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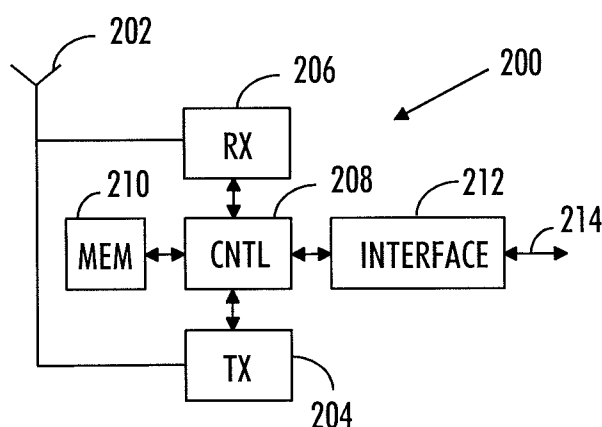


FIG. 2A

(57) Abstract: A method for providing a private base station coverage area and a base station are provided. The base station comprises a transmitter configured to provide a coverage area in which an access for one or more user terminal to a radio system is enabled and to transmit an identification signal enabling user terminals to identify a base station, the signal being different from identification signals transmitted by public base stations.

Accessibility of private base station

Field

The invention relates to accessibility of a private base station residing in a radio system which includes public base stations.

5 Background

Existing radio systems (GSM, Global System for Mobile Communications; WCDMA/HSPA, Wide-band Code Division Multiple Access/High Speed Packet Access) are not optimally suited for, for example, downloading movies from the Internet since they were developed and defined under the assumption of a coordinated network deployment.

To alleviate the problem, a user can acquire a private base station for his/her own disposal. The private base stations are typically associated with uncoordinated and large scale deployment. A private base station may be called many names such as Home Base Station, Home NodeB, femto eNodeBs or simply Home Access and it has become a popular topic within the operator and manufacturer community.

It can be assumed that the end-user buys an economic private base station and installs the physical entity at his home. The private base station then provides coverage and service to the user equipment registered by the owner of the private base station. Still, the private base station may use the same spectrum as the radio system. The private base station may be connected via a DSL (Digital Subscriber Line) and via the core network of the operator towards the Internet. Some local breakout scenarios bypassing the core network of the operator may also exist. In any case the consumed services of the owner of a private base station should prevent eating up capacity of the operator deployed macro radio system.

A major requirement for private base stations is that the system supports efficient mechanisms to restrict access to a private base station unless user equipment have access rights to communicate with a specific private base station. Correspondingly, user equipment should not unnecessarily attempt to camp on a cell of a private base station if they do not have access rights.

User equipment may be able to maintain a list of the base stations they have access to. For example, in UMTS (Universal Mobile Telecommunications System), access to regionally restricted areas are handled via a list of

“forbidden Location Areas for roaming” and a list of “forbidden location areas for regional provision of service”. These lists in the user equipment are erased when the user equipment is switched off or when the SIM/USIM (Subscriber Identity Module/Universal SIM) is removed, and even regularly in a period, for instance, of 12/24 hours. A new entry – corresponding to the LAI (Location Area Identification) received on the broadcast channel – can be added to one of those lists. For LTE/SAE (Long Term Evolution/System Architecture Evolution) a similar list can be defined for Tracking Areas and can be stored in the user equipment. A similar list does exist for PLMNs (Public Land Mobile Network) as well.

In general, concepts relying on NAS (Non-Access-Stratum) procedures can generate a lot of signaling between private base stations, user equipment and the core network, as user equipment need to learn about their restrictions once they attempt to contact a private base station. Given the limitation of user equipment to store lots of forbidden LAIs, it might well happen that user equipment on their daily trip through a city erase their forbidden LAI list several times and hence generate the necessity to contact the network in vain on daily (or shorter) basis, introducing unnecessary power consumption and battery drain, etc.

NAS procedures initiated generate signaling, which increases interference and should thus be avoided. The NAS procedures may also cause security problems, if for instance intermediate gateways, which serve the private base stations and which do not have security keys of the user equipment available, request user equipment to authenticate themselves with permanent user equipment identifications like IMSI (International Mobile Subscriber Identity) or IMEI (International Mobile Equipment Identity).

Brief description of the invention

An object of the invention is to provide an improved accessibility of a private base station. According to an aspect of the invention, there is provided a method comprising: providing by a private base station a coverage area in which an access for one or more user terminal to a radio system is enabled; transmitting by a private base station an identification signal enabling user terminals to identify a base station, the signal being different from identification signals transmitted by public base stations.

According to another aspect of the invention, there is provided a base station, comprising: a transmitter configured to provide a coverage area

in which an access for one or more user terminal to a radio system is enabled; transmit an identification signal enabling user terminals to identify a base station, the signal being different from identification signals transmitted by public base stations.

5 According to another aspect of the invention, there is provided a base station, comprising: means for providing a coverage area in which an access for one or more user terminal to a radio system is enabled and means for transmitting an identification signal enabling user terminals to identify a base station, the signal being different from identification signals transmitted by public base stations.

10 According to another aspect of the invention, there is provided a radio system comprising public base stations, private base stations and user terminals; at least one private base station being configured to transmit an identification signal enabling user terminals to identify a base station, the signal being different from identification signals transmitted by public base stations.

15 According to another aspect of the invention, there is provided a user terminal comprising: a receiver configured to receive identification signals transmitted by base stations and a controller configured to decode identification signals of at least two different formats.

20 According to another aspect of the invention, there is provided a user terminal comprising: means for receiving identification signals transmitted by base stations and means for decoding identification signals of at least two different formats.

25 According to another aspect of the invention, there is provided a method, comprising: storing identification data of base stations in a memory; receiving and decoding identification signals transmitted by a base station; compare the received identification signals to the identification data in the memory, trying to establish a connection with a base station only if the identification data in the memory matches with the data sent by the base station.

30 The invention provides several advantages. The signaling related to NAS procedures can be avoided. That eliminates signaling load in the core network and increased interference in the radio network, i.e. radio interface. In addition, the decreased signaling results in a reduction of energy consumption of a battery in user equipment.

List of drawings

In the following, the invention will be described in greater detail with reference to the embodiments and the accompanying drawings, in which

Figure 1 shows a radio system;

5 Figure 2A illustrates an example of the structure of a base station;

Figure 2B illustrates an example of the structure of a user terminal;

Figure 3 illustrates the organization of system information blocks;

and

Figures 4 and 5 are flowcharts illustrating embodiments.

10 Description of embodiments

First, a radio system is described by means of Figure 1. A digital radio system may comprise user equipment 100 to 104, at least one base station 106 to 108, and a base station controller 110, which can also be called as a radio network controller. The user equipment 100 to 104 which may also be
15 called user terminals may communicate with the base stations 106 to 108 using signals 112 to 116. In this example, base station 106 is a public base station serving all user terminals of the system. Base station 108 is a private base station intended to serve only user terminal 100. The private base station may be located at the home of the user of the terminal 100, for example.

20 The public base station 106 may have connection to the base station controller 110 by a digital transmission link 118. The base station controller 110 provides a connection to other parts of the system and possibly Internet (not shown). The private base station 108 may not necessarily be a part of the radio system although it may have a connection to the core network such as
25 the base station controller 110. The private base station 108 may be connected, for example, to WLAN (Wireless Local Area Network) and utilize the Internet. The signals 112 to 116 between the user terminals 100 to 104 and the base stations 106 to 108 carry digitized information, which is e.g. traffic data or control data.

30 The radio system may be based on GERAN (GSM/EDGE RAN, where EDGE stands for Enhanced Data rates for Global Evolution and RAN stands for Radio Access Network), UTRAN (UMTS Terrestrial RAN) or LTE network elements, without limiting to them. The radio system may also utilize HSDPA, HSUPA (High Speed Uplink Packet Access), WiFi (known as wireless
35 fidelity) and WIMAX (Worldwide Interoperability for Microwave Access).

Each base station 106 to 108, both private and public, broadcasts a signal 112 to 116 such that a user terminal 100 to 104 can observe a potential base station and synchronize to the signal of the base station. The signal may comprise basic system information regarding the base station and the system the base station belongs to. A user terminal synchronizes to the base station signal, determines the basic system information and selects a base station with which to start a communication when switched on or to which to perform a handoff during a normal operation. In general, all the public base stations 106 of the system are typically meant to serve and communicate with all user terminals of the system 100 to 104. In contrast, all private base stations 108 are not meant to serve or communicate with all user terminals 100 to 104 of the system but a predetermined few, which may be selected by the owner of the private base station. As private base stations typically are located at the homes they are intended to serve the terminals of the users living at the location of the private base station.

In an embodiment of the invention, the basic system information transmitted by a private base station is modified in such a manner that user terminals which are not allowed to communicate with the base station cannot start communicating with the base station. The user terminals which are allowed to communicate with the private base station detect the basic system information in a normal manner.

Figure 2A illustrates an example of the simplified structure of a typical base station 200. The base station comprises an antenna 202, a receiver 204, a transmitter 206, a controller 208, a memory 210 and an interface 212. In addition, the base station may comprise other modules as one skilled in the art is aware. Such modules may include an isolator to separate the receiver 204 and the transmitter 206, filters and other interfaces. In addition, the base station may comprise more than one transmitter and receiver pairs. Transmitters and receivers may be realized with a transceiver.

The base station 200 can transmit a signal such that a digital signal processed by the controller 208 is fed to the transmitter 206 for mixing the base band signal up to a radio frequency signal which is guided to the antenna 202 to be transmitted as an electromagnetic radiation. The signal to be transmitted may be received through the interface 212 or it may be obtained from the memory 210.

A radio frequency electromagnetic signal hitting the antenna 202, in turn, propagates to the receiver 204 which mixes the radio frequency signal down to a base band signal, filters the analog signal and A/D-converts the signal to a digital form. To process the received signal, the receiver 204 forwards
5 the base band signal to the controller 208. The digital signal may be filtered and the data in the signal may be digitally processed. The controller 208 may save the data obtained from the pieces of analog and/or digital information of the received signal in the memory 210. The controller may forward the received data to the interface 212 which may forward 214 the data further, to
10 core network or other parts of the system or to Internet.

Figure 2B illustrates an example of the simplified structure of a typical user terminal 220. The user terminal includes an antenna 222, an isolator 224, a receiver 226, a transmitter 228, a controller 230, a memory 232 and user interface 234. The isolator 224 may be, for example, a circulator to separate the receiver 226 and the transmitter 228.
15

The user terminal 220 can transmit a signal such that a digital signal processed by the controller 230 is fed to the transmitter 228 for mixing the base band signal up to a radio frequency signal which is guided to the antenna 222 by the isolator 224 to be transmitted as an electromagnetic radiation.

20 A radio frequency electromagnetic signal hitting the antenna 222, in turn, propagates through the isolator 224 to the receiver 226 which mixes the radio frequency signal down to a base band signal, filters the analog signal and A/D-converts the signal to a digital form. To process the received signal, the receiver 226 forwards the base band signal to the controller 230. The digital
25 signal may be filtered and the data in the signal may be digitally processed. The controller 230 may save the data obtained from the pieces of analog and/or digital information of the received signal in the memory 232.

The user interface 234 may comprise a microphone, a keyboard and a display and various other interfaces.

30 Let us study examples of embodiments applied to an UMTS type system. In an UMTS type system, each base station transmits a downlink synchronization channel (SCH) which contains a primary synchronization channel (P-SCH) and a secondary synchronization channel (S-SCH). In traditional UMTS system, each base cell transmits a primary synchronization channel (P-
35 SCH) which contains a code word of a given length. The code word is identical

in every cell of the system. Base stations transmit the primary synchronization channel which does not carry any information.

Each user terminal is configured to detect code word transmitted on the primary synchronization channel using matched filtering, for example. User
5 terminals utilize the primary synchronization channel for achieving synchronization with the base station, i.e. achieving time and frequency synchronization.

In an embodiment of the invention, private base stations transmit a synchronization signal different from synchronization signals transmitted by public base stations. For example, the private base stations use a code word
10 on the primary synchronization channel different from the code word used by the public base stations.

Referring to the base station of Figure 2A, the controller 208 of the base station may read the code word to be transmitted on the primary synchronization channel from the memory 210 and control the transmitter 206 to
15 transmit the code word.

When the private base stations use a different code word, user terminals connected to public base stations are not able to synchronize to the private base stations. Only the user terminals configured to detect the different code word may synchronize on the primary synchronization channel transmitted by the private base stations. The P-SCH code word for the private base
20 stations may be selected such that it has low cross correlation characteristics with the existing P-SCH codeword. Thus, interference to the network served by the public base stations is negligible, specifically as the private base stations may be limited in maximum output power to small values, such as the level
25 used by DECT (Digital Enhanced Cordless Telecommunications) stations.

In an embodiment, the base station may be configured to select the synchronization signal to be transmitted by a private base station from at least two alternatives, at least one of which being the same as the synchronization signals transmitted by public base stations and at least one being different to
30 the synchronization signals transmitted by public base stations.

For example, the code word may be configurable by the operator of the base station. The user may have several user terminals, some of which support the code word specific to the private base station and some support only the code word used by the public base stations. The user may want to use
35 the terminals supporting only the public base station code word, and in such cases the private base station may be configured to utilize the same code word

as the public base stations. The base station may be configured to store both code words in the memory 210, and the controller may select the desired coder word to be transmitted. The base station may also receive the code word to be used from the core network.

5 Let us study other examples of embodiments applied to an UMTS type system. In an UMTS type system, each base station transmits a Broadcast Channel (BCH) which is used for broadcasting information about the cell and the system. The BCH may comprise a Broadcast Control Channel (BCCH) which may be used to transmit basic system information.

10 In an embodiment, private base stations transmit system information on a broadcast channel in a format different from the format used by public base stations.

 In UMTS based systems, system information is transmitted in system information blocks (SIB). System information of same type may be grouped together in a same block. System information may be transmitted in
15 several system information blocks. For example, dynamic system information may be transmitted in a different block than static system information. A system information message transmitted by a base station may comprise several system information blocks, or only a part of a single system information block,
20 depending on the size of the blocks to be transmitted.

 In an embodiment, the system information blocks transmitted by a base station are organized in a tree-like form. Information about the scheduling of the system information blocks transmitted by a base station is included in a Master Information Block (MIB). MIB may also comprise other information.
25 Figure 3 illustrates the Master Information Block and the organization of system information blocks. Base stations transmit the Master Information Block regularly on the Broadcast Channel (BCH).

 In an embodiment, the first system information block (SIB1) transmitted by a private base station is changed from the SIB1 transmitted by public
30 base stations. The change may be implemented in various manners. For example, a suitable bit may be changed or dropped in the block.

 In an embodiment, the Master Information Block (MIB) transmitted by a private base station is changed from the MIB transmitted by public base stations. The change may be implemented in various manners. For example, a
35 suitable bit may be changed or dropped in the block.

Respectively, any other change in the BCH format may be used to differentiate the BCH of private base station from the BCH of a public base station in such a manner that a user terminal utilizing public base stations and not granted an access to the private base station may not read BCH information from the transmission of the he private base station.

Referring to the base station of Figure 2A, the controller 208 of the base station may read the format of the BCH from the memory 210 and control the transmitter 206 to transmit the channel in the desired format.

In an embodiment, the private base station is configured to transmit at least one System Information Block on a broadcast control channel identifying that the transmitting base station is a private base station.

In an embodiment, the private base station is configured to transmit at least one System Information Block on a broadcast control channel comprising information about the identity of the private base station.

In this manner, user terminals may distinguish private base stations from public base stations and an access restriction mechanism may be based on these identities included in the SIB transmission.

For example, a user terminal 220 may store identification data of base stations with which the terminal is allowed to communicate in the memory 232. The controller 230 of the user terminal may be configured to decode from a System Information Block received from a base station the identity data of the base station and compare the received identity data to the data in the memory. The controller 230 of the user terminal may be configured to try to establish a connection with a private base station only if identification data in the memory matches with the data sent by the base station.

Figure 4 is a flowchart illustrating an embodiment. In step 400, a user terminal is storing identification data of base stations in a memory;

In step 402, the user terminal receives and decodes identification signals transmitted by a base station;

In step 404, the user terminal compares the received identification signals to the identification data in the memory,

If a match is found, the user terminal tries to establish a connection with a base station in step 406 and the procedure ends in 408.

If the data do not match, the user terminal does not try to establish a connection with a base station and the procedure ends in 408.

Figure 5 is a flowchart illustrating an embodiment.

In step 500, a private base station is providing a coverage area in which an access for one or more user terminal to a radio system is enabled.

In step 502, the private base station transmits an identification signal enabling user terminals to identify a base station, the signal being different
5 from identification signals transmitted by public base stations. The base station may transmit a synchronization signal different from synchronization signals transmitted by public base stations or system information on a broadcast channel in a format different from the format used by public base stations.

The steps, signaling messages and related functions described
10 above in Figures 4 and 5 are in no absolute chronological order, and some of the steps may be performed simultaneously or in an order differing from the given one. Other functions can also be executed between the steps or within the steps. Some of the steps or part of the steps can also be left out or replaced by a corresponding step/point or part of the step.

15 The processing unit of a base station and a user terminal may be implemented as an electronic digital computer, which may comprise a working memory (RAM), a central processing unit (CPU), and a system clock. The CPU may comprise a set of registers, an arithmetic logic unit, and a control unit. The control unit is controlled by a sequence of program instructions transferred to
20 the CPU from the RAM. The control unit may contain a number of microinstructions for basic operations. The implementation of microinstructions may vary, depending on the CPU design. The program instructions may be coded by a programming language, which may be a high-level programming language, such as C, Java, etc., or a low-level programming language, such as a machine language, or an assembler. The electronic digital computer may also
25 have an operating system, which may provide system services to a computer program written with the program instructions.

Embodiments of the invention may be implemented as a computer program comprising instructions for executing a computer process. The computer program may be embodied on a distribution medium.
30

The computer program may be in source code form, object code form, or in some intermediate form, and it may be stored in some sort of carrier, which may be any entity or device capable of carrying the program. Such carriers include a record medium, computer memory, read-only memory, electrical carrier signal, telecommunications signal, and software distribution package,
35 for example. Depending on the processing power needed, the computer

program may be executed in a single electronic digital computer or it may be distributed amongst a number of computers.

The processing units of a base station and a user terminal may also be implemented as one or more integrated circuits, such as application-specific
5 integrated circuits ASIC. Other hardware embodiments are also feasible, such as a circuit built of separate logic components. A hybrid of these different implementations is also feasible. When selecting the method of implementation, a person skilled in the art will consider the requirements set for the size and power consumption of the network unit and the mobile unit, necessary proc-
10 essing capacity, production costs, and production volumes, for example.

Even though the embodiments have been described above with reference to examples according to the accompanying drawings, it is clear that the invention is not restricted thereto but it can be modified in several ways within the scope of the appended claims.

Claims

1. A method comprising:
providing by a private base station a coverage area in which an access for one or more user terminal to a radio system is enabled;
5 transmitting by a private base station an identification signal enabling user terminals to identify a base station, the signal being different from identification signals transmitted by public base stations.
2. The method of claim 1, the method comprising:
10 transmitting a synchronization signal, the signal being different from synchronization signals transmitted by public base stations.
3. The method of claim 1 or 2, the method comprising:
transmitting a synchronization signal, the signal having low cross
15 correlation characteristics with synchronization signals transmitted by public base stations.
4. The method of claim 1 or 2, the method comprising:
selecting the synchronization signal to be transmitted by a private
20 base station from at least two alternatives, at least one of which being the same as the synchronization signals transmitted by public base stations and at least one being different to the synchronization signals transmitted by public base stations.
- 25 5. The method of claim 1, the method comprising:
transmitting system information on a broadcast channel in a format different from the format used by public base stations.
6. The method of claim 5, the method comprising:
30 transmitting at least one System Information Block on a broadcast control channel in a format different from the format used by public base stations.
7. The method of claim 5, the method comprising:
35 transmitting a Master Information Block on a broadcast control channel in a format different from the format used by public base stations.

8. The method of any of claims 5 to 7, the method comprising:
transmitting at least one System Information Block on a broadcast
control channel identifying that the transmitting base station is a private base
5 station.

9. The method of any of claims 5 to 7, the method comprising:
transmitting at least one System Information Block on a broadcast
control channel comprising information about the identity of the private base
10 station.

10. A base station, comprising:
a transmitter configured to
provide a coverage area in which an access for one or more user
15 terminal to a radio system is enabled;
transmit an identification signal enabling user terminals to identify a
base station, the signal being different from identification signals transmitted by
public base stations.

20 11. The base station of claim 10, comprising a transmitter configured to transmit a synchronization signal different from synchronization signals transmitted by public base stations.

12. The base station of claim 10 or 11, comprising a transmitter configured to transmit a synchronization signal having low cross correlation characteristics with synchronization signals transmitted by public base stations.

13. The base station of claim 10 or 11, comprising a transmitter configured to select the synchronization signal to be transmitted from at least two
30 alternatives, at least one of which being the same as the synchronization signals transmitted by public base stations and at least one being different to the synchronization signals transmitted by public base stations.

14. The base station of claim 10, comprising a transmitter configured to transmit system information on a broadcast control channel in a format
35 different from the format used by public base stations.

15. The base station of claim 14, comprising a transmitter configured to transmit at least one System Information Block on a broadcast control channel in a format different from the format used by public base stations.

5

16. The base station of claim 14 or 15, comprising a transmitter configured to transmit a Master Information Block on a broadcast control channel in a format different from the format used by public base stations.

10

17. The base station of any of claims 14 to 16, comprising a transmitter configured to transmit at least one System Information Block on a broadcast control channel identifying that the transmitting base station is a private base station.

15

18. The base station of any of claims 14 to 17 comprising a transmitter configured to transmit at least one System Information Block on a broadcast control channel comprising information about the identity of the private base station.

20

19. A base station, comprising:
means for providing a coverage area in which an access for one or more user terminal to a radio system is enabled and
means for transmitting an identification signal enabling user terminals to identify a base station, the signal being different from identification signals transmitted by public base stations.

25

20. A radio system comprising public base stations, private base stations and user terminals;

at least one private base station being configured to transmit an identification signal enabling user terminals to identify a base station, the signal being different from identification signals transmitted by public base stations.

30

21. The radio system of claim 20, comprising at least one private base station configured to transmit a synchronization signal different from synchronization signals transmitted by public base stations.

35

22. The radio system of claim 20, comprising at least one private base station configured to transmit system information on a broadcast control channel in a format different from the format used by public base stations.

5 23. The radio system of claim 20, comprising at least one private base station configured to transmit at least one System Information Block on a broadcast control channel comprising information about the identity of the private base station.

10 24. A user terminal comprising:
a receiver configured to receive identification signals transmitted by base stations and a controller configured to decode identification signals of at least two different formats.

15 25. The user terminal of claim 24, comprising a controller configured to decode identification signals of private and public base stations.

26. The user terminal of claim 24, comprising a memory configured to store identification data of base stations with which the terminal is allowed to
20 communicate, and
a controller configured to
decode from a System Information Block received from a base station the identity data of a private base station and compare the received identity data to the data in the memory.

25 27. The user terminal of claim 26, comprising a controller configured to try to establish a connection with a private base station only if the identification data in the memory matches with the data sent by the base station.

30 28. A user terminal comprising:
means for receiving identification signals transmitted by base stations and
means for decoding identification signals of at least two different formats.

35 29. A method, comprising:

storing identification data of base stations in a memory;
receiving and decoding identification signals transmitted by a base
station;

compare the received identification signals to the identification data
5 in the memory,
trying to establish a connection with a base station only if the identification data in the memory matches with the data sent by the base station.

30. A computer program comprising program instructions which,
10 when loaded into the apparatus, execute the method according to any preceding claim 1 to 9.

31. A computer program distribution medium readable by a computer and comprising program instructions which, when loaded into an apparatus,
15 execute the method according to any preceding claim 1 to 9.

32. A computer program comprising program instructions which, when loaded into the apparatus, execute the method according to claim 29.

20 33. A computer program distribution medium readable by a computer and comprising program instructions which, when loaded into an apparatus, execute the method according to claim 29.

34. The computer program distribution medium of claim 30 or claim
25 33, the distribution medium including at least one of the following media: a computer readable medium, a program storage medium, a record medium, a computer readable memory, a computer readable software distribution package, a computer readable signal, a computer readable telecommunications signal, and a computer readable compressed software package.

1/3

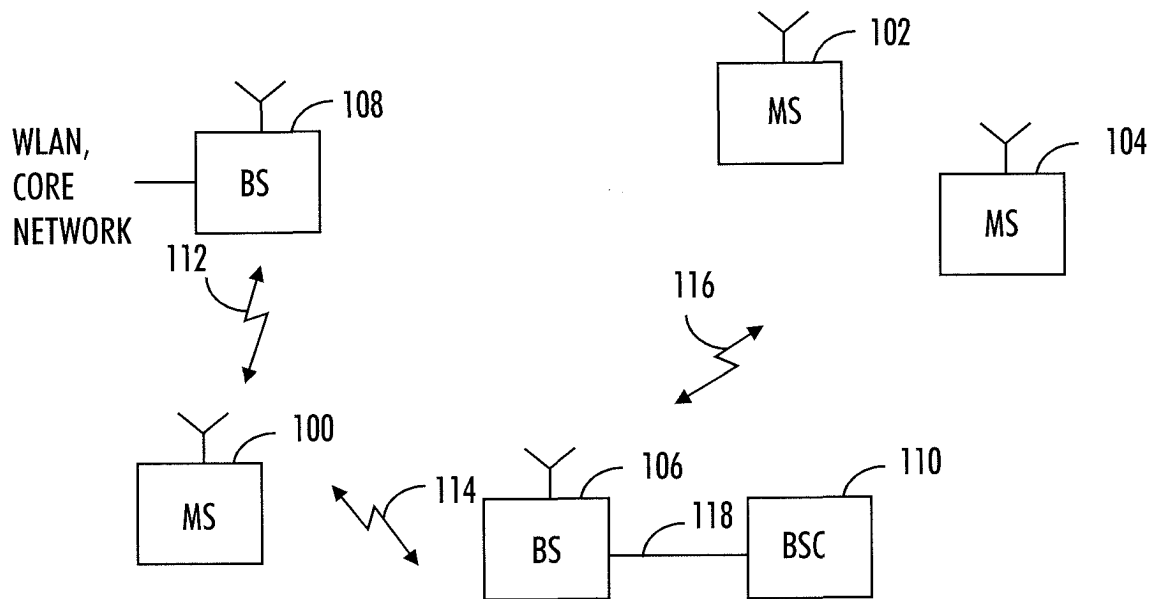


FIG. 1

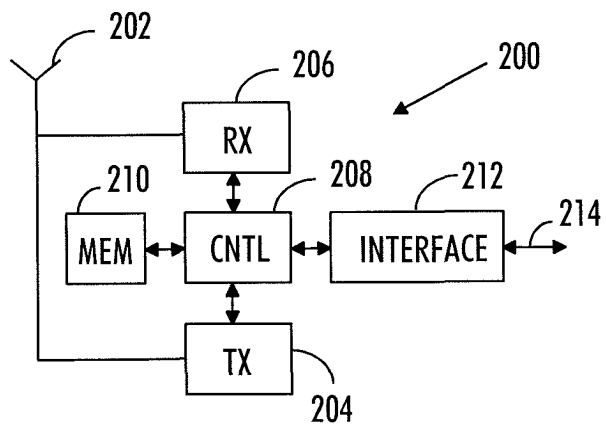


FIG. 2A

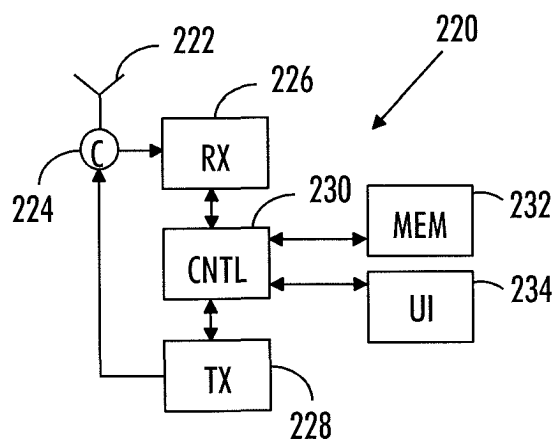


FIG. 2B

2/3

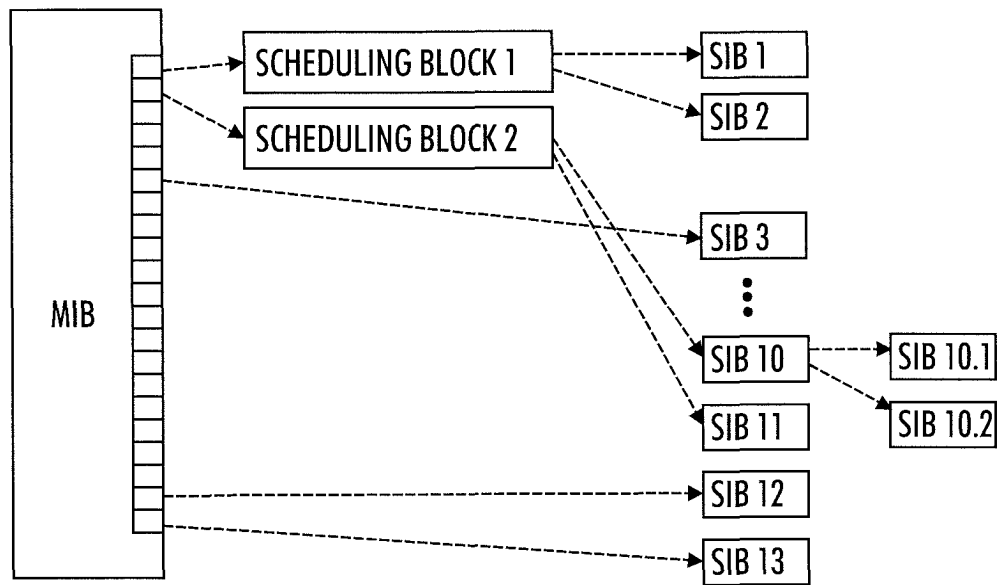


FIG.3

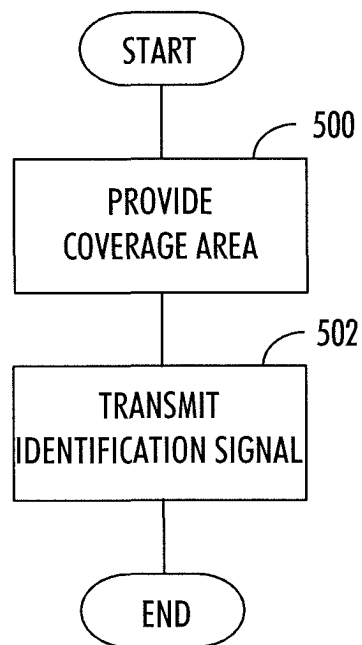


FIG. 5

3/3

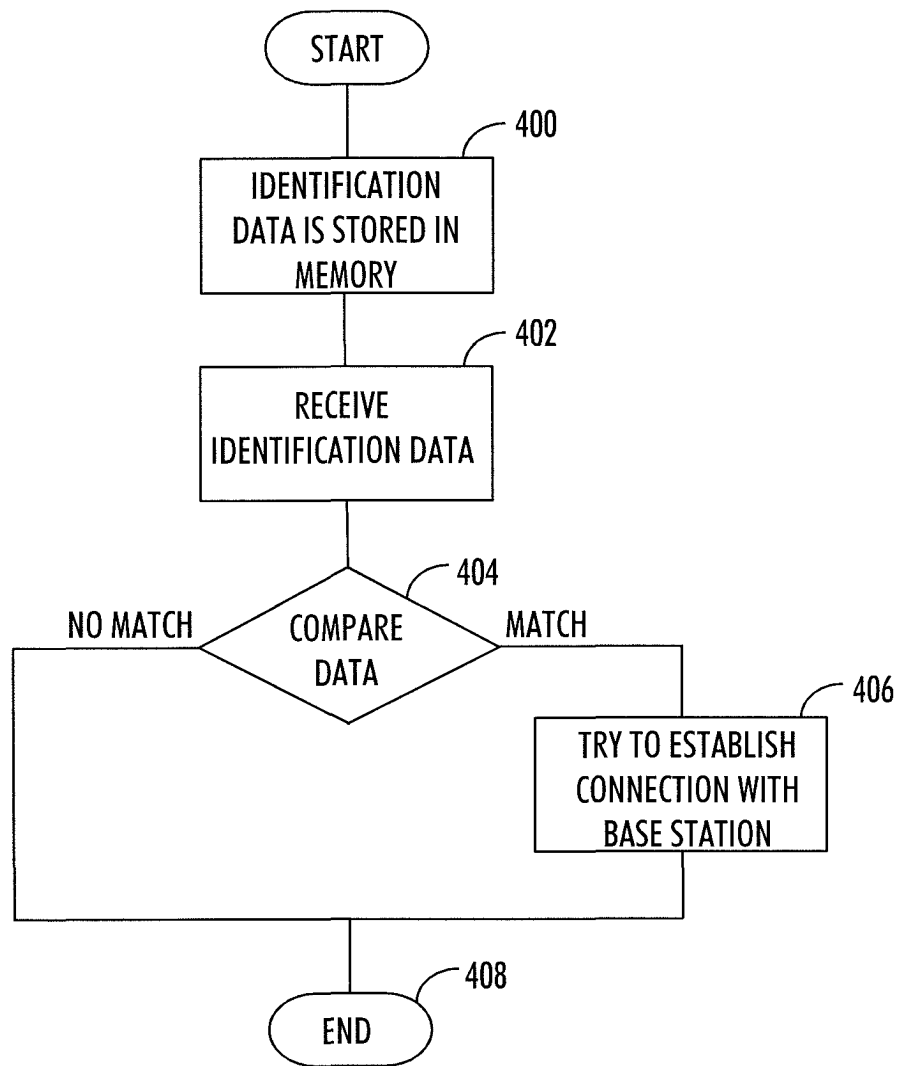


FIG.4

INTERNATIONAL SEARCH REPORT

International application No

PCT/EP2008/057929

A. CLASSIFICATION OF SUBJECT MATTER
INV. H04L12/56

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)
H04L H04Q

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, 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	WO 2005/043866 A (THOMSON LICENSING SA [FR]; BICHOT GUILLAUME [FR]; LI JUN [US]; GAO WEN) 12 May 2005 (2005-05-12) page 2, lines 13-25 page 4, line 21 - page 5, line 7 page 6 claims 1-11	1-34
X	US 6 826 414 B1 (REYNOLDS PHILIP [GB] ET AL) 30 November 2004 (2004-11-30) column 4, lines 29-52 column 5, lines 23-45 column 5, line 66 - column 6, line 7	1-34

☐ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

* Special categories of cited documents :

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- *O* document referring to an oral disclosure, use, exhibition or other means
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- *&* document member of the same patent family

Date of the actual completion of the international search

6 October 2008

Date of mailing of the international search report

15/10/2008

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/EP2008/057929

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