



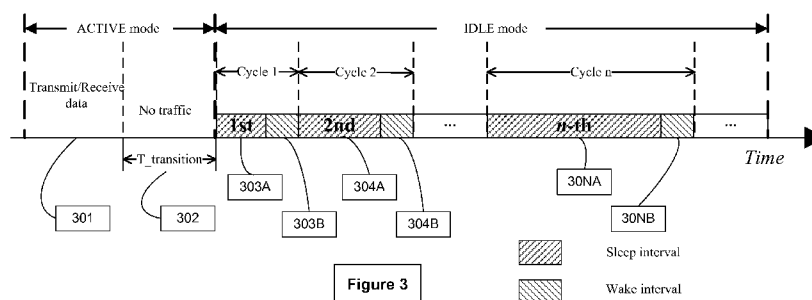
- (51) **International Patent Classification:**
H04W 52/00 (2009.01) *H04W 88/02* (2009.01)
- (21) **International Application Number:**
PCT/CN2012/082380
- (22) **International Filing Date:**
28 September 2012 (28.09.2012)
- (25) **Filing Language:** English
- (26) **Publication Language:** English
- (71) **Applicant:** FRANCE TELECOM [FR/FR]; 78, rue Olivier de Serres, F-75015 Paris (FR).
- (72) **Inventors; and**
- (71) **Applicants (for US only):** ZHANG, Yingkai [CN/CN]; 10/f, South Tower Raycom Info Park C, No. 2 Science Institute South Road, Haidian District, Beijing 100080 (CN). WU, Wenjun [CN/CN]; 10/f, South Tower Raycom Info Park C, No. 2 Science Institute South Road, Haidian District, Beijing 100080 (CN). LUO, Yajuan [CN/CN]; 10/f, South Tower Raycom Info Park C, No. 2 Science Institute South Road, Haidian District, Beijing 100080 (CN).
- (74) **Agent:** INSIGHT INTELLECTUAL PROPERTY LIMITED; 19 A, 19B, Tower A, InDo Building, No. 48A Zhichun Road, Haidian District, Beijing 100098 (CN).

- (81) **Designated States** (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.
- (84) **Designated States** (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:

— with international search report (Art. 21(3))

(54) **Title:** ENERGY SAVING METHOD FOR A RADIO ACCESS NODE



(57) **Abstract:** The invention relates to a method for managing power consumption of a home access node, said home access node being in a functioning mode called idle mode, the method comprising the following steps executed by the home access node during the idle mode : - after a first duration called sleep duration during which at least one component of the home access node is powered off, powering on at least one of the powered off components for a second duration called wake duration, - during the wake duration, determining if an incoming message is received by the home access node, - if no incoming message is received, entering the sleep mode, by powering off previously powered on components.

ENERGY SAVING METHOD FOR A RADIO ACCESS NODE**FIELD OF THE PRESENT SYSTEM:**

The present invention generally relates to radio telecommunication access node power consumption, and more specifically to a method to reduce power consumption of a Femtocell access node.

BACKGROUND OF THE PRESENT SYSTEM:

The information and communication technologies (ICT) domain contributes more and more to the global warming. In 2009, the CEA-LETI evaluates that 3 percent of worldwide energy is consumed by the ICT infrastructure and that ICT infrastructure is responsible for two percents of the worldwide CO₂ emissions, said level being comparable the worldwide emissions of CO₂ by airplanes (Dr L. Herault, CEA-LETI, *Holistic Approach for Future Energy Efficient Cellular Networks*, Wireless World Research Forum 23rd Meeting., invited talk, Beijing, China, Oct. 21st, 2009). Given the increasing number of mobile communication subscribers, the move to higher-data-rate wireless broadband, and the serious contribution of information technology to the overall energy consumption, the worldwide energy consumed by ICT is bound to increase, being estimated to double every 4 to 5 years.

The same CEA-LETI study estimates that radio access network is responsible for nearly 90% of the CO₂ emissions and power consumption (respectively 20 Mt CO₂/year and 4,5 GW) of ITC infrastructures. Thus, there is a need to research on green radio access technologies to reduce the energy consumption of wireless networks, and in particular on radio access nodes.

Among these radio access nodes, Femtocell access nodes – hereafter Femtocell - are specific cells as they only cover a limited area, such as home, business mall or office. In a 3GPP (*Third Generation Partnership Project*) context, a Femtocell is called a Home eNodeB (HeNB). A Femtocell is connected to the core network, either directly through a Serving Gateway or indirectly via a gateway node. As a Femtocell only covers a small area for a limited connection of user equipments, such as mobile terminal, it implies reduced power consumption comparing to a Macrocell access node, such as a eNodeB.

Nevertheless, as Femtocells become widely deployed, series of important issues arise, one of which being the energy consumption. According to ABI research (S. Carlaw and C. Wheelock, *Femtocell Market Challenges and Opportunities: Cellular-Based Fixed Mobile Convergence for Consumers, SMEs, and Enterprises*, ABI Research, 2007) by the end of 2012, a total of approximately 36 million Femtocells are expected to be sold worldwide. Assuming that each Femtocell requires an

operational power of 12 W, the total power consumption of all Femtocells will amount to nearly 0.5 GW. Also, it is estimated that Femtocells will produce approximately 2.06 Mt of CO₂ per year. Therefore, an energy-saving method for Femtocells should be designed.

5 The 3GPP TR 32.826 v10.0.0 (2010-03) document (hereafter *3GPP document*) proposes a solution to improve energy savings management in a radio access network. In this 3GPP document, Energy Saving Management (ESM) concept defines an energy saving state for eNodeB and Home eNodeB. In said energy saving state, the network element is powered off. By powered off, the 3GPP document means that the radio part of the network element is powered off while the control part
10 of the network element remains powered on. As represented on **figure 1**, the 3GPP document suggests applying the ESM method to a Femtocell B, said Femtocell B being covered by a Macrocell A. The Femtocell B can be totally powered off when light traffic or no traffic is detected in Femtocell B. When in energy saving state, potential users in Femtocell B coverage can only connect to the Macrocell A. The 3GPP document defines that a network entity called Operations, Administration,
15 Maintenance (OAM) decides on enabling or disabling ESM in the network. Thus, in the 3GPP energy saving management proposed solution, a Femtocell relies on OAM for the decision of enabling or disabling its energy saving state. This is adding on the complexity of the management of a cellular network. Moreover, when in energy saving state no user equipments may connect to the Femtocell, the user equipments can only connect to the Macrocell. This is particularly disadvantageous for
20 example when talking about a Closed Subscriber Group (CSG) Femtocell, as potentially user equipments belonging to the CSG may benefit from extra services when connecting to said CSG Femtocell.

Ashraf, L. T. W. Ho, and H. Claussen (*Improving Energy Efficiency of Femtocell Base Stations via User Activity Detection*, Proc. IEEE Wireless Commun. and Networking Conf. WCNC 2010; Sydney, Aus., 2010) suggest a method to tackle such restrictions, but the proposed solution relies on a modified Femtocell, as the Femtocell must include a “low power sniffer”. Such solution, implying a modification of the hardware, is not a feasible option for existing Femtocell. More generally, adding a “low power sniffer” hardware to a Femtocell represents a costly solution.

30 Thus, there is a need to ensure energy saving management for a radio access node like a Femtocell with low management complexity on the network side.. There is also a need to ensure energy saving management guarantying the connectivity to the Femtocell for user equipments.

SUMMARY OF THE PRESENT SYSTEM:

In that respect, the present invention relates to method for managing power consumption of a home access node, said home access node being in a functioning mode called idle mode, the method comprising the following steps executed by the home access node during the idle mode :

- after a first duration called sleep duration during which at least one component of the home access node is powered off, powering on at least one of the powered off components for a second duration called wake duration,
- during the wake duration, determining if an incoming message is received by the home access node,
- if no incoming message is received, entering the sleep mode, by powering off previously powered on components.

The present method allows energy savings by powering off some components of the home access node during the idle duration. Typically radio components, including especially the transmission power amplification components, are powered off during the idle duration, as said components are usually responsible of most of the energy consumption of a radio access node like a Femtocell. Thus energy consumption is greatly reduced. If there is no incoming message, the access node keeps on repeating cycles of sleep and wake intervals. During the wake intervals, potential incoming request are received by the Femtocell, guarantying the connectivity for potential user equipments to the Femtocell. Indeed, said energy saving method is executed by the Femtocell in an autonomous fashion while preserving the possibility for an user equipment to connect to the Femtocell.

According to a characteristic of the method object of the invention, upon reception of an incoming message, the method further comprises the step of powering on all the previously powered off components, the home access node exiting the idle mode.

Thus, when receiving a message, the home access node exits the idle mode, powering on all previously powered off components. The home access node switches back to normal mode of working, called ACTIVE mode. Receiving a message is an indication that a user equipment is entering in communication with the home access node, the home access node resumes to a normal way of working to support the communication with the user equipment.

According to a characteristic of the method object of the invention, if no message is received after the expiration a third duration, entering the idle mode. After a certain period of inactivity, the home access node switches to the IDLE mode in order to save energy. The transition to the IDLE mode is decided after the expiration of a timer.

According to a characteristic of the method object of the invention, the sleep duration is variable.

5 The sleep duration may change during time. In order to improve energy saving efficiency, the sleep duration may advantageously be increased from one idle cycle to another. Thus, powered off components are powered off during a longer time, resulting in more energy savings. A trade off should be find between short or long idle duration, as longer idle duration means more power saving, it also means more latency when an user equipment wants to connect to the Femtocell.

10 According to a characteristic of the method object of the invention, during the powering on of the at least one of the powered off components for the wake duration the home access node broadcasts a message signaling the waking up the home access node.

Broadcasting a message when entering the wake duration improves the performance of the system. Indeed, user equipment that would want to connect to the Home access node may emit a request for connection during a sleep duration, and the home access node would not be able to receive it. When broadcasting the message, the home access node ensures that user equipments receiving information in the broadcasted message can send their request for connection during the wake duration, when the home access node is able to receive the messages. Thus, it reduces latency time of connection for user equipments.

20 Another object of the invention is a home access node capable of managing power consumption, said home access node being capable of functioning in a mode called idle mode, the home access node comprising :

- after a first duration called sleep duration during which at least one component of the home access node is powered off, means for powering on at least one of the powered off components for a second duration called wake duration,
- 25 - during the wake duration, means for determining if an incoming message is received,
- if no incoming message is received, means for entering the sleep mode, by powering off previously powered on components.

Such a home access node is for example a Femtocell or HeNodeB.

30 Finally, one object of the invention concerns a computer program, in particular a computer program on or in an information medium or memory, suitable for implementing the method object of the invention. This program can use any programming language, and be in the form of source code, binary code, or of code intermediate between source code and object code such as in a partially compiled form, or in any other desirable form for implementing the communication methods according to the invention.

The information medium may be any entity or device capable of storing the program. For example, the medium can comprise a storage means, such as a ROM, for example a CD ROM or a microelectronic circuit ROM, or else a magnetic recording means, for example a diskette (floppy disk) or a hard disk.

Moreover, the information medium may be a transmissible medium such as an electrical or optical signal, which may be conveyed via an electrical or optical cable, by radio or by other means. The programs according to the invention may in particular be downloaded from a network of Internet type.

BRIEF DESCRIPTION OF THE DRAWINGS:

The invention is explained in further detail, and by way of example, with reference to the accompanying drawings wherein:

FIG. 1 shows prior art (3GPP), previously described;

FIG. 2 shows a chart of the transition between IDLE state and ACTIVE state;

FIG. 3 shows cycles in an IDLE state;

FIG. 4 shows hardware system and parts of the system powered ON or OFF during the wake and sleep cycles of the IDLE state.

DETAILED DESCRIPTION OF THE PRESENT SYSTEM:

FIG. 2 illustrates a first implementation of the method of the present invention. In this illustration, the home access node considered is for example a Femtocell. The Femtocell works according to two modes, a first mode called ACTIVE mode and a second mode called IDLE mode. ACTIVE mode is similar to the normal mode of working of an existing Femtocell, apart from a triggering step 202 leading the Femtocell to enter the IDLE mode. IDLE mode is described hereafter.

When the Femtocell is in the ACTIVE mode, in the step 201, the Femtocell works normally, that is to say all the components of the Femtocell are powered on. In step 202, the Femtocell checks for inactivity, i.e. the Femtocell checks if at least one user equipment attached to the Femtocell has an active communication with another equipment. If the Femtocell has been inactive, i.e. if no user equipment attached to the Femtocell has an active communication with another equipment during more than a duration $T_{\text{transition}}$, the Femtocell leaves the ACTIVE mode and enter the IDLE mode.

When entering the IDLE mode during a step 211, the Femtocell first powers off at least one component of the Femtocell. The powered off components will remain powered off for a duration called sleep duration.

In one embodiment of present invention, only the microprocessor is left powered on during the sleep duration, when others components of the Femtocell are powered off, as described in reference to FIG. 4. In others embodiment, others components of the Femtocell may be left powered on along with the microprocessor, for example the components allowing the connection of the Femtocell to the network, i.e. the connection to the Serving Gateway or Gateway. In order to increase energy savings, the radio components are advantageously powered off, especially the power amplification components as they do consume lot of energy. When the sleep duration is over, the Femtocell goes to step 212. Said sleep duration may be fixed, or may advantageously be variable.

In step 212, called wake interval, the Femtocell powers on at least some of the powered off components for a second duration called wake duration. The principle of said wake interval is for the Femtocell to be able to receive potential incoming request from a user equipment that would like to connect to the Femtocell. In one embodiment, the Femtocell powers on all the previously powered off components. In one advantageous embodiment, only components necessary to receive potential request or message from user equipments are powered on, as described in FIG. 4.

During the wake interval, the Femtocell determines, in a step 213, if an incoming message is received by the Femtocell, such a message can be intended to the Femtocell or to a user equipment attached to the Femtocell. If there is no incoming message, the Femtocell enters a new sleep duration by powering off previously powered on components. If an incoming message is received during the sleep duration, the Femtocell returns to the ACTIVE mode, powering on all powered off components.

While in the wake interval, an increase in the energy saving is obtained as only components necessary the reception of potential incoming messages are powered on. It means that components like power amplification used for transmission are left powered off. Said components are known to consume a lot of energy, thus powering them off contributes in increasing energy savings.

Nevertheless, if energy savings are increased, network performances may be affected. Indeed, an user equipment that would want to send a request for connection to the Femtocell would not be able to tell if the Femtocell is in a sleep or wake interval, and may not send the request a the right timing, meaning during a wake interval. This may adversely affect latency of user equipments connection, which may be not acceptable for some kind of services.

Thus, in another embodiment of the present invention, the Femtocell broadcasts a message signaling the waking up the Femtocell when entering the wake interval. The wake

duration comprises 3 Transmission Time Interval (TTI, in a 3G context). During the first TTI of the wake duration, the Femtocell powers on the components necessary for radio transmission, for example radio frequency components and power amplification, and broadcasts a message signaling the waking up the Femtocell through a broadcast channel. In the next two TTI, the Femtocell listens to a random access channel, specified in the broadcast message, for potential incoming messages from user equipments.

By proceeding like that, user equipments may send their request for connection to the Femtocell at the right timing, meaning during the last two TTI of the wake duration. This implementation allows for a better performance of network connection latency, while contributing in reducing overall energy savings.

The sleep duration may be variable. FIG. 2 describes one exemplary embodiment of present invention wherein the sleep duration is variable. During a first sleep interval, meaning here during a sleep interval directly following the transition from ACTIVE mode to IDLE mode, the sleep duration is T_{min} . In the next sleep interval, in the hypothesis that no incoming request was received during the wake interval following the first sleep interval, the sleep duration is doubled : $2 \times T_{min}$. And so on until the sleep duration reaches a maximum T_{max} :

- (1) a parameter "i" is set to zero when going from step 202 to step 211, i. e. when entering IDLE mode;
- (2) sleep duration is equal to maximum ($2^i \times T_{min}$; T_{max}), that is to say, for the first sleep duration, T_{min} ;
- (3) in step 213, if no incoming request is received, "i" is increased by one;
- (4) so, for the second sleep duration, "i" is equal to one, so sleep duration is $2 \times T_{min}$;
- (5) previous steps are repeated until the sleep duration reaches a maximum T_{max} , from here, sleep duration remains T_{max} until the end of the IDLE mode;
- (6) next time the Femtocell enters the IDLE mode, "i" is reset to zero.

FIG. 3 shows the cycles of sleep and wake intervals. In 301, the Femtocell is in ACTIVE mode. In 302, the Femtocell is inactive for a duration longer than $T_{transition}$, the Femtocell then enters IDLE mode. In 303A, the Femtocell is in the first sleep interval of the IDLE mode with "i" equal to zero. In 303B, the Femtocell is in its first wake interval. 303A and 303B form the first cycle of the IDLE mode. As there is no incoming message, the Femtocell goes to the second sleep interval of the IDLE mode, 304A with "i" equal to one. 304B is the next wake interval. And so on until the duration of the sleep interval reaches T_{max} . 30NA and 30NB are representing the n -th cycle of the IDLE mode for the Femtocell. The sleep duration of 30NA is $\max(2^n \times T_{min}; T_{max})$. There

is a trade off to determine when defining $T_{\max}$. When $T_{\max}$ increases, maximum sleep duration increases and energy savings increase. But, at the same time, duration between two wake intervals increases, so the delay for an user equipment to send a request for connection increase at the same time, introducing latency for the user equipment. Such latency may be unbearable for some services. So, $T_{\max}$ is chosen as the maximum $T_{\max}$ that satisfy the requirement of service delay.

FIG. 4 are illustrative embodiments of the present system.

FIG. 4A represents a Femtocell, typically a Home eNodeB, when in ACTIVE mode. In such situation, all components are powered on.

FIG4B represents an exemplary embodiment of the same Femtocell when in a sleep interval of the IDLE mode. In such situation, all components, except for the microprocessor and associated memories, are powered off.

Fig4C represents an exemplary embodiment of the same Femtocell when in a wake interval of the IDLE mode. In such situation, in addition to the microprocessor and associated memories, the Femtocell also powers on radio components used for transmission, i.e. the RF packet reception (RF: Radio Frequency), the RF packet transmission and the RF power amplification.

In another embodiment of the present invention, as the FPGA (Field-Programmable Gate Array) and the circuitry may be left powered on as well as to preserve the connection of the Femtocell to the network, i.e. the connection to the Serving Gateway or Gateway. Such embodiment enables the Femtocell to receive incoming request from the network, for example a call incoming from the network directed to an user equipment previously registered by the Femtocell.

CLAIMS

Claim 1 - A method for managing power consumption of a home access node, said home access node being in a functioning mode called idle mode, the method comprising the following steps executed by the home access node during the idle mode :

- after a first duration called sleep duration during which at least one component of the home access node is powered off, powering on at least one of the powered off components for a second duration called wake duration,
- during the wake duration, determining if an incoming message is received by the home access node,
- if no incoming message is received, entering the sleep mode, by powering off previously powered on components.

Claim 2 - The method according to claim 1, wherein upon reception of an incoming message, powering on all the previously powered off components, the home access node exiting the idle mode.

Claim 3 – The method according to claim 2, wherein if no message is received after the expiration a third duration, entering the idle mode.

Claim 4 – The method according to claim 1, wherein the sleep duration is be variable.

Claim 5 – The method according to any combination of previous claims, wherein during the powering on of the at least one of the powered off components for the wake duration the home access node broadcasts a message signaling the waking up the home access node.

Claim 6 - A home access node capable of managing power consumption, said home access node being capable of functioning in a mode called idle mode, the home access node comprising :

- after a first duration called sleep duration during which at least one component of the home access node is powered off, means for powering on at least one of the powered off components for a second duration called wake duration,
- during the wake duration, means for determining if an incoming message is received,
- if no incoming message is received, means for entering the sleep mode, by powering off previously powered on components.

Claim 7 – Computer program characterized in that it comprises program code instructions for the implementation of the steps of the method for managing power consumption of a home access

node as claimed in claim 1 when the program is executed by a processor.

1/4

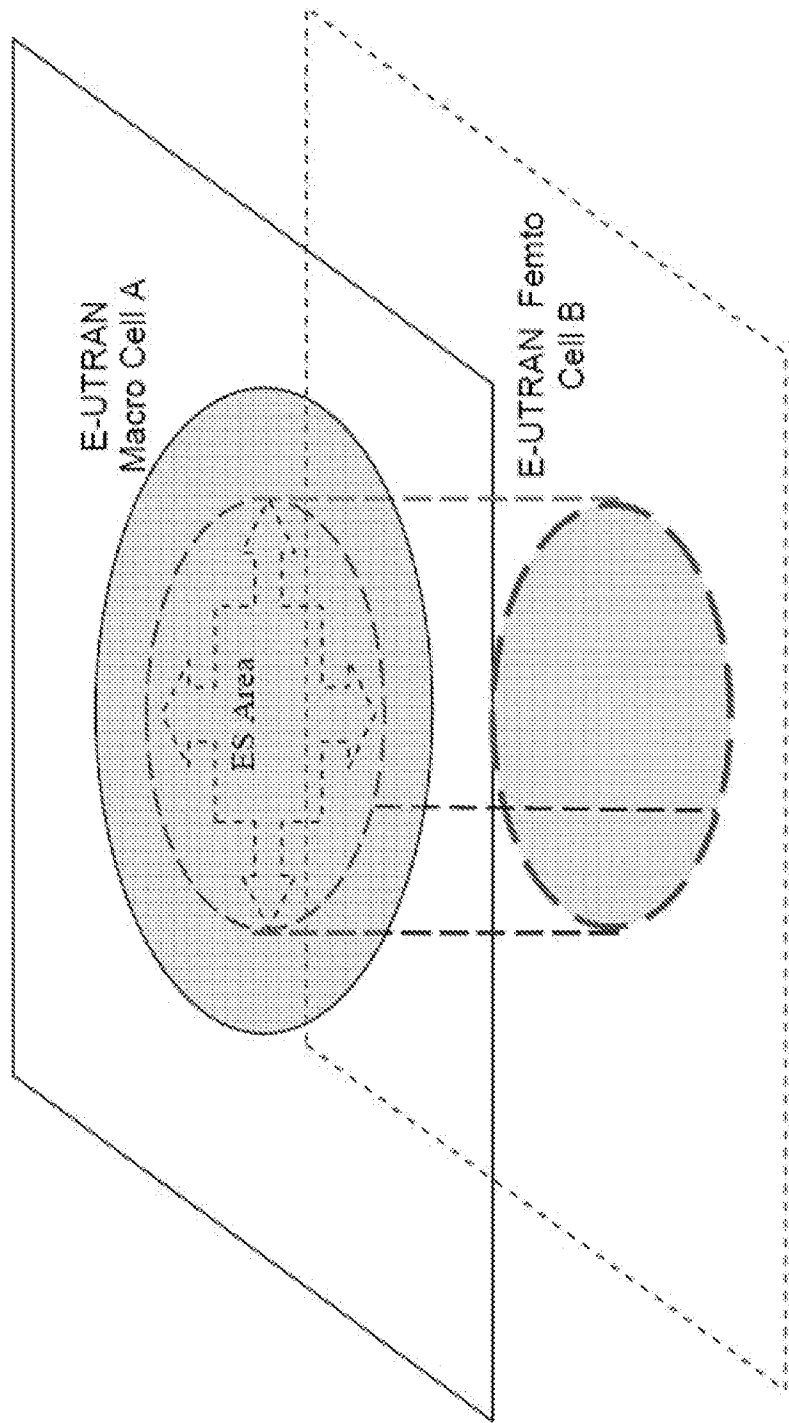


Figure 1
(prior art)

2/4

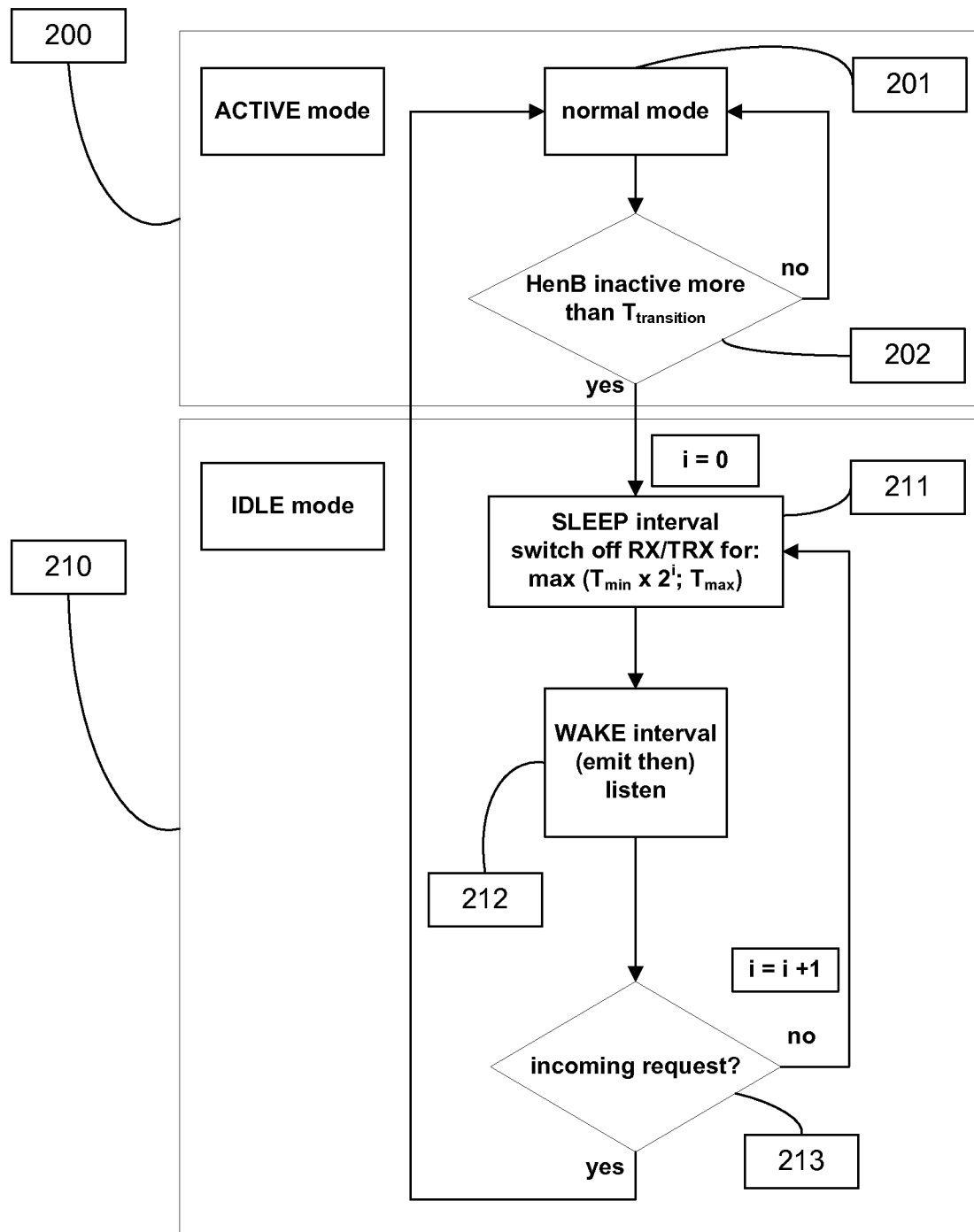


Figure 2

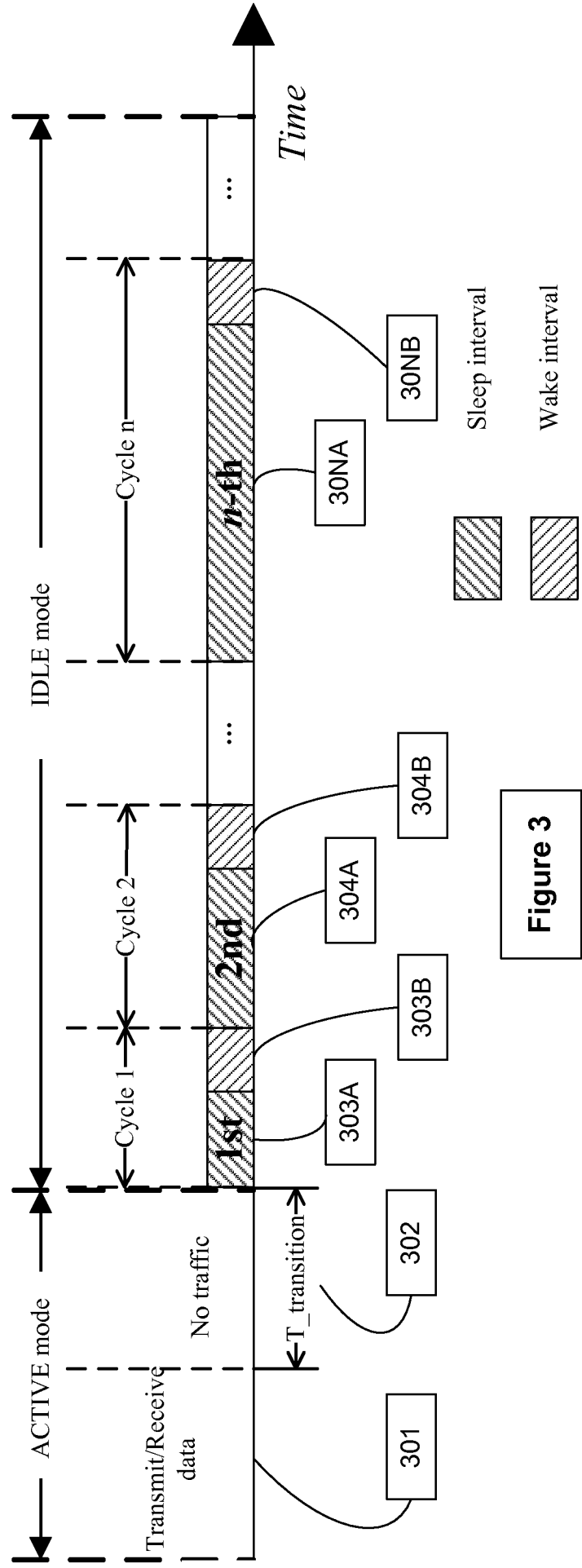


Figure 3

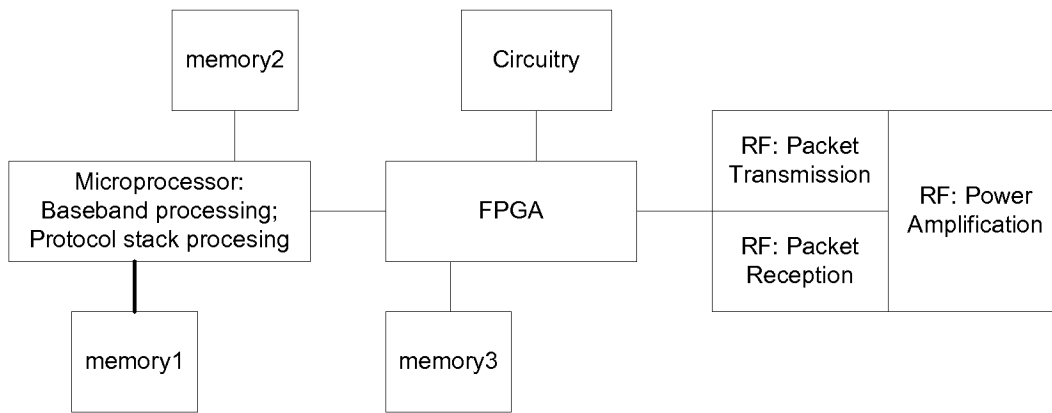


FIG. 4A. Hardware components of a Home eNodeB – ACTIVE mode

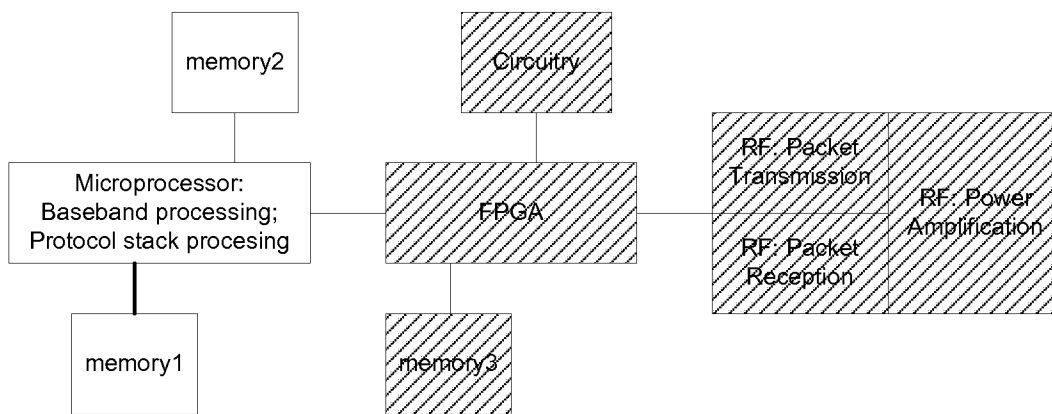


FIG. 4B. Hardware components of a Home eNodeB – IDLE mode, SLEEP interval

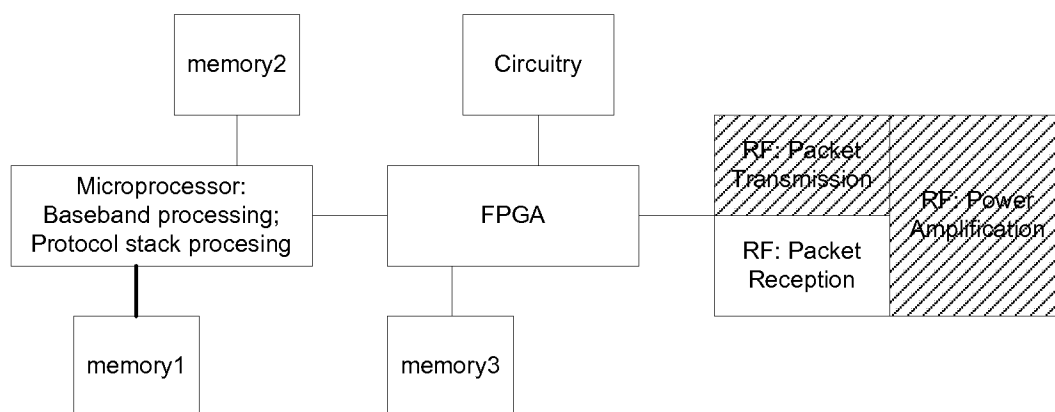
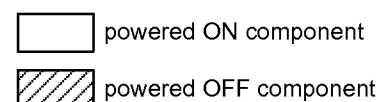


FIG. 4C. Hardware components of a Home eNodeB – IDLE mode, WAKE interval

Figure 4



INTERNATIONAL SEARCH REPORT

International application No.

PCT/CN2012/082380

A. CLASSIFICATION OF SUBJECT MATTER

See the extra sheet

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)

IPC: H04W, 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 practicable, search terms used)

CNPAT,CNKI,WPLEPODO: energy power resource sav+ consumption shut off on base w station node terminal wak+ sleep+ idle

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 2005/125234 A2 (FLARION TECHNOLOGIES, INC.) 29 Dec. 2005 (29.12.2005) description, page 1 line 10 to page 2 line 19	1-7
A	US 2011/0176465 A1 (ROBERT BOSCH GMBH.)21 Jul. 2011 (21.07.2011) the whole document	1-7
A	CN 101707796 A (CHONGQING CYIT COMMUNICATION & TECHNOLOGY) 12 May 2010 (12.05.2010) the whole document	1-7

☐ Further documents are listed in the continuation of Box C.☒ See patent family annex.

* Special categories of cited documents:	“T” later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
“A” document defining the general state of the art which is not considered to be of particular relevance	“X” document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
“E” earlier application or patent but published on or after the international filing date	“Y” document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
“L” document which may throw doubts on priority claim (S) or which is cited to establish the publication date of another citation or other special reason (as specified)	“&”document member of the same patent family
“O” document referring to an oral disclosure, use, exhibition or other means	
“P” document published prior to the international filing date but later than the priority date claimed	

Date of the actual completion of the international search
15 Jun.2013 (15.06.2013)Date of mailing of the international search report
04 Jul. 2013 (04.07.2013)Name and mailing address of the ISA/CN
The State Intellectual Property Office, the P.R.China
6 Xitucheng Rd., Jimen Bridge, Haidian District, Beijing, China
100088
Facsimile No. 86-10-62019451

Authorized officer

LI, Yanjun

Telephone No. (86-10)62413431

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/CN2012/082380

Patent Documents referred in the Report	Publication Date	Patent Family	Publication Date
WO2005/125234A2	29.12.2005	US2010178942A1	15.07.2010
		US2010190514A1	29.07.2010
		US2005277429A1	15.12.2005
		EP1754387A2	21.02.2007
		NO20070154A	09.01.2007
		AU2005256065A1	29.12.2005
		KR20070032322A	21.03.2007
		MXPA06014199A	01.03.2007
		INCHENP200700097E	24.08.2007
		BRPI0511990A	22.01.2008
		JP2008505591A	21.02.2008
		ZA200610296A	30.07.2008
		SG153814A1	29.07.2009
		NZ580563A	24.12.2009
		CN101385364A	11.03.2009
		RU2392769C2	20.06.2010
		JP2011045108A	03.03.2011
		PH12006502479B1	19.11.2010
		RU2010119232A	20.11.2011
		MX300296B	12.06.2012
		MX275816B	11.05.2010
		JP2012170111A	06.09.2012
US2011/0176465A1	21.07.2011	None	
CN101707796A	12.05.2010	None	

INTERNATIONAL SEARCH REPORT

International application No.

PCT/CN2012/082380

Continuation of Classification of Subject Matter:

H04W 52/00 (2009.01) i

H04W 88/02 (2009.01) i