information) server via a mobile telecommunication network or a local network.

 In one embodiment, the acquisition of said specified PLMN list is triggered by an event or time condition.

 The event may involve receiving check-in related data or receiving a command
30 to enter a flight mode.

 Suitably, the time condition involves a time period preceding a departure time.

 In a further embodiment, if the pre-defined PLMN is not applicable at a current location at switch on of the wireless terminal, the method involves retrieving the

MCC and MNC at the current location; searching for a match between the retrieved MCC and MNC at the current location and an MCC and MNC entry in the specified PLMN list; if a MCC and MNC match exists, using the entry for mobile network (VPLMN) selection.

- 5 Further, if only a MCC match exists, the method involves using that entry to re-arrange the specified list is in a prioritized order; and using the re-arranged specified list for cell search and mobile network (VPLMN) selection.

 According to a second aspect, the invention relates to a wireless terminal, comprising: a user interface; a memory for storing software instructions and other
10 data; a transceiver arranged to establish radio communication via a mobile telecommunication network and a local network; and a processing unit arranged: to detect a future need for a specified PLMN list valid at a particular location outside the wireless terminal's home network; to acquire and store said specified PLMN list in the memory; to create and store a criterion for determining the wireless
15 terminal's position at the particular location in said memory; to detect the wireless terminal's position at the particular location by means of the criterion; and to use the specified PLMN list for mobile network (VPLMN) selection.

 The processing unit may be arranged to detect the future need for a specified PLMN list by analyzing data received and accessible in the memory.

- 20 In one embodiment, the processing unit is further arranged to be triggered by an event or time condition for the acquisition of said specified PLMN list.

 The event may involve receiving check-in related data or receiving a command through the user interface to enter a flight mode.

- 25 In a further embodiment, the processing unit is further arranged, if the pre-defined PLMN is not applicable at a current location at switch on of the wireless terminal, to retrieve the MCC and MNC at the current location; to search for a match between the retrieved MCC and MNC at the current location and an MCC and MNC entry in the specified PLMN list; and if a MCC and MNC match exists, to use the entry for mobile network (VPLMN) selection.

- 30 Further, if only a MCC match exists, the processing unit is further arranged to use that entry to re-arrange the specified list is in a prioritized order; and to use the re-arranged specified list the for cell search and mobile network (VPLMN) selection.

According to a third aspect, the invention relates to a computer program for mobile network (VPLMN) selection in a wireless terminal, the computer program comprising computer program code which, when run on the wireless device, causes the wireless device to operate in one of the alternatives as mentioned above.

5 According to a fourth aspect, the invention relates to a carrier, comprising the computer program as mentioned above, wherein the carrier is one of an electronic signal, an optical signal, a radio signal and a computer readable storage medium.

10 Among the advantages of some embodiments one may mention that the cell search and the queries and response signaling, as well as the number of nodes involved, can be kept at a minimum.

Additionally, requesting VPLMN lists via analytics as well as retrieving the lists at secure access points provide further advantages of machine-to-machine (M2M) communications, information usage certainty as well as power saving.

Brief Description of the Drawings

15 Further objects, features and advantages will appear from the following detailed description of embodiments, with reference being made to the accompanying drawings, in which:

Fig. 1 is a schematic drawing of a 3GPP network access procedure according to prior art;

20 Fig. 2A is a schematic drawing of nodes involved in roaming data provisioning according to embodiments of the invention;

Fig. 2B is a schematic diagram of signaling and actions between nodes when carrying out a method to provision a specified list according to an embodiment of the invention;

25 Fig. 2C is a schematic diagram of signaling and actions between nodes when carrying out a method to provision a specified list according to another embodiment of the invention;

Fig. 3 is a schematic drawing of a 3GPP network access procedure according to embodiments of the invention;

30 Fig. 4 is a schematic drawing of a 3GPP network access procedure according to further embodiments of the invention; and

Fig. 5 is a schematic drawing illustrating a device in the form of a wireless terminal and a computer readable medium according to some embodiments of the invention.

Detailed Description

5 It should be emphasized that the term “comprises/comprising” when used in this specification is taken to specify the presence of stated features, integers, steps, or components, but does not preclude the presence or addition of one or more other features, integers, steps, components, or groups thereof.

10 The network access procedure according to a 3GPP (3rd Generation Partnership Project standard) prior art telecommunications system is shown in figure 1. A basic pre-defined PLMN list is provided by the network operator of the wireless terminal at the first initialization of the wireless terminal. It is updated at times as and when necessary and pushed to the wireless terminal. The pre-defined PLMN list is not
15 includes PLMNs to be preferred when the terminal is roaming in accordance with the network operator’s roaming agreements in various countries.

During a flight to another country, the wireless terminal is switched off or set to flight mode with no connection to any telecommunications network. After
20 landing, the wireless terminal, UE, is switched on or normal connected mode is resumed. Then, the wireless terminal starts to access a telecommunications (3GPP) network; step S10.

If the home PLMN is not found, the wireless terminal starts to scan all the frequencies in a supported band to find strong signals, e.g. received signal strength indication, RSSI, higher than threshold; step S12.

25 If a cell with a strong signal is found, the wireless terminal tries to synchronize time and frequency with the identified candidate cell; step S13. The wireless terminal reads the system info broadcast by the candidate cell and initiates a random access procedure, and then establishes radio resource control, RRC, Connections with it; step S14.

30 Then the wireless terminal performs registration to the network via the candidate cell and Mobile Switching Center/Serving GPRS Support Node- Mobility Management Entity, MSC/SGSN-MME, with agreed ciphering and integrity protections; step S15.

The MSC/SGSN-MME in turn contacts the Home Location Register/ Home Subscriber Server, HLR/HSS, to get the subscription data of the wireless terminal; step S16.

35 The subscription data is checked to verify if the wireless terminal is allowed for the

PLMN of the candidate cell; step S17.

If allowed, the wireless terminal continues with registration and service requests, if any; step S18.

If not allowed, the wireless terminal continues with the scan until all bands
5 supported by the wireless terminal are scanned; step S11.

As readily seen from the description above, the network access procedure involving scanning of all bands supported by the wireless terminal together with queries and response signaling can be time and power consuming, as well as involving several nodes. This is especially so if there is no hit, that is an allowed
10 PLMN found for the wireless terminal, early in the process.

Briefly, embodiments of the invention propose methods for a wireless terminal to send, prior to departure, a request to the Operational Support Systems/Business Support Systems, OSS/BSS, or a crowd-sourcing server or service for a specified PLMN list, including radio access technology and frequency band information valid
15 at the destination. The destination may preferably be identified by data analytics in connection with an email or calendar application, or in a basic manual manner. Then the server is to push down a tentative list to the wireless terminal, preferably when the wireless terminal is at a location prior to departure, possibly just before enabling flight mode. When the wireless terminal eventually is powered on at the
20 destination, it can readily find the cell to camp based on the specified list. In addition, in the case of unexpected events such as unplanned trips or landing in a place other than the planned destination, the wireless terminal can check the stored specified list with the matched MCC (Mobile Country Code) - MNC (Mobile Network Code), also known as the MCC/MNC tuple, prior to performing a full radio access
25 technology (RAT) and frequency scanning.

The information about the visited mobile network and associated specified PLMN list is to be provisioned in the wireless terminal prior to the trip. The first step is to specify the time and destination applicable in the VPLMN search procedure, which can be done by the user when actively planning the trip or
30 responding to a query by an application in the wireless terminal (smart phone). Such an application can be stand-alone or implemented as part of an advanced calendar application, travel application or the like. In one embodiment a notification is sent to the user from an application in the smart phone a time, e.g. 24 hours, before the trip planned in the calendar is to start. Either the user is prompted to acquire the
35 specified PLMN list or it is done automatically by the wireless terminal without user interaction. This approach is not time-critical, and allows the user to do a manual

search and insert the found VPLMN with the corresponding RATs and frequency bands in the wireless terminal to be used at the destination.

Alternatively, an application for asking the user to search for the VPLMN with the corresponding RATs and frequency bands at the destination can be triggered when a flight mode is initiated. The user is suitably prompted to answer if such a search is to be done. If positive, the application is to do the search quickly before it switches off the network connection. In this case the application is preferably pre-programmed with the search engine connected to the services about the PLMN with the corresponding RATs and frequency bands provided by crowd-sourcing based services or ISPs such as OPEN SIGNAL™ (wireless coverage mapping).

In a further embodiment, the stand-alone application is a data analytics application in the wireless terminal which is used to acquire the specified PLMN list. One example is to use GOOGLE NOW™ to analyze the booking of the user's flight via an email account or the like storing travel data in the wireless terminal and trigger the search for the preferred VPLMN, RATs and frequency bands to build up the user controlled specified PLMN list prior to the trip without any user interventions.

At the destination, when the flight mode is deactivated, the smart phone can quickly find the cells to camp on using the PLMN and corresponding RAT and frequency bands listed in the specified PLMN list.

Fig. 2A shows some of the nodes involved in roaming data provisioning according to embodiments of the invention. When the search for a specified PLMN list is started as in one of the embodiments described above, the wireless terminal (UE) 101 sends a request for possible roaming data via a network, e.g. a 3GPP LTE telecommunications network. The nodes illustrated in the figure are named according to 3GPP LTE terminology for convenience. Thus, a base station - eNB 102 cooperates with a Mobility Management Entity - MME 103 and a S-GW - Serving Gateway 105 together with a P-GW (or PDN GW) - Packet Data Network Gateway 106 in a known manner. However, the invention is applicable to any network for retrieving the wanted information.

An OSS/BSS 110 provisions the data in a roaming server 120 (e.g. SMS-C type), suitably located close to a departure place or the OSS/BSS 110. Data may be gathered by crowd-sourcing based services or ISPs in a cloud environment 107. The maintenance and update of the roaming data in the roaming server 120 is an ongoing process independent of one specific wireless terminal. For a wireless

terminal involved in a process according to embodiments of the invention, it is assumed that the roaming server 120 contains sufficient data.

In one embodiment, the wireless terminal UE is located in an area of departure which is detected by a local network 104, e.g. WLAN, or by cooperation with a travel application or a check-in device. Then, the local network 104 fetches the roaming data from the roaming server 120 and feeds into wireless terminal 101. The roaming data is mapped and sorted according to the itinerary provided by the travel application or the check-in device to match the wanted destination. In an alternative embodiment, the roaming data is filtered and sorted by the wireless terminal according to the known destination and specific preferences of the wireless terminal.

Fig. 2B shows a diagram of the signaling and actions between nodes when carrying out a method to provision a specified list according to an embodiment of the invention. The process starts with the user entering trip data in the wireless terminal 101 configured with a suitable application (App). In an alternative, trip related data is received in the wireless terminal through a server in the cloud 107, for example as an email, and trip data is extracted by means of a data analytics tool. In a first alternative, a trigger time is set when the trip data is stored, for example 24 hours before the trip is planned to start. When the trigger time is passed, the application send a prompt to the user, asking if a PLMN query should be initiated. If the user confirms, the PLMN query is sent. In another alternative, the PLMN query is sent automatically after the trigger time is passed without user intervention.

In a further alternative, the PLMN query is sent automatically after the user has initiated a flight mode in the wireless terminal. As mentioned before, the wireless terminal will do the necessary actions quickly before it switches off the connections.

The PLMN query is sent to the roaming server 120, possibly via a crowd-based service or other cooperating servers in the cloud 107, using any suitable telecommunication (3GPP) or local connectivity network.

The roaming server 120 responds with a tentative list reflecting the time and location of the planned trip. It may be sent to the wireless terminal 101 which carries out further sorting to match its operator's or other preferences to be applicable at the time and location of the planned trip. In an alternative, the list is sent to a crowd-based service or other cooperating servers in the cloud 107 which

performs a similar sorting based on data received from the wireless terminal 101. Thus, a ready-made customized specified list is sent to the wireless terminal 101.

Fig. 2C shows a similar signaling diagram for provisioning a specified list according to another embodiment of the invention. As in the previous embodiment, the process starts with the user entering trip data in the wireless terminal 101. However, here the wireless terminal is triggered when it is being connected to a local network 104. This may be via a dedicated check-in device at an airport. When exchanging credentials with the local network 104, trip data is fetched by the local network 104 pertaining to the wireless terminal 101 in question, from the wireless terminal or through connection with another system, for example a booking system or through servers in the cloud 107 (dashed line).

Then the local network 104 sends a PLMN query to the roaming server 120 via any suitable channel. The roaming server 120 responds with a tentative list sent to the local network 104 which forwards the list to the wireless terminal 101 for sorting as described above. Alternatively the list is sorted by the local network 104 and then sent to the wireless terminal 101.

Fig. 3 is a flow chart of a VPLMN selection procedure for a wireless terminal (UE) at a destination.

In step S31, the wireless terminal detects a need for a specified list according to embodiments of the invention. The specified list is similar to the conventional operator provided PLMN list preferably including RAT and frequencies, but customized for a specific location. As described above, this detection can be made based on direct input of a planned trip by the wireless terminal's user or done automatically by a data analytics tool having access to data and applications in the wireless terminal.

In step S32, the specified list is acquired, for example as described with reference to figures 2A-C, and stored to be accessible locally in the wireless terminal without any external network connection. If a specified list matching the planned location and not older than a specified value is already stored in the wireless terminal, the creation of a new specified list may be omitted.

More than one such a specified list can be stored, as more than one trip may be planned in advance. For ease of description, it is assumed that only one list is stored in the wireless terminal.

In step S33, a criterion for determination of the wireless terminal's position without any external network connection is also stored locally. Thus, for example a time window is defined corresponding to the planned trip. Until the wireless terminal is switched off or put in flight mode, and then on again, it will operate in the normal way. It is assumed that the wireless terminal is switched off or put in flight mode or losing telecommunications (3GPP) network connectivity during a trip abroad. Today deactivating connections is mandatory on airplanes.

In step S34, if the wireless terminal is switched on or flight mode deactivated and the criterion is met, e.g. if the time is within the time window, the wireless terminal will assume that it is away from its home PLMN and the specified list should be used, step S37.

In step S35, if the criterion not is met, it is determined if the wireless terminal is in its home PLMN by indications from a local network, GPS or directly by the user. In this case, the wireless terminal can continue with registration in its home network in step S36.

Alternatively, the wireless terminal is away from its home PLMN without any planned trip in advance. Since there is no specified list valid for this time, the wireless terminal goes to a reduced search in step S39, according to embodiments of the invention which are explained below with reference to figure 4.

In step S37, the specified list customized for the location associated with the criterion is used for a cell search.

In step S38, it is checked if a PLMN allowed for the wireless terminal is found, which normally is the case.

In step S40, then the wireless terminal can continue with registration in the found PLMN as VPLMN.

However, if an allowed PLMN is not found, this indicates that the specified list is deficient, in other words the pre-stored list has failed at the current location. Then, the wireless terminal goes to a reduced search in step S39.

Fig. 4 is a flow chart of a VPLMN selection procedure with a reduced search for a wireless terminal UE at a destination, which is used when the specified list is deficient or in case of an unplanned trip, that is not stored in the wireless terminal. In step S41, a search is made to find the current MCC and MNC. The MCC and MNC tuple of the first network found may be used.

In step S42, then a search is made for a match between the MCC and MNC tuple found and any entry in the specified list.

In step S43, if a match is found, that entry is used for registration in the corresponding network, step S44.

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In step S45, if a match not is found with the MCC and MNC tuple, it is determined if there is a match between the MCC only and any entry in the specified list.

In step S46, if there is no MCC match, the wireless terminal will resort to the conventional cell search and registration.

- 5 In step S47, if there is a MCC match, the specified list is re-arranged by the wireless terminal in a prioritized order, such that entries with a MCC match is placed to be searched first in a reduced cell search. This will likely result in an early hit of an allowed PLMN, particularly if the wireless terminal's location coincides with locations visited before on planned trips.
- 10 In step S48, if the reduced cell search results in an allowed PLMN, the wireless terminal continues with registration in the corresponding network, step S49. If the reduced cell search does not result in an allowed PLMN, the wireless terminal will resort to the conventional cell search and registration, step S46.

Alternatively, if the pre-defined PLMN is not applicable at a current location at
15 switch on of the wireless terminal, a list may be pushed down to the wireless terminal from the local network. This list is customized to be suitable at the current location and may be used for a prioritized cell search.

Embodiments may appear within an electronic apparatus, such as a wireless terminal, also called mobile or cellular telephone, user equipment (UE) or equivalent,
20 comprising circuitry/logic or performing methods according to any of the embodiments.

Figure 5 shows such a wireless terminal 101, in terms of a number of functional modules. A processing unit 6 is provided using any combination of one or more of a suitable central processing unit (CPU), multiprocessor, microcontroller, digital signal processor (DSP), application specific integrated circuit (ASIC), field
25 programmable gate arrays (FPGA) etc., capable of executing software instructions stored in a computer program product 61 (as in Fig. 6), or in an internal memory 16. Thus the processing unit 6 is thereby arranged to execute methods as herein disclosed. The memory 16 may comprise persistent storage, which, for example, can
30 be any single one or combination of magnetic memory, optical memory, solid state memory or even remotely mounted memory. The wireless device 101 may further comprise an input/output (I/O) user interface 8 for receiving and providing information from and to a user. The wireless device 101 also comprises transceiver modules including one or more transmitters 12 and receivers 10, comprising analog
35 and digital components and a suitable number of antennae 14 for radio communication with network nodes 102 and 104 (Fig. 2A). The processing unit 6

controls the general operation of the wireless device 101, e.g. by sending control signals to the transmitter 12 and/or receiver 10 and receiving reports from the transmitter 12 and/or receiver 10 of its operation. Other components, as well as the related functionality, of the wireless device 101 are omitted in order not to obscure the concepts presented herein.

According to some embodiments, a computer program product comprises a computer readable medium such as, for example, a diskette, a USB-stick, a plug-in card, an embedded drive, or a CD-ROM as illustrated by 61. The computer readable medium 61 may have stored thereon a computer program comprising program instructions. The computer program may be loadable into a data-processing unit (processor) 6, which may, for example, be comprised in the wireless terminal 101. When loaded into the data-processing unit 6, the computer program may be stored in a memory 16 associated with or integral to the data-processing unit 6. According to some embodiments, the computer program may, when loaded into and run by the data-processing unit, cause the data-processing unit to execute method steps according to, for example, any of the methods described in this specification.

In summary, the invention provides a number of advantages. One advantage of embodiments of the invention is the provision of a specified PLMN list, customized for a specific location away from the HPLMN. The specified PLMN list will be arranged such that a cell search at the location in question will result in an early hit, most probably the first or one of the first VPLMNs on the list. Thus, possibly only one or a few bands have to be searched. Also the queries and response signaling, as well as the number of nodes involved, can be kept at a minimum.

Additionally, requesting VPLMN lists via analytics as well as retrieving the lists in the vicinity of the airport gates provide further advantages of M2M communications, information usage certainty as well as power saving.

Reference has been made herein to various embodiments. However, a person skilled in the art would recognize numerous variations to the described embodiments that would still fall within the scope of the claims. For example, the method embodiments described herein describes example methods through method steps being performed in a certain order. However, it is recognized that these sequences of events may take place in another order without departing from the scope of the claims. Furthermore, some method steps may be performed in parallel even though they have been described as being performed in sequence.

In the same manner, it should be noted that in the description of embodiments, the partition of functional blocks into particular units is by no means limiting. Contrarily, these partitions are merely examples. Functional blocks described herein as one unit may be split into two or more units. In the same
5 manner, functional blocks that are described herein as being implemented as two or more units may be implemented as a single unit without departing from the scope of the claims.

Hence, it should be understood that the details of the described embodiments are merely for illustrative purpose and by no means limiting. Instead, all variations
10 that fall within the range of the claims are intended to be embraced therein.

CLAIMS

1. A method for mobile network (VPLMN) selection in a wireless terminal (101), comprising:

- 5 detecting (S31) a future need for a specified PLMN list valid at a particular location outside the wireless terminal's home network;
acquiring and storing (S32) said specified PLMN list;
creating and storing (S33) a criterion for determining the wireless terminal's position at the particular location;
10 detecting (S34) the wireless terminal's position at the particular location by means of the criterion; and
using (S37) the specified PLMN list for mobile network (VPLMN) selection.

2. A method according to claim 1, wherein the detection (S31) of the future need
15 for a specified PLMN list comprises:
analyzing data received and accessible in the wireless terminal.

3. A method according to claim 1, wherein the detection (S31) of the future need for a specified PLMN list comprises:
20 receiving an input of a future destination location and time data.

4. A method according to any one of the preceding claims, wherein the acquisition (S32) of said specified PLMN list comprises:
cooperating with a roaming (information) server (120) via a mobile
25 telecommunication network (102, 103, 105, 106) or a local network (104).

5. A method according to any one of the preceding claims, wherein the acquisition (S32) of said specified PLMN list is triggered by an event or time condition.
30

6. A method according to claim 5, wherein the event is receiving check-in related data.

7. A method according to claim 5, wherein the event is receiving a command to
35 enter a flight mode.

8. A method according to claim 5, wherein the time condition involves a time period preceding a departure time.

9. A method according to any one of the preceding claims, wherein, if the pre-defined PLMN is not applicable at a current location at switch on of the wireless terminal, retrieving (S41) the MCC, Mobile Country Code, and MNC, Mobile Network Code, at the current location;
searching (S42, S43) for a match between the retrieved MCC and MNC at the current location and an MCC and MNC entry in the specified PLMN list;
if a MCC and MNC match exists, using (S44) the entry for mobile network (VPLMN) selection.

10. A method according to claim 9, wherein, if only a MCC match exists (S45), using that entry to re-arrange (S47) the specified list is in a prioritized order;
and using the re-arranged specified list the for cell search and mobile network (VPLMN) selection.

11. A wireless terminal (101), comprising:
a user interface (8);
a memory (16) for storing software instructions and other data;
a transceiver (10, 12, 14) arranged to establish radio communication via a mobile telecommunication network (102, 103, 105, 106) and a local network (104); and
a processing unit (6) arranged:
to detect a future need for a specified PLMN list valid at a particular location outside the wireless terminal's home network;
to acquire and store said specified PLMN list in the memory (16);
to create and store a criterion for determining the wireless terminal's position at the particular location in said memory (16);
to detect the wireless terminal's position at the particular location by means of the criterion; and
to use the specified PLMN list for mobile network (VPLMN) selection.

12. A wireless terminal according to claim 11, wherein the processing unit (6) is further arranged to detect the future need for a specified PLMN list by analyzing data received and accessible in the memory (16).

16

13. A wireless terminal according to any one of claims 11 and 12, wherein the processing unit (6) is further arranged to be triggered by an event or time condition for the acquisition of said specified PLMN list.

5 14. A wireless terminal according to claim 13, wherein the event is receiving check-in related data.

15. A wireless terminal according to claim 13, wherein the event is receiving a command through the user interface (8) to enter a flight mode.

10

16. A wireless terminal according any one of claims 11 to 15, wherein the processing unit (6) is further arranged, if the pre-defined PLMN is not applicable at a current location at switch on of the wireless terminal, to retrieve the MCC and MNC at the current location;

15 to search for a match between the retrieved MCC and MNC at the current location and an MCC and MNC entry in the specified PLMN list; and
if a MCC and MNC match exists, to use the entry for mobile network (VPLMN) selection.

20 17. A wireless terminal according to claim 16, wherein the processing unit (6) is further arranged, if only a MCC match exists, to use that entry to re-arrange the specified list is in a prioritized order;
and to use the re-arranged specified list the for cell search and mobile network (VPLMN) selection.

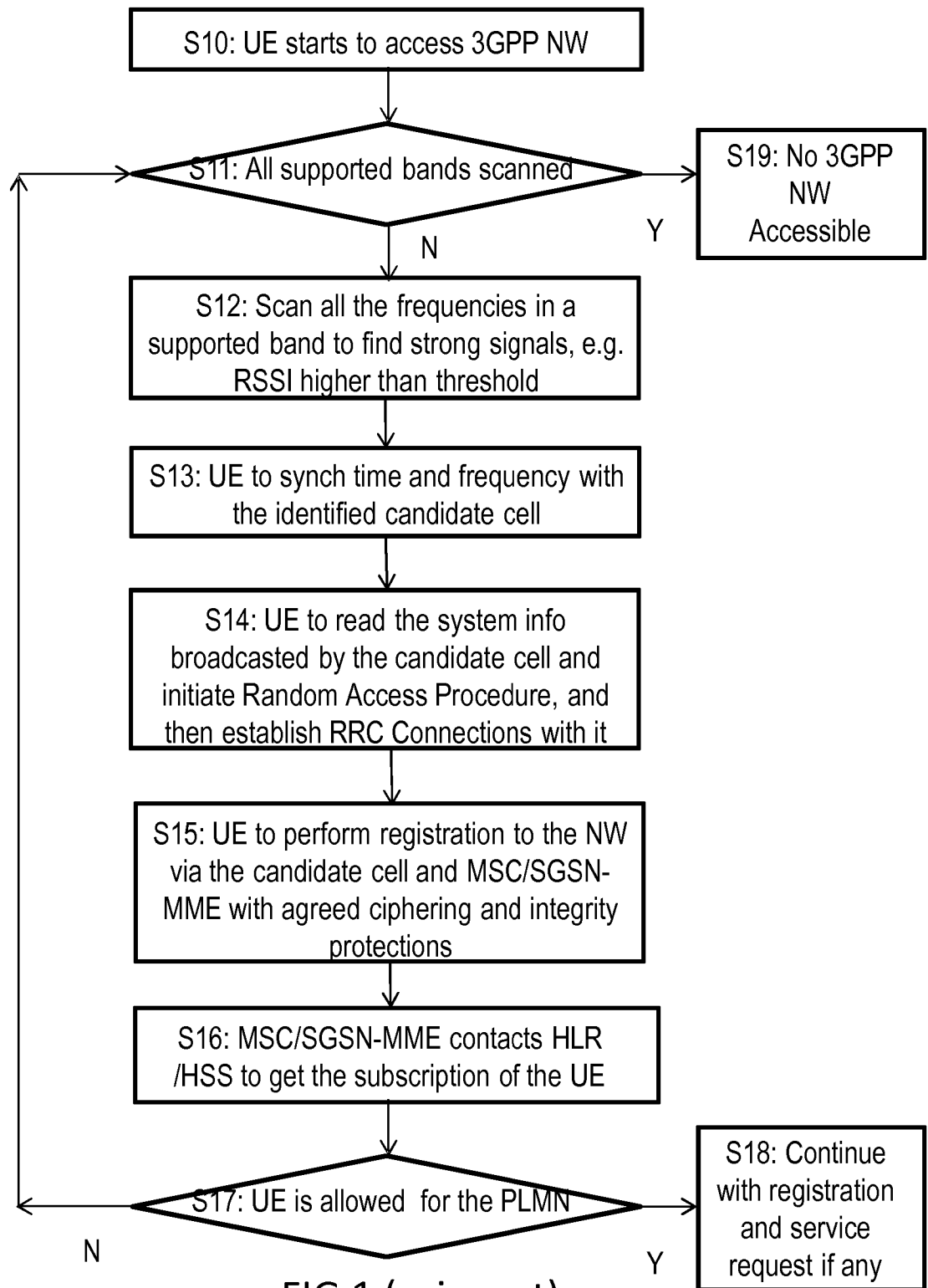
25

18. A computer program for mobile network (VPLMN) selection in a wireless terminal (102), the computer program comprising computer program code which, when run on the wireless device (102), causes the wireless device to operate in accordance with the method defined in any one of claims 1 to 10.

30

19. A carrier, comprising the computer program of claim 18, wherein the carrier is one of an electronic signal, an optical signal, a radio signal and a computer readable storage medium (61).

35



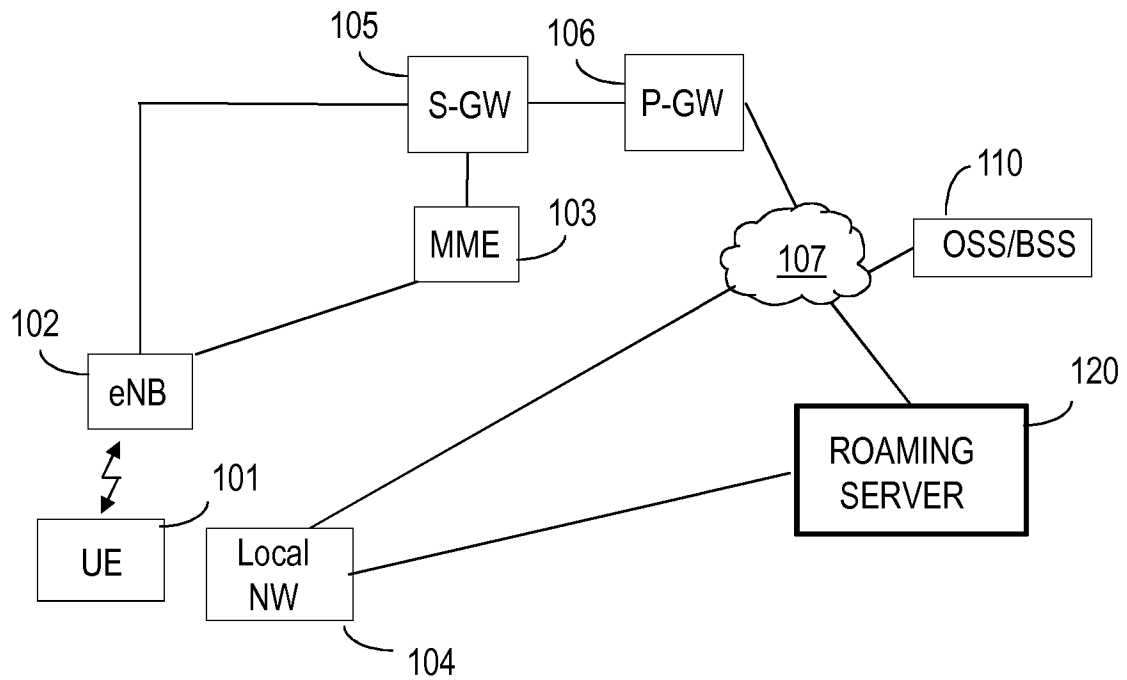


FIG 2A

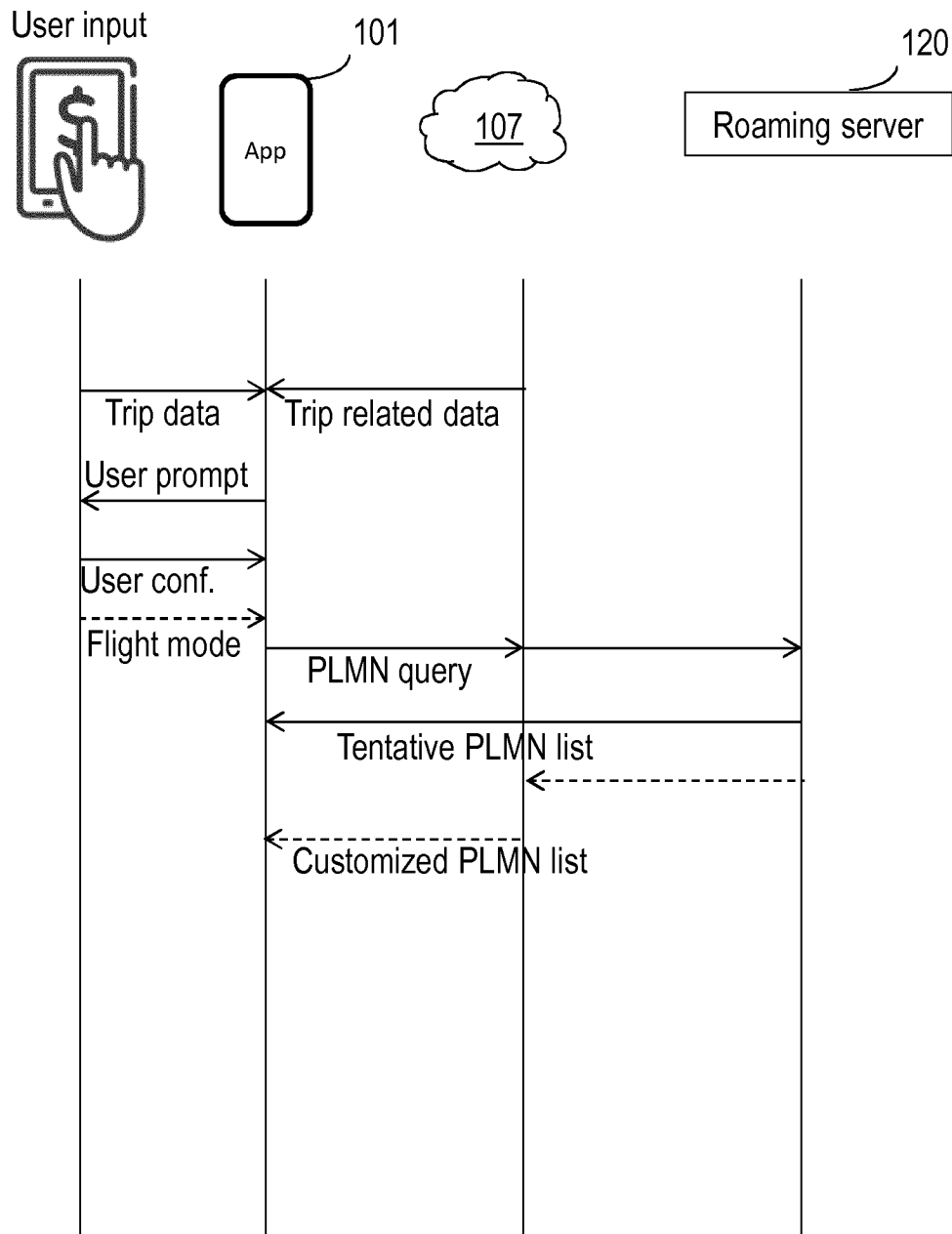


FIG 2B

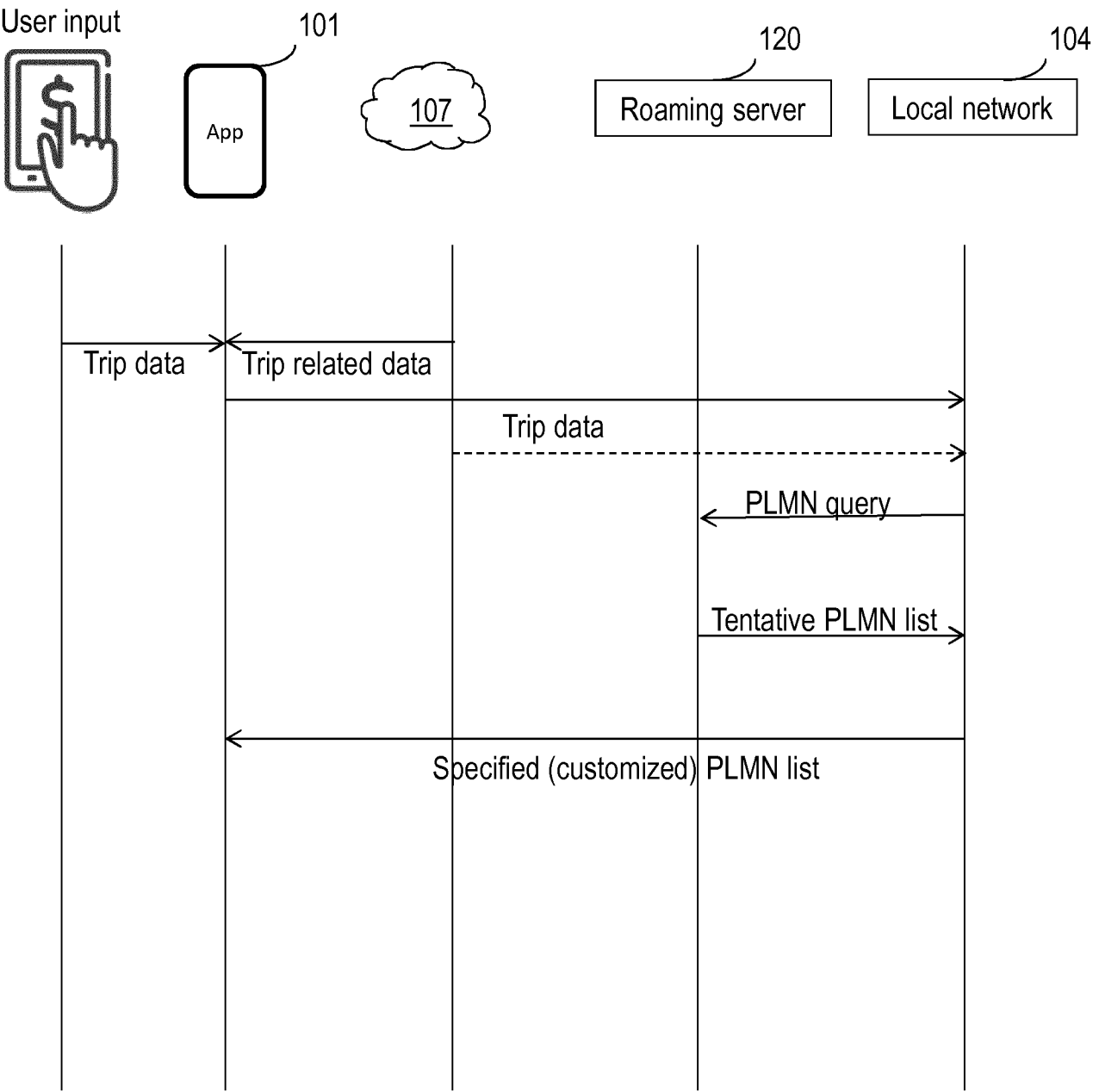


FIG 2C

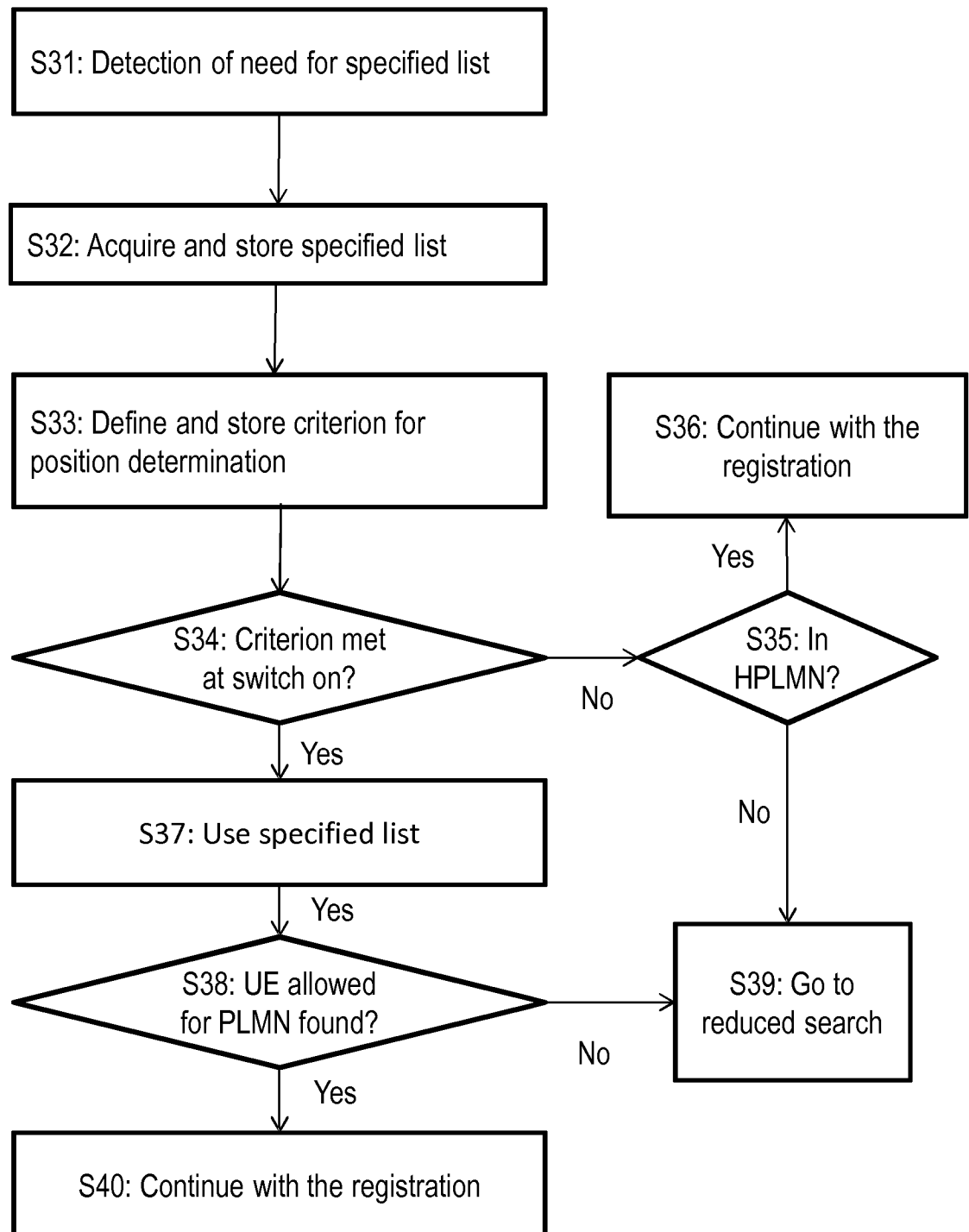


FIG 3

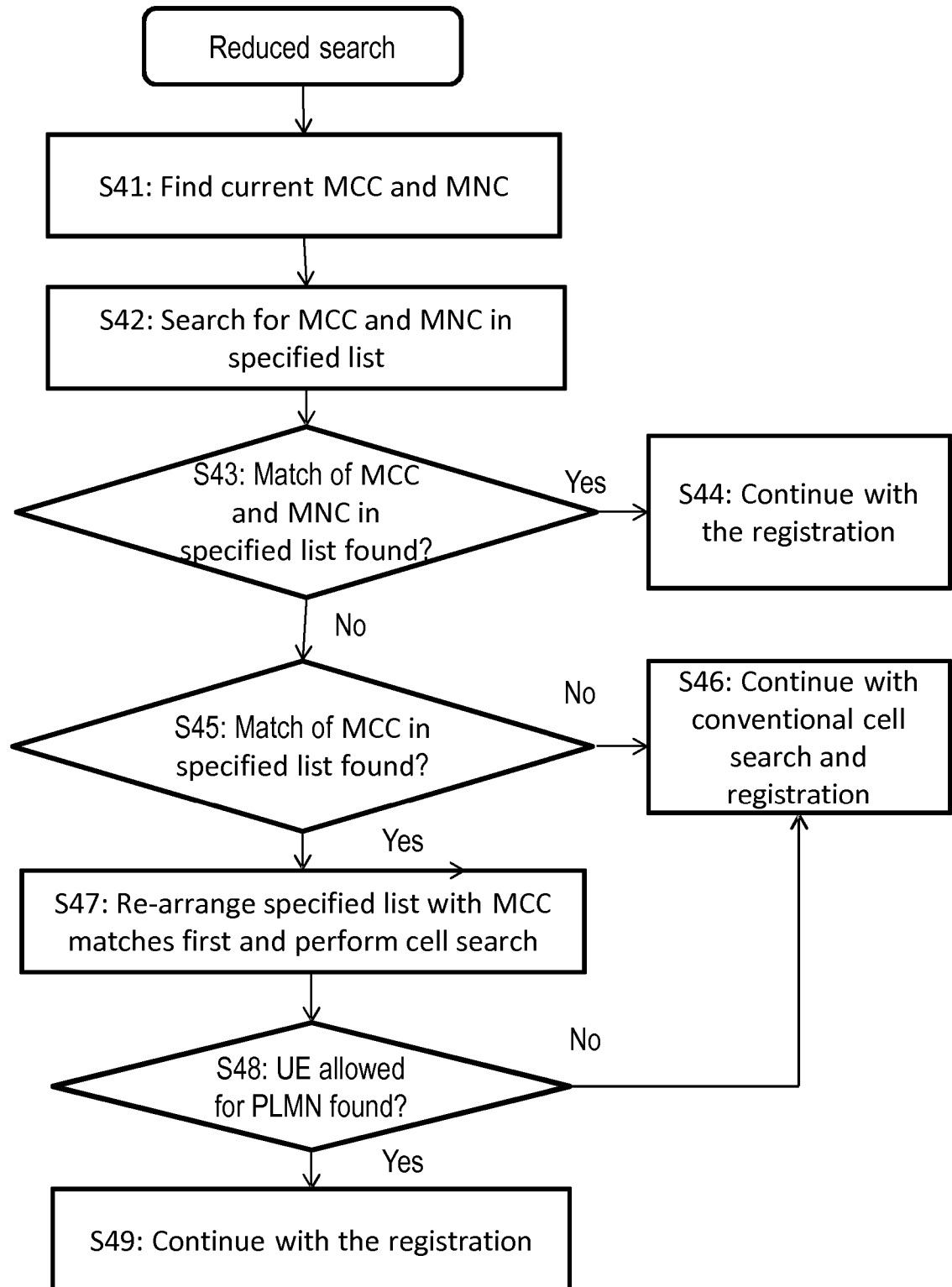


FIG 4

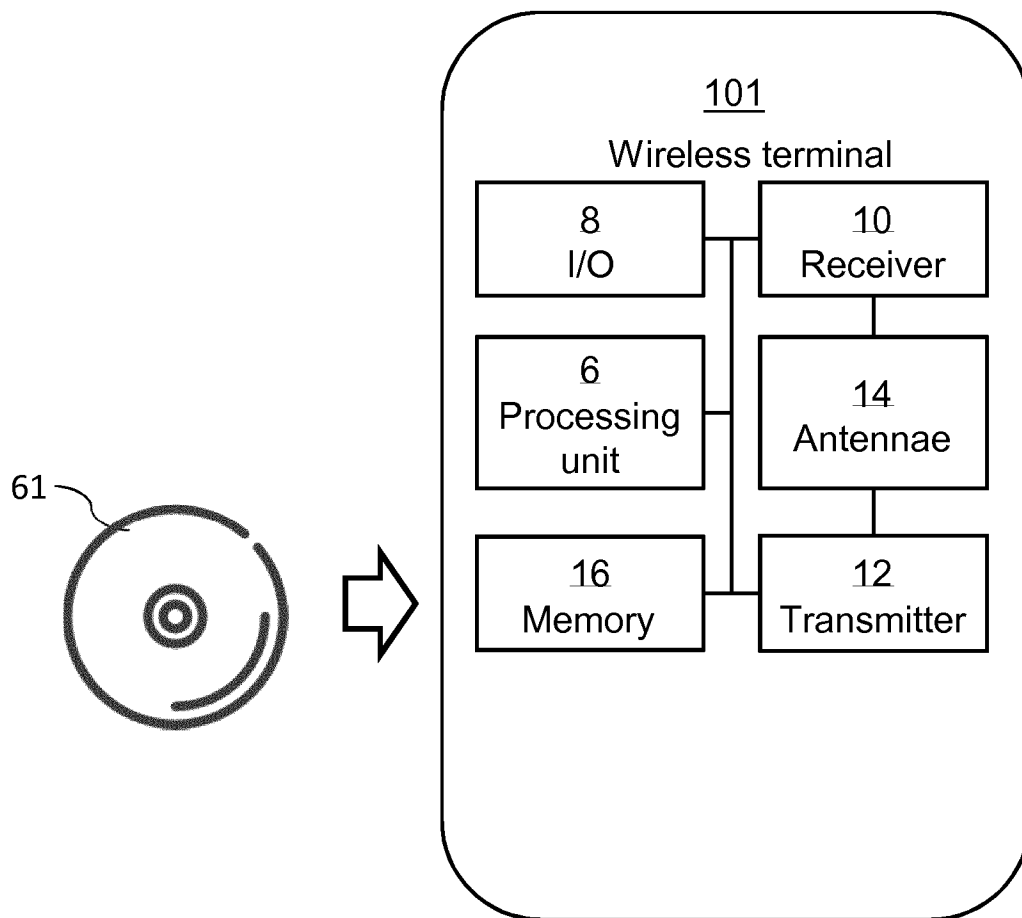


FIG 5

**ANY REFERENCE TO FIGURE 6 SHALL BE
CONSIDERED NON-EXISTENT**

INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2015/076585

A. CLASSIFICATION OF SUBJECT MATTER

INV. H04W48/18

ADD. H04W8/24 H04W48/16

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)

H04W

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 practicable, search terms used)

EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2014/342732 A1 (MANALO ROBERT E [CA] ET AL) 20 November 2014 (2014-11-20)	1-3,5-19
Y	abstract figures 1,5 paragraphs [0003], [0004], [0010], [0011] paragraph [0031] - paragraph [0047] paragraph [0051] - paragraph [0052] paragraph [0058] - paragraph [0059] claims 1,4	4
Y	----- WO 2014/172867 A1 (QUALCOMM INC [US]; ZHANG WENTAO [CN]; WANG KANG [CN]; WANG GRACE [CN]) 30 October 2014 (2014-10-30)	4
A	abstract page 4, paragraph 43 - paragraph 47 ----- -/-	1-3,5-19



Further documents are listed in the continuation of Box C.



See patent family annex.

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Date of the actual completion of the international search

7 July 2016

Date of mailing of the international search report

18/07/2016

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Authorized officer

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INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2015/076585

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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A	US 2011/217979 A1 (NAS PETRUS WILHELMUS ADRIANUS JACOBUS MARIA [NL]) 8 September 2011 (2011-09-08) abstract figure 1 paragraph [0032] - paragraph [0038] paragraph [0072] -----	1-19

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Information on patent family members

International application No

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