(12) STANDARD PATENT (11) Application No. **AU 2008226789 B2**
(19) AUSTRALIAN PATENT OFFICE

(54) Title
Cell reselection process for wireless communications

(51) International Patent Classification(s)
H04W 48/20 (2009.01) *H04W 36/30* (2009.01)

(21) Application No: **2008226789** (22) Date of Filing: **2008.03.13**

(87) WIPO No: **WO08/112255**

(30) Priority Data

(31) Number	(32) Date	(33) Country
60/894,588	**2007.03.13**	**US**

(43) Publication Date: **2008.09.18**
(44) Accepted Journal Date: **2011.06.16**

(71) Applicant(s)
InterDigital Technology Corporation

(72) Inventor(s)
Olvera-Hernandez, Ulises;Somasundaram, Shankar;Sammour, Mohammed

(74) Agent / Attorney
Watermark Patent and Trade Marks Attorneys, Level 2 302 Burwood Road, Hawthorn, VIC, 3122

(56) Related Art
WO 2005/101886
EP 1509056
US 2004/0157600

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
18 September 2008 (18.09.2008)

PCT

(10) International Publication Number
WO 2008/112255 A3

(51) International Patent Classification:
H04Q 7/38 (2006.01)

(21) International Application Number:
PCT/US2008/003286

(22) International Filing Date: 13 March 2008 (13.03.2008)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
60/894,588 13 March 2007 (13.03.2007) US

(71) Applicant *(for all designated States except US)*: **INTERDIGITAL TECHNOLOGY CORPORATION** [US/US]; 3411 Silverside Road, Concord Plaza, Suite 105, Hagley Building, Wilmington, Delaware 19810 (US).

(72) Inventors; and
(75) Inventors/Applicants *(for US only)*: **SOMASUNDARAM, Shankar** [IN/US]; 5 Andover Drive, Deer Park, New York 11729 (US). **SAMMOUR, Mohammed** [CA/CA]; 2555 Modugno, Apt. #705, Montreal, q H4R 2L5 (CA). **OLVERA-HERNANDEZ, Ulises** [MX/CA]; 2 Rolland Laniel, Kirkland, Québec H9J 4A5 (CA).

(74) Agent: **BALLARINI, Robert, J.**; Volpe and Koenig, P.C., United Plaza, Suite 1600, 30 South 17th Street, Philadelphia, Pennsylvania 19103 (US).

(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, BR, BW, BY, BZ, CA, CH, 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, PG, PH, PL, PT, RO, RS, RU, SC, SD, SE, SG, SK, SL, SM, SV, SY, 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, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MT, NL, NO, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:
— *with international search report*

(88) Date of publication of the international search report:
5 February 2009

(54) Title: CELL RESELECTION PROCESS FOR WIRELESS COMMUNICATIONS

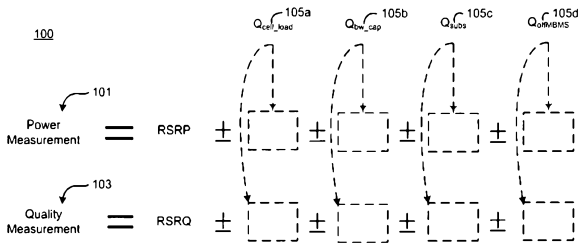

Fig. 1

(57) Abstract: A method of cell reselection in a wireless communications system where parameters are transmitted by the network in system information blocks to WTRU's on the network. Parameters are either added or subtracted from an equation representing the signal power and/or quality of a cell. Parameters may be prioritized. The results of the calculations are used to rank the servicing cell and neighboring cells. If a neighboring cell has a higher quality than the servicing cell, then the WTRU reselects the better cell. The network may transmit a blacklist of cells where the WTRU cannot camp as well as a barring timer for each cell where if the timer expires, the cell may again be considered for reselection. Information germane to the reselection decision may be transmitted and used by the network.

WO 2008/112255 A3

[0001] # CELL RESELECTION PROCESS FOR WIRELESS COMMUNICATIONS

[0002] ## FIELD OF INVENTION

[0003] The present invention is related to wireless communication systems. More particularly, the present invention is related to cell reselection in wireless devices.

[0004] ## BACKGROUND

[0005] The Third Generation Partnership Project (3GPP) standards group has recently initiated the Long Term Evolution (LTE) program to bring new technology, new network architecture, configurations and new applications and services to wireless cellular networks in order to provide improved spectral efficiency, reduced latency, faster user experiences and richer applications and services with less cost. LTE aims at realizing an Evolved Universal Mobile Telecommunications system (UMTS) Terrestrial Radio Access Network (E-UTRAN).

[0006] In a Universal Mobile Telecommunications System (UMTS), when a Wireless Transmit/Receive Unit (WTRU) is camped on a cell, it regularly searches for a better cell according to a set of criteria. If a better cell is found, that cell is selected. In earlier UMTS systems, the WTRU may perform cell reselection either in Idle mode or on the forward access channel (FACH) or the paging channel (PCH). In LTE with only 2 states: LTE_Idle and LTE_active, the WTRU can perform cell reselection only in the LTE_idle state.

[0007] In prior systems, before a WTRU decides to camp on a cell, it is required to check basic criteria for the cell on which it is camping. $S_{qual} > 0$ AND $S_{rxlev} > 0$ is the condition that needs to be satisfied to camp on a cell. S_{qual} is measured as:

$$S_{qual} = E_c / I_o - Q_{qualmin} \qquad \text{Equation (1)}$$

where E_c/I_0 is a signal to interference ratio of a corresponding cell, measured by the WTRU, and $Q_{qualmin}$ is obtained from system information block 3 (SIB3), which is broadcast by the system.

[0008] The signal receive level, S_{rxlev} is measured as:

$$S_{rxlev} = RSCP - Q_{rxlevmin} - \max(UE\_TXPWR\_MAX\_RACH - P\_MAX, 0)$$

Equation (2)

where received signal code power (RSCP) is measured by the WTRU and $Q_{rxlevmin}$ the minimum required quality is measured based on RSCP, and UE_TXPWR_MAX_RACH , the maximum allowed uplink transmitter power, are system parameters transmitted in SIB3 as explained below.

[0009] Along with $Q_{qualmin}$, $Q_{rxlevmin}$ and UE_TXPWR_MAX_RACH, other parameters are transmitted in SIB3 and SIB11 for cell reselection, including, but not limited to the following parameters that are transmitted in SIB 3:

- $S_{intrasrch}$ (optional): Measure intra-frequency neighbor cells when $S_{qual} \leq S_{intrasearch}$. Always measure intra-frequency neighbor cells when not specified.
- $S_{intersrch}$ (optional): Measure inter-frequency neighbor cells when $S_{qual} \leq S_{intersearch}$. Always measure inter-frequency neighbor cells when not specified.
- SsearchRAT (optional): Measure inter- Radio Access Technology (RAT) neighbor cells when $S_{qual} \leq S_{searchRAT}$. Always measure inter-RAT neighbor cells when not specified.
- Q_{hyst1s}: Used in ranking serving cell based on Reference Signal Code Power (RSCP).
- Q_{hyst2s} : Used in ranking serving cell based on Ec/Io.
- $Q_{qualmin}$: Minimum required quality measure based on Ec/Io.
- $Q_{rxlevmin}$: Minimum required quality measure based on RSCP.
- UE_TXPWR_MAX_RACH: Maximum allowed uplink (UL) TX power
- $T_{reselection}$: Time in which a neighbor cell preferably meets cell reselection criteria for WTRU to reselect.

- Cell Selection and Reselection Quality Measure: Ec/Io or RSCP: specifies the measurement quantity on which a ranking should be based.

[0010] The following are parameters transmitted in System Information Block (SIB) 11:

- Neighbor List.
- $Q_{offset1s,n}$: Quality Offset used to rank cell based on RSCP.
- $Q_{offset2s,n}$: Quality Offset used to rank cell based on Ec/Io.
- UE_TXPWR_MAX_RACH: Maximum allowed uplink (UL) transmitter (TX) Power for neighbor cell.
- $Q_{qualmin}$: Minimum required quality measure based on Ec/Io.
- $Q_{rxlevmin}$: Minimum required quality measure based on RSCP.

[0011] Using these parameters, the WTRU is able to rank its serving and neighbor cells. The equation for ranking the serving cell is given as:

$$Rank\_s = Ec/Io + Q_{hyst2} + Q_{offmbms}. \quad \text{Equation (3)}$$

The equation for ranking neighbor cells is given as:

$$Rank\_n = Ec/Io - Qoffset2 + Q_{offmbms} . \quad \text{Equation (4)}$$

[0012] Similar ranking equations are present when the measurement quantity is RSCP. The signalled value $Q_{offmbms}$ is added to those cells (serving or neighboring) that belong to the multimedia broadcast/multicast service (MBMS) preferred frequency layer (PL).

[0013] Using the above criteria for cell reselection, however, does not take into account other factors such as cell loading and WTRU bandwidth capabilities. In LTE, where Orthogonal Frequency Division Multiplexing (OFDM) is the physical layer medium, these factors play an important role in driving the cell reselection process. In the development of LTE, in addition to considering cell load and WTRU bandwidth capability, other factors that have been considered are found in Table 1 below.

	#	Drivers/limitations	Intra-frequency	Inter-frequency	Inter-RAT
Drivers	1	Best radio condition	X	X	X
	2	Camp load balancing		X	X
	3	Traffic load balancing		X	X
	4	UE capability		X	X
	5	Hierarchical cell structures		X	X
	6	Network sharing		X	X
	7	Private networks/home cells		X	X
	8	Subscription based mobility control		X	X
	9	Service based mobility control		X	X
	10	MBMS		X	X
Limitations	11	UE battery saving	X	X	X
	12	Network signalling/processing load	X	X	X
	13	U-plane interruption and data loss	X	X	X
	14	OAM complexity	X	X	X

Table 1

[0014] The drivers included in Table 1 are described in detail in below:

[0015] *Best radio condition*

[0016] The primary purpose of cell reselection, regardless of intra-frequency, inter-frequency, or inter-RAT, is to ensure that the UE camps on/connects to the best cell in terms of radio condition, e.g., path loss, received reference signal power, or received reference symbol Es/Io.

[0017] *Camp load balancing*

[0018] This is to distribute idle state UEs among the available bands/carriers/RATs, such that upon activation, the traffic loading of the bands/carriers/RATs would be balanced.

[0019] *Traffic load balancing*

[0020] This is to balance the loading of active state UEs, using redirection for example. In E-UTRAN, traffic load balancing is essential because of the

shared channel nature. That is, the user throughput decreases as the number of active UEs in the cell increases, and the loading directly impacts on the user perception.

[0021] *UE capability*

[0022] As E-UTRAN bands/carriers may be extended in the future, UEs having different band capabilities may coexist within a network. It is also likely that roaming UEs have different band capabilities. Overlaying different RATs adds to this variety.

[0023] *Hierarchical cell structures*

[0024] As in UTRAN, hierarchical cell structures (HCS) may be utilised in E-UTRAN to cover for example, indoors and hot spots efficiently. It is possible that E-UTRAN is initially deployed only at hot spots, in which case this driver becomes essential for inter-RAT, not just for inter-frequency. Another use case would be to deploy a large umbrella cell to cover a vast area without having to deploy a number of regular cells, while providing capacity by the regular cells on another frequency.

[0025] *Network sharing*

[0026] At the edge of a shared portion of a network, it will be necessary to direct UEs belonging to different Pubilc Land Mobile Networks (PLMNs) to different target cells. The mobility solutions in both idle and active states should therefore support differentiation between UEs of different operators.

[0027] *Private networks / home cells*

[0028] Cells that are part of a sub-network should prioritise the camping on that sub-network. UEs that do not belong to private sub-networks should not attempt to camp or access them.

[0029] *Subscription based mobility control*

[0030] This mobility driver aims to limit the inter-RAT mobility for certain UEs, e.g., based on subscription or other operator policies.

[0031] *Service based mobility control*

[0032] An operator may have different policies in allocating frequencies to certain services. For example, the operator may concentrate Voice over Internet Protocol (VoIP) UEs to a certain frequency layer or RAT (e.g., UTRAN or GERAN), if evaluations prove this effective.

[0033] *MBMS*

[0034] As MBMS services may be provided only in certain frequency layers, it may be beneficial/necessary to control inter-frequency/RAT mobility depending on whether the UE receives a particular MBMS service or not

[0035] *Limitations for mobility control*

[0036] While the issues mentioned above drive E-UTRAN towards "aggressive" mobility control, the limiting factors also have to be considered. The factors listed below apply to all intra-frequency, inter-frequency, and inter-RAT mobility scenarios.

[0037] *UE battery saving*

[0038] The mobility solution should not consume excessive UE battery, e.g., due to measurements, measurement reporting, broadcast channel (BCH) reception, or terminal adapter (TA) update signalling.

[0039] *Network signalling / processing load*

[0040] The mobility solution should not cause excessive network signalling/processing load. This includes over-the-air signalling, S1/X2 signalling, and processing load at network nodes. Unnecessary handovers and cell reselections should be avoided, and paging channel (PCH) and BCH signallings, as well as dedicated signallings, should be limited. This could be achieved by similar countermeasures as for UE battery saving.

[0041] *U-plane interruption and data loss*

[0042] U-plane interruption and data loss caused by the mobility solution should be limited. The required QoS should be satisfied in any case.

[0043] *Operation, Administration and Maintenance (OAM) complexity*

[0044] The mobility solution should not demand excessive efforts in operating/maintaining a network. For example, when a new e Node B (eNB) is added or an existing eNB fails, the mobility solution should not incur excessive efforts to set up or modify the parameters.

[0045] In view of the increasing complexity in the cell reselection process, it would be beneficial to have a method by which the WTRU and the network would signal information relating to the reselection process to each other.

[0046] **SUMMARY**

[0047] According to a first aspect of the present invention there is provided a method, implemented by a wireless transmit/receive unit (WTRU), of cell reselection from a servicing cell to a neighboring cell of at least one neighboring cell, the method including: receiving a system information message indicative of an inability of a cell to support a first service to which the WTRU is subscribed; and excluding from cell reselection the cell indicated by the system information message.

[0047a] According to a second aspect of the present invention there is provided a wireless transmit/receive unit (WTRU) including: a receiver configured to receive a system information message indicative of an inability of a cell to support a first service to which the WTRU is subscribed; and a processor configured to exclude the cell indicated by the system information message from cell reselection from a servicing cell to a neighboring cell of at least one neighboring cell.

[0047b] According to another aspect of the present invention there is provided a method, implemented by a wireless transmit/receive unit (WTRU), for cell reselection, including: receiving a list from a communication network, the list including a plurality of neighboring cells; receiving a system information message including an indication of camping permission at a cell; and updating the list based on a condition that the camping permission is not granted.

[0047c] According to a further aspect of the present invention there is provided a wireless transmit/receive unit (WTRU) including a receiver configured to: receive a list from a communication network, the list including a plurality of neighboring cells; receive a system information message including an indication of camping permission at a cell; and a processor configured to update the list based on a condition that permission is not granted to camp at the cell.

[0048] **BRIEF DESCRIPTION OF THE DRAWINGS**

[0049] Figure 1 is an illustration of equations used for cell reselection.

[0050] Figure 2 is a block diagram depicting the use of a cell load parameter in cell reselection.

[0055] Figure 3 is a block diagram depicting the use of a bandwidth capability parameter in cell reselection.

[0056] Figure 4 is a block diagram depicting the use of a subscribed services parameter in cell reselection.

[0053] Figure 5 is a block diagram depicting the use of a blacklist in cell reselection.

[0054] Figure 6 is a block diagram showing how MBMS cells may be included or excluded in cell reselection.

[0055] Figure 7 is a block diagram depicting a method of assigning priorities to parameters used in cell reselection.

[0056] DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0057] When referred to hereafter, the terminology "wireless transmit/receive unit (WTRU)" includes but is not limited to a user equipment (UE), a mobile station, a fixed or mobile subscriber unit, a pager, a cellular telephone, a personal digital assistant (PDA), a computer, or any other type of user device capable of operating in a wireless environment. When referred to hereafter, the terminology "base station" includes but is not limited to a Node-B, a site controller, an access point (AP), or any other type of interfacing device capable of operating in a wireless environment.

[0058] The following is a list of factors that may affect the reselection decision, that are preferably used in one embodiment of the present invention:

1. WTRU measurements;
2. Offset and hysterisis value transmitted by the network;
3. Cell Loading;
4. WTRU and Network BW capabilities;
5. MBMS;
6. Best Radio Condition;
7. Camp Load Balancing;
8. Traffic Load Balancing;
9. UE Capability;
10. Hierarchical Cell Structures;
11. Network Sharing;
12. Private Networks/Home Cells;
13. Subscription Based Mobility Control;

14. Service Based Mobility Control;

15. MBMS;

16. UE Battery Saving;

17. Network Signalling/Processing Load;

18. U-Plane Interruption and Data Loss; and

19. Operations, Administration, and Maintenance (OAM) Complexity.

[0059] WTRU measurement, and offset and hysterisis values transmitted by the network are incorporated in the cell reselection criteria. An offset for MBMS cells is also included. However, the MBMS criterion is modified to allow the WTRU and the network to make decisions as to camping on MBMS cells.

[0060] Cell loading, and WTRU and network bandwidth capabilities, are also herein introduced as reselection parameters.

[0061] In the following description, examples are provided for performing calculations to rank cells for reselection. In the Long Term Evolution (LTE) project, the measurements used for cell quality are Reference Signal Received Power (RSRP) and Reference Signal Received Quality (RSRQ). In previous versions of Universal Mobile Telecommunications Systems (UMTS), Received Signal Code Power (RSCP) and the signal to interference ratio Ec/Io were used, respectively. While examples provided may use the above mentioned quantities to perform reselection ranking measurements, these quantities may be substituted by any other suitable signal power or signal quality measure without falling outside the intended scope of this specification. One skilled in the art would recognize that if any other measurements were used in the cell reselection process, the concepts disclosed herein would be equally applicable to such other measurements and thereby fall within the scope of this specification as well.

[0062] A WTRU receives various pieces of information from the network System Information Blocks (SIB). Information received factors into the cell reselection decision process. In Figure 1, an illustration 100 depicting ranking cells for reselection using certain parameters in a reselection algorithm is shown. A signal between a WTRU and a cell under consideration is measured with respect to the signal power and the signal quality. Signal power may be

quantified for comparison with other cells' signals using a signal power measurement equation 101. Likewise, the signal quality may be quantified for comparison against other cells' quality measurement by using a quality measurement equation 103.

[0063] In this example, Reference Signal Receive Power (RSRP) is used as a basis for signal power quality in the power measurement equation 101. Reference Signal Receive Quality (RSRQ) is used as basis for signal quality as shown in the quality measurement equation 103. Other parameters 105a, 105b, 105c and 105d are shown. They include parameters representing cell load, bandwidth capability, subscribed services of the WTRU, and whether the cell is a MBMS cell. These parameters, which are discussed in greater detail below, are substituted into the power measurement equation 101 and/or the quality measurement equation 103 as determined by the WTRU during the ranking process for cell reselection. For example, if the WTRU was prioritizing cell selection based on the services to which the WTRU was subscribed, the parameter Q_{subs} 105c would be substituted into the power measurement equation 101 and the quality measurement equation 103. Adding the parameter 105a, 105b, 105c, 105d to the equations 101, 103 will increase the power or quality measurement, respectively. When using the measurement in the ranking process, a higher quality or power measurement will make it more likely that the cell being considered will be selected for reselection. Conversely, if the parameter 105a, 105b, 105c, 105d is subtracted from the power measurment equation 101 or the quality measurement equation 103, the resulting measurement will be lower, thereby making it less likely that the cell under consideration will be opted for reselection.

[0064] More than one parameter 105a, 105b, 105c, 105d may be substituted in the measurement equations 101, 103. They may be added or subtracted from the measurement values in any combination. The nature of the parameter 105a, 105b, 105c, 105d and how the WTRU views the parameter 105 in light of the reselection algorithm determines whether the parameter 105a, 105b, 105c, 105d weighs in favor of selecting the cell, in which case it is added, or weighs against

camping on the cell, in which case the parameter 105a, 105b, 105c, 105d is subtracted.

[0065] While RSRP and RSRQ are shown here by way of example, any suitable measurement may be used. Various parameters 105a, 105b, 105c, 105d may be added or subtracted as indicated to perform a cell reselection ranking and still fall within the intended scope of this disclosure.

[0066] A method 200 of using a cell parameter Q_{cell_load} is shown in Figure 2. The network creates a parameter Q_{cell_load} that may represent the traffic loading of the cell or the camp loading of the cell (block 201). In another embodiment, Q_{cell_load} may be a single parameter that represents both the traffic and camp loading of the cell. In another embodiment, the parameter Q_{cell_load} may represent the amount of resources left in a particular cell.

[0067] After the parameter Q_{cell_load} has been determined, the network transmits the parameter to a WTRU, signaling the parameter in a system information block (block 203). The parameter Q_{cell_load} has not been incorporated in $Q_{qualmin}$ and $Q_{rxlevmin}$ because it is a parameter whose value may vary from cell to cell across different time periods. However, in an embodiment the cell loading parameter Q_{cell_load} may be incorporated in the parameters $Q_{qualmin}$ and $Q_{rxlevmin}$ which would then vary across different cells across different time intervals. It may also be treated as an optional parameter where the network might not transmit Q_{cell_load}, whereby the WTRU's criteria for camping on that cell is comprised of the other factors being used in the reselection process. When the status of a cell changes, Q_{cell_load} would need to be re-transmitted or may be configured to re-transmit regularly and some predetermined time interval.

[0068] If, based on the value of Q_{cell_load} the cell under consideration is preferred as a cell on which the WTRU would like to camp (block 205), the parameter Q_{cell_load} is added to the signal power and quality measurements for that cell (block 209). By adding the value of Q_{cell_load} to the signal power and quality measurements, the ranking of the cell is increased with respect to other neighboring cells. If the cell under consideration is not a cell on which the WTRU would opt to camp due to the value of Q_{cell_load}, then the value of Q_{cell_load} is

subtracted from the signal power and quality measurements (block 207). By subtracting the value of Q_{cell_load}, the cell will have lower signal power and quality measurements as compared with other neighboring cells, thereby making it less likely that the cell will be chosen for cell reselection by the WTRU. After the signal power and quality measurements for the servicing cell and the neighboring cells are calculated, the servicing and neighboring cells are ranked (block 211). If a neighboring cell has higher signal power and/or quality measurements than the current servicing cell, the WTRU will select the cell with the better signal and camp on the better cell (block 213) and the method ends until the next cell ranking.

[0069] If a cell is heavily loaded, the network might not want the WTRU to camp on the cell at all. By providing a large value of Q_{cell_load} and transmitting it to the WTRU , then subtracting Q_{cell_load} from the cell's signal power and quality measurements, the likelihood that the cell will be camped on by the WTRU is greatly reduced.

[0070] The quality measure for the cell may be written as:

$$S_{qual} = RSRQ - Q_{qualmin} \pm Q_{cell\_load}. \quad \text{Equation (5)}$$

[0071] The signal power may be represented by:

$$S_{rxlev} = RSRP - Q_{rxlevmin} - \max(UE\_TXPWR\_MAXRACH - P\_MAX,0) \pm Q_{cell\_load}.$$

Equation (6)

[0072] The parameter Q_{cell_load} may also be included along with the other parameters used in cell ranking as shown below. The ranking for the servicing cell may be kept the same:

$$Rank\_s = RSRQ_s + Q_{hyst2} \pm Q_{offMBMS}. \quad \text{Equation (7)}$$

[0073] For the neighboring cell, the equation for ranking may be modified as follows:

$$Rank\_n = RSRQ_n - \mathrm{Min}(Q_{offset2}, Q_{hyst}) \pm Q_{cell\_load} \pm Q_{bw\_cap} \pm Q_{subs} \pm Q_{offMBMS}.$$

Equation (8)

[0074] A method 300 of using a cell parameter Q_{bw_cap} is shown in Figure 3. The bandwidth capabilities of the network are transmitted to the WTRU through

a system information (block 301). The WTRU calculates a parameter Q_{bw_cap} based on the bandwidth capabilities signaled by the network (block 303).

[0075] If the bandwidth capabilities of the cell under match those of the WTRU (block 305), the parameter Q_{bw_cap} is added to the signal power and quality measurements for that cell (block 309). By adding the value of Q_{bw_cap} to the signal power and quality measurements, the ranking of the cell is increased with respect to other neighboring cells. If the cell under consideration is not a cell on which the WTRU would opt to camp due to a mismatch of the bandwidth capabilities between the cell and the WTRU, then the value of Q_{bw_cap} is subtracted from the signal power and quality measurements (block 307). By subtracting the value of Q_{bw_cap}, the cell will have lower signal power and quality measurements when they are compared with neighboring cells, thereby making it less likely that the cell will be chosen for cell reselection by the WTRU. After the signal power and quality measurements for the servicing cell and the neighboring cells are calculated, the servicing and neighboring cells are ranked (block 311). If a neighboring cells has higher signal power and/or quality measurements than the current servicing cell, the WTRU will select the cell with the better signal and camp on the better cell (block 313) and the method 300 ends until the next cell ranking.

[0076] In another embodiment, the WTRU may have signaled its bandwidth capabilities to the network at the initial cell selection, or through a Radio Resource Control (RRC) message after entering the connected state. In such a case, the parameter Q_{bw_cap} may be transmitted by the network and directly added or substracted from the cell ranking equations.

[0077] If the WTRU has previously signaled its bandwidth capability, the network may use that information along with its knowledge of cell resources available and send a single parameter P_{cell_access} combining the two parameters, Q_{cell_load} and Q_{bw_cap}. The parameter P_{cell_access} may either be added or subtracted from the neighbor cell ranking, changing Equation 8 to:

$$Rank\_n = RSRQ_n - Min(Q_{offset2}, Q_{hyst}) \pm P_{cell\_access} \pm Q_{subs} \pm Q_{offMBMS} \qquad \text{Equation (9)}$$

[0078] Because the subscription services might differ between different WTRUs in the network, it might be difficult for the eNodeB to incorporate the parameter Q_{subs} into P_{cell_access}.

[0079] A method 400 of using a cell parameter Q_{subs} is shown in Figure 4. The network transmits, in the system information block, the services supported by the cell as indicated in block 401. The WTRU then calculates a parameter Q_{subs} based on the services being supported by a cell under consideration (block 403).

[0080] If the cell supports the services to which the WTRU is subscribed (block 405), the parameter Q_{subs} is added to the signal power and quality measurements for that cell (block 409). By adding the value of Q_{sbus} to the signal power and quality measurements, the ranking of the cell is increased with respect to other neighboring cells. If the cell under consideration is not a cell on which the WTRU would opt to camp because the cell does not support all the services to which the WTRU is subscribed, then the value of Q_{subs} is subtracted from the signal power and quality measurements as shown in block 407. By subtracting the value of Q_{subs}, the cell will have lower signal power and quality measurements as compared with other neighboring cells, thereby making it less likely that the cell will be chosen for cell reselection by the WTRU. After the signal power and quality measurements for the servicing cell and the neighboring cells are calculated, the servicing and neighboring cells are ranked (block 411). If a neighboring cells has higher signal power and/or quality measurements than the current servicing cell, the WTRU will select the cell with the better signal and camp on the better cell (block 413) and the method 400 ends until the next cell ranking.

[0081] If a cell does not support a service to which the WTRU is subscribed or wishes to acquire, the WTRU may decide not to camp on that cell based on its lack of support for the service. In such a case, a very large value of Q_{subs} may be subtracted from the signal power and quality measurements of the cell to reduce the cell's ranking and preclude its selection by the WTRU.

[0082] In a case where the WTRU has already signaled its bandwidth capability, the network may use that information in combination with its

knowledge of cell resources available and may send a blacklist of cells on which the WTRU should not be allowed to camp based on the information. The ranking of neighboring cells in such a case is calculated by:

$$Rank\_n = RSRQ_n - Min(Q_{offset2}, Q_{hyst}) \pm Q_{subs} \pm Q_{offMBMS} \quad \text{Equation (10)}$$

[0083] A potential problem exists with blacklisting cells without incorporating cell loading and bandwidth capabilities in that there may be a lightly loaded cell on which the network may want to discourage a WTRU from camping, but not eliminate the cell from reselection altogether. This cannot be done with a blacklist. Blacklisting does not allow this. Referring to figure 5, a method 500 of using blacklists in cooperation with barring timers is shown. A WTRU periodically searches for a better cell than the cell by which it is currently being serviced (block 501). The network, based on the information provided by the WTRU relating to its bandwidth capabilities and its knowledge of cell resources available, transmits a blacklist of cells on which the WTRU should not be allowed to camp, along with a barring timer indicating the time period that each cell in the blacklist should be barred from camping. The blacklist and barring timers are received by the WTRU (block 503). When ranking the neighboring cells, the WTRU looks to see if the cell under consideration is included in the blacklist (block 505). If the cell is included in the blacklist, the WTRU then looks to see if the barring timer associated with that cell has expired (block 507). If the barring timer has not expired, then the cell is excluded from the cell rankings (block 511). If either the cell is not in the blacklist (block 505), or the barring timer has expired (block 507) then the cell is included in the cell ranking (block 509). In either case, the cell ranking is used, whether it includes a given cell or not, and a decision to reselect a cell on which to camp is made (block 513) where the method 500 ends.

[0084] The parameter $Q_{offMBMS}$ may be added or subtracted for Multimedia Broadcast / Multicast Service (MBMS) cells depending on whether the network wants to give priority to those cells. This decision may be made by the network based on the type of service to which the WTRU has subscribed. It may be

decided that the network does not want to allow the WTRU camp on MBMS cells. In such a case the cell reselection algorithm may be altered as shown in Figure 6.

[0085] Figure 6 depicts a method 600 by which the network optionally signals to a WTRU whether the WTRU is permitted to camp on MBMS cells. A WTRU periodically searches for a new cell with a better signal than the cell by which the WTRU is currently being serviced (block 601). The network then transmits an indicator to the WTRU in the system information block which informs the WTRU whether it can camp on MBMS cells (block 603). If the WTRU is permitted to camp on MBMS cells,(block 605), it is determined if the cell is favored for some factor making the cell desirable to the WTRU (block 607). If the cell is seen favorably, the value of $Q_{offMBMS}$ is added to the cell signal power and quality measurements (block 611). If the cell is not seen favorably, the value of the parameter $Q_{offMBMS}$ is subtracted from the signal power and quality measurements (block 613).

[0086] If in block 605, the network indicates that the WTRU may not camp on MBMS cells, the WTRU excludes a cell that the network indicates is a MBMS cell from the cell ranking and MBMS cells are not considered in the cell ranking process. Rankings of cell based on signal power and quality measurements are made for all neighboring cells on which the WTRU is permitted to camp (block 615) and if a cell is found to have higher measurements than the cell currently servicing the WTRU, then a cell reselection is made (block 617) and the method 600 ends.

[0087] In some scenarios, the network may also want to give more priority to some parameters like WTRU measurements over other parameters like bandwidth capabilities or cell loading. The network may signal the absolute of relative priority indications between the different parameters and the WTRU may make use of the priority information to adjust its cell reselection criteria according to certain predefined rules. Alternatively, the network may signal an optional scaling parameter along with the parameter signaled to the WTRU, applying the scaling parameter to the equation. In general, there may be

different scaling factors (weights) to each of the ranking parameters and the equations for ranking become:

$$Rank\_s = RSRQ_s + Q_{hyst2} \pm Q_{offMBMS} \quad \text{Equation (11)}$$

for servicing cells, and:

$$Rank\_n = RSRQ_n - a * Min(Q_{offset2}, Q_{hyst}) \pm b * Q_{cell\_load} \pm c * Q_{bw\_cap} \pm d * Q_{subs} \pm e * Q_{offMBMS} \quad \text{Equation (12)}$$

for neighboring cells where a, b, c, d, and e are scaling factors for a respective parameter and $Q_{offset2}$ is an offset value based on RSCP, Q_{hyst} is a factor used in ranking based on the hysteresis of the cell and $Q_{offMBMS}$ is a ranking factor offset based on whether the cell is a MBMS cell.

[0088] Alternatively, the equation for the neighboring ranking may be written as:

$$Rank\_n = RSRQ_n - \sum_i \alpha_i * Q_{param} \quad \text{Equation (13)}$$

where index i may go from 0 to a value M depending on the number of parameters present in the equation and where α represents a scaling factor that may go from 0 to a value N. Q_{param} represents the different parameters for cell reselection as those mentioned above.

[0089] A method of applying scaling factors to the parameters in the cell reselection process 700 is shown in Figure 7 where the network establishes priorities for one or more parameters being used in the cell reselection procedure (block 701). The network then transmits the priority indicia, or alternatively, a scaling factor to be applied against some or all of the parameters in the reselection equations to the WTRU (block 703). The WTRU applies the priority indicia or scaling factors to the parameters in the cell reselection process (block 705). The equations are then evaluated to compute the signal power and quality measurements for each neighboring cell and the servicing cell and a ranking is performed based on the results of the signal power and quality measurements (block 707). If a cell is found to have higher signal power and quality measurement that the servicing cell by which the WTRU is currently being

serviced, a decision to perform cell reselection and camp on the better cell is made as shown in block 709 where the cell reselection method ends.

[0090] In all of the above described scenarios, a network may also be given the option of not signaling some of the parameters for ranking or threshold detection depending on the scenario and services running on the WTRU. In this case the WTRU may use whatever parameters it derives or are received from the network to perform the ranking calculations.

[0091] Additionally, it may be helpful if the network knew the reasons why a cell performed a reselection. Information relating to the reasons why the WTRU camped on a new cell, such as the top factor in making the reselection decision the top N reasons why a new cell was selected may be transmitted to the network. With the reasons why WTRUs are reselecting cells, such as for the services being supported in certain cells, the network may use that information in load balancing and as input to the values of parameters to be transmitted by the network for the cell reselection process.

[0092] If, during the system information reading stage, a neighbor cell has prior knowledge of a WTRU's capabilities, subscription services, and knowledge of its own resources, it may indicate to the WTRU whether or not it wants to allow the WTRU to camp on the cell at that time. If the neighbor cell did not want to allow the WTRU to camp on it, the WTRU may then camp on the next cell in its ranking list. If the neighbor cell allowed the WTRU to camp on it, then the WTRU may reselect that cell for camping.

[0093] Although the features and elements are described in the embodiments in particular combinations, each feature or element may be used alone without the other features and elements or in various combinations with or without other features and elements. The methods or flow charts provided may be implemented in a computer program, software, or firmware tangibly embodied in a computer-readable storage medium for execution by a general purpose computer or a processor. Examples of computer-readable storage media include a read only memory (ROM), a random access memory (RAM), a register, cache memory, semiconductor memory devices, magnetic media such as internal hard

disks and removable disks, magneto-optical media, and optical media such as CD-ROM disks, and digital versatile disks (DVDs)

[0094] Suitable processors include, by way of example, a general purpose processor, a special purpose processor, a conventional processor, a digital signal processor (DSP), a plurality of microprocessors, one or more microprocessors in association with a DSP core, a controller, a microcontroller, Application Specific Integrated Circuits (ASICs), Field Programmable Gate Arrays (FPGAs) circuits, any other type of integrated circuit (IC), and/or state machine.

[0095] A processor in association with software may be used to implement a radio frequency transceiver for use in a wireless transmit receive unit (WTRU), user equipment (UE), terminal, base station, radio network controller (RNC), or any host computer. The WTRU may be used in conjunction with modules, implemented in hardware and/or software, such as a camera, a video camera module, a videophone, a speakerphone, a vibration device, a speaker, a microphone, a television transceiver, a hands-free headset, a keyboard, a Bluetooth® module, a frequency modulated (FM) radio unit, a liquid crystal display (LCD) unit, an organic light-emitting diode (OLED) display unit, a digital music player, a media player, a video game player module, an Internet browser, and/or any wireless local area network (WLAN) module.

[0096] Embodiments.

1. A method of reselecting a cell in a wireless communication system comprising

creating at least one parameter relating to a cell reselection decision.

2. The method characterized by embodiment 1 further comprising transmitting the at least one parameter to a wireless transmit/receive unit (WTRU).

3. The method characterized any of the preceding embodiments further comprising substituting the at least one parameter into an equation

for calculating a cell ranking measurement, wherein a parameter is added to make it more likely the WTRU will camp on a cell associated with the parameter or subtracting a parameter to make it less likely the WTRU will camp on a cell associated with the parameter.

4. The method characterized any of the preceding embodiments further comprising ranking a servicing cell and at least one neighboring cell based on the cell ranking measurement.

5. The method characterized any of the preceding embodiments further comprising making a cell reselection decision based on cell rankings.

6. The method characterized any of the preceding embodiments wherein the at least one parameter is transmitted in a system information block (SIB).

7. The method characterized any of the preceding embodiments wherein the creating is performed by an eNodeB.

8. The method characterized any of the preceding embodiments wherein the creating is performed by a WTRU.

9. The method characterized any of the preceding embodiments wherein one of the parameters is selected from the group of cell load, bandwidth capabilities, and subscribed services.

10. The method characterized any of the preceding embodiments wherein the equation calculates a cell measurement based on cell signal quality.

11. The method characterized any of the preceding embodiments wherein the equation calculates a cell measurement based on cell signal power level.

12. The method characterized any of the preceding embodiments wherein a parameter Q_{cell_access} is created using information based on cell load and bandwidth capabilities of a cell.

13. The method characterized any of the preceding embodiments further comprising transmitting in a system information message an inability of a cell to support services to which a WTRU is subscribed.

14. The method characterized any of the preceding embodiments further comprising receiving the system information message during a system information reading stage.

15. The method characterized any of the preceding embodiments further comprising excluding the unsuitable cell from cell reselection and selecting a next highest ranked cell for reselection.

16. A method of reselecting a cell in a wireless communications system comprising determining if a cell should allow a WTRU to camp on it.

17. The method of embodiment 16 further comprising adding the cell to a blacklist if it is determined a WTRU should not camp on the cell.

18. The method characterized by any of embodiments 16-17 further comprising transmitting the blacklist to a WTRU.

19. The method characterized by any of embodiments 16-18 further comprising referencing the blacklist when ranking cells for reselection.

20. The method characterized by any of embodiments 16-19 further comprising excluding cells contained on the blacklist when performing cell reselection.

21. The method characterized by any of embodiments 16-20 further comprising creating a cell ranking based on non-excluded cells.

22. The method characterized by any of embodiments 16-21 further comprising establishing a barring timer for each cell added to the blacklist.

23. The method characterized by any of embodiments 16-22 further comprising transmitting the barring timers to the WTRU along with the blacklist.

24. The method characterized by any of embodiments 16-23 comparing a expiration time associated with the barring timer with a current time when a cell being ranked in contained in the blacklist and including the cell being ranked in the cell ranking if the current time is past the expiration time.

25. The method characterized by any of embodiments 16-24, wherein the expiration time is represented as a time period and is compared with an elapsed time.

26. A method of ranking cells for cell reselection in a wireless communications system comprising identifying a plurality of parameters representing factors in the cell reselection decision.

27. The method characterized by embodiment 26 further comprising assigning a priority to each parameter.

28. The method characterized by any of the embodiments 26-27 further comprising transmitting the plurality of parameters and associated priority indicia to a wireless transmit/receive unit (WTRU).

29. The method characterized by any of the embodiments 26-28 further comprising applying the priority indicia to an associated parameter.

30. The method characterized by any of the embodiments 26-29 further comprising substituting the priority indicia and associated parameter into an equation for calculating a cell ranking measurement, wherein a parameter is added to make it more likely the WTRU will camp on a cell associated with the parameter and subtracting a parameter to make it less likely the WTRU will camp on a cell associated with the parameter.

31. The method characterized by any of the embodiments 26-30 further comprising making a cell reselection decision based on cell rankings.

32. The method characterized by any of the embodiments 28-31 wherein the priority is transmitted as part of an associated parameter.

33. The method characterized by any of the embodiments 28-31 wherein the priority is transmitted along with an associated parameter as a scaling factor.

34. A method of cell reselection in a wireless communications system comprising transmitting a plurality of parameters representing factors in the cell reselection process.

35. The method characterized by embodiment 34 further comprising receiving the plurality of parameters and substituting them in an equation to calculate a cell measurement.

36. The method characterized by any of embodiments 34-35 further comprising creating a cell ranking from the calculations performed on the plurality of parameters.

37. The method characterized by any of embodiments 34-36 further comprising making a reselection decision based on the cell ranking.

38. The method characterized by any of embodiments 34-37 further comprising transmitting at least one factor used in the reselection decision.

39. The method characterized by any of embodiments 35-39 wherein each of the plurality of parameters is assigned a priority and the priority is applied to an associated parameter when calculating a cell measurement.

40. The method characterized by any of embodiments 35-39 wherein the cell measurement is a cell signal power level measurement.

41. The method characterized by any of embodiments 35-40 wherein the cell measurement is a cell signal quality measurement.

42. A wireless transmit/receive unit (WTRU) comprising a receiver configured to receive at least one parameter representing factors in a cell reselection decision.

43. The WTRU characterized by embodiment 42 further comprising a cell ranking processor configured to substitute the at least one parameter into an equation for calculating a cell ranking measurement, wherein a parameter

is added to make it more likely the WTRU will camp on a cell associated with the parameter and subtracting a parameter to make it less likely the WTRU will camp on a cell associated with the parameter and ranking a servicing cell and at least one neighboring cell based on the cell ranking measurement.

44. The WTRU characterized by any of embodiments 42-43 further comprising a cell reselection processor configured to make a cell reselection decision based on cell rankings and camp on a selected cell.

45. The WTRU characterized by any of embodiments 42-44 wherein one of the parameters is selected from the group of cell load, bandwidth capabilities, and subscribed services.

46. The WTRU characterized by any of embodiments 44-45 wherein the equation calculates a cell measurement based on cell signal quality.

47. The WTRU characterized by any of embodiments 44-46 wherein the equation calculates a cell measurement based on cell signal power level.

48. The WTRU characterized by any of embodiments 44-47 wherein one of the at least one parameters is a parameter, $Q_{cell\_access,}$ created using information based on cell load and bandwidth capabilities of a cell.

49. The WTRU characterized by any of embodiments 44-48 wherein the receiver is further configured to receive in a system information message an inability of a cell to support services to which a WTRU is subscribed and excluding the unsuitable cell from cell reselection and selecting a next highest ranked cell for reselection.

50. A wireless transmit/receive unit (WTRU) comprising a receiver configure to receive a blacklist containing cell on which the WTRU is not allowed to camp.

51. The WTRU characterized by embodiment 50 further comprising a cell ranking processor configured to exclude a cell contained in the blacklist from cell ranking calculations.

52. The WTRU characterized by any of embodiments 50-51 further comprising a cell reselection processor configured select a cell based on a cell ranking, wherein the cell ranking excludes cells contained in the blacklist.

53. The WTRU characterized by embodiment 52 wherein the receiver is further configured to receive barring timers associated with each cell in the blacklist and the cell ranking processor is further configured to compare a barring timer expiration time with a current time and include a cell associated with the barring timer in the cell ranking calculation if the barring timer expiration time is prior to the current time.

54. The WTRU characterized by embodiment 53, wherein the barring timer expiration time is a pre-selected time period and the cell ranking processor is configured to compare the barring timer expiration time with an elapsed time and include a cell associated with the barring timer in the cell ranking calculation if the barring timer expiration time is shorter than the elapsed time.

55. A wireless receive/transmit unit (WTRU) comprising a receiver configured to receive at least one parameter representing a factor in a cell reselection decision.

56. The WTRU characterized by embodiment 55 further comprising a cell ranking processor configured to substitute the at least one parameter into an equation, wherein the equation calculates a measurement associated with a cell and wherein the at least one parameter is added to the equation to make it more likely that the WTRU will select a cell under consideration for reselection and the at least one parameter is subtracted from the equation to make it less likely that the WTRU will select a cell under consideration for reselection.

57. The WTRU characterized by embodiment 56, wherein one of the parameters is selected from the group of cell load, bandwidth capabilities, and subscribed services.

58. The WTRU characterized by any of embodiments 56-57 wherein the equation calculates a cell measurement based on cell signal quality.

59. The WTRU characterized by any of embodiments 56-58 wherein the equation calculates a cell measurement based on cell signal power level.

60. The WTRU characterized by any of embodiments 56-59 wherein a parameter Q_{cell_access} is created using information based on cell load and bandwidth capabilities of a cell.

61. The WTRU characterized by any of embodiments 56-60 wherein the receiver is further configure to receive in a system information message an

inability of a cell to support services to which a WTRU is subscribed and excluding the unable cell from cell reselection and selecting a next highest ranked cell for reselection.

62. A wireless transmit/receive unit comprising:

a cell reselection processor configured to reselect a cell on which the WTRU is camped based on a plurality of factors;

a transmitter configured to transmit at least one factor that was used to make a cell reselection decision.

63. A base station comprising a transmitter configured to signal at least one parameter representing a factor in a cell reselection decision, wherein the at least one parameter is signaled in a system information block (SIB).

64. The base station characterized by embodiment 63 further comprising a blacklist processor configured to create a blacklist of cells on which a wireless transmit/receive unit (WTRU) should not camp.

65. The base station characterized by embodiment 64, wherein the blacklist processor is further configured to create a barring timer for each cell contained in the blacklist.

66. The base station characterized by embodiment 65, wherein the transmitter is further configured to transmit at least one of the blacklist and the barring timers along with the at least one parameter.

67. The base station characterized by any of embodiments 63-66 further comprising a priority processor configured to assign a priority indicator for each of the at least one parameters.

68. The base station characterized by any of the embodiments 63-67 further comprising and wherein the transmitter is further configured to transmit each priority indicator along with the at least one parameter.

69. A base station comprising a transmitter configured to broadcast in a system information message that a cell is unable to support services to which a wireless transmit/receive unit (WTRU) is subscribed indicating the WTRU should not camp on the cell.

70. A base station comprising a receiver configured to receive messages containing factors used by a wireless transmit/receive unit (WTRU) in making a cell reselection.

71. The base station characterized by embodiment 70, wherein the messages are used to calculate at least one parameter representing a factor used in a cell reselection decision.

72. The base station characterized by any of embodiments 70-71, wherein the messages are used to manage load balancing.

* * *

2008226789 25 May 2011

THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS:

1. A method, implemented by a wireless transmit/receive unit (WTRU), of cell reselection from a servicing cell to a neighboring cell of at least one neighboring cell, the method including:

receiving a system information message indicative of an inability of a cell to support a first service to which the WTRU is subscribed; and

excluding from cell reselection the cell indicated by the system information message.

2. The method of claim 1, wherein the system information message is received from a communication network.

3. The method of claim 1, further including:

receiving a second system information message indicative of an inability of a second cell to support a second service to which the WTRU attempts to acquire; and

excluding from cell reselection the second cell indicated by the second system information message.

4. A wireless transmit/receive unit (WTRU) including:

a receiver configured to receive a system information message indicative of an inability of a cell to support a first service to which the WTRU is subscribed; and

a processor configured to exclude the cell indicated by the system information message from cell reselection from a servicing cell to a neighboring cell of at least one neighboring cell.

5. The WTRU of claim 4, wherein the system information message is received from a communication network.

6. The WTRU of claim 4, wherein the receiver is further configured to receive a second system information message indicative of an inability of a second cell to support a second service to which the WTRU attempts to acquire, and the processor is further configured to exclude from cell reselection the second cell indicated by the second system information message.

7. A method, implemented by a wireless transmit/receive unit (WTRU), for cell reselection, including:

receiving a list from a communication network, the list including a plurality of neighboring cells;

receiving a system information message including an indication of camping permission at a cell; and

updating the list based on a condition that the camping permission is not granted.

8. The method of claim 7, further including excluding cells on the list when performing cell reselection, wherein the list is a blacklist.

9. The method of claim 7, further including adding the cell to the blacklist on a condition that permission is not granted to camp at the cell, wherein the list is a blacklist.

10. A wireless transmit/receive unit (WTRU) including a receiver configured to:

receive a list from a communication network, the list including a plurality of neighboring cells;

receive a system information message including an indication of camping permission at a cell; and

a processor configured to update the list based on a condition that permission is not granted to camp at the cell.

11. The WTRU of claim 10, wherein the processor is further configured to exclude the plurality of neighboring cells on the list when performing cell reselection.

12. The WTRU of claim 10, wherein the processor is further configured to add the cell to a blacklist on a condition that the camping permission is not granted.

13. A method substantially as herein described with reference to the accompanying drawings.

2008226789 25 May 2011

14. A wireless transmit/receive unit (WTRU) substantially as herein described with reference to the accompanying drawings.

INTERDIGITAL TECHNOLOGY CORPORATION

WATERMARK PATENT & TRADE MARK ATTORNEYS

P32358AU00

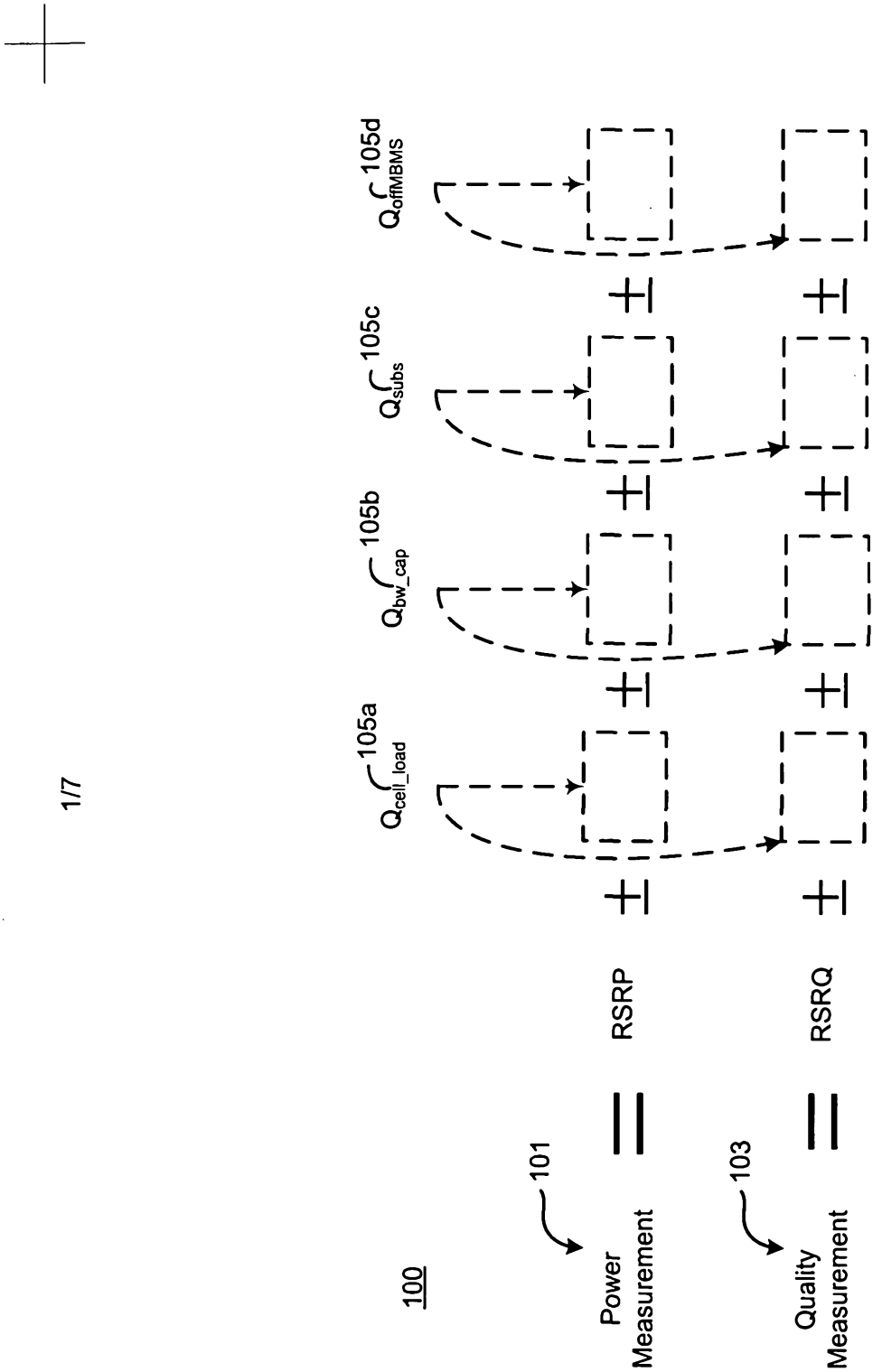
100
101
Power Measurement
103
Quality Measurement
RSRP
RSRQ
Q_{cell_load} 105a
Q_{bw_cap} 105b
Q_{subs} 105c
$Q_{offMBMS}$ 105d

Fig. 1

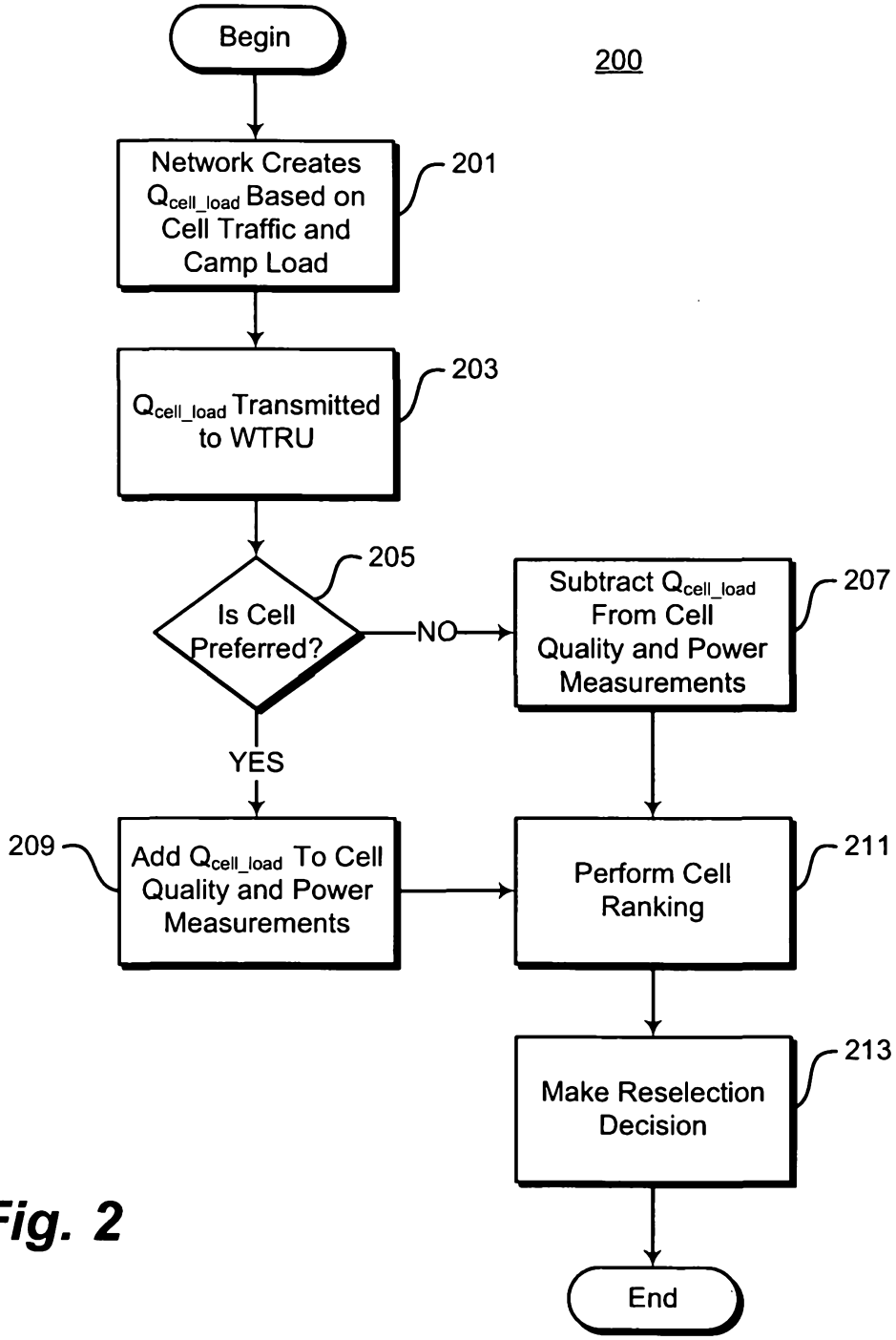
Begin
200
Network Creates Q_{cell_load} Based on Cell Traffic and Camp Load
201
Q_{cell_load} Transmitted to WTRU
203
Is Cell Preferred?
205
NO
Subtract Q_{cell_load} From Cell Quality and Power Measurements
207
YES
Add Q_{cell_load} To Cell Quality and Power Measurements
209
Perform Cell Ranking
211
Make Reselection Decision
213
End

Fig. 2

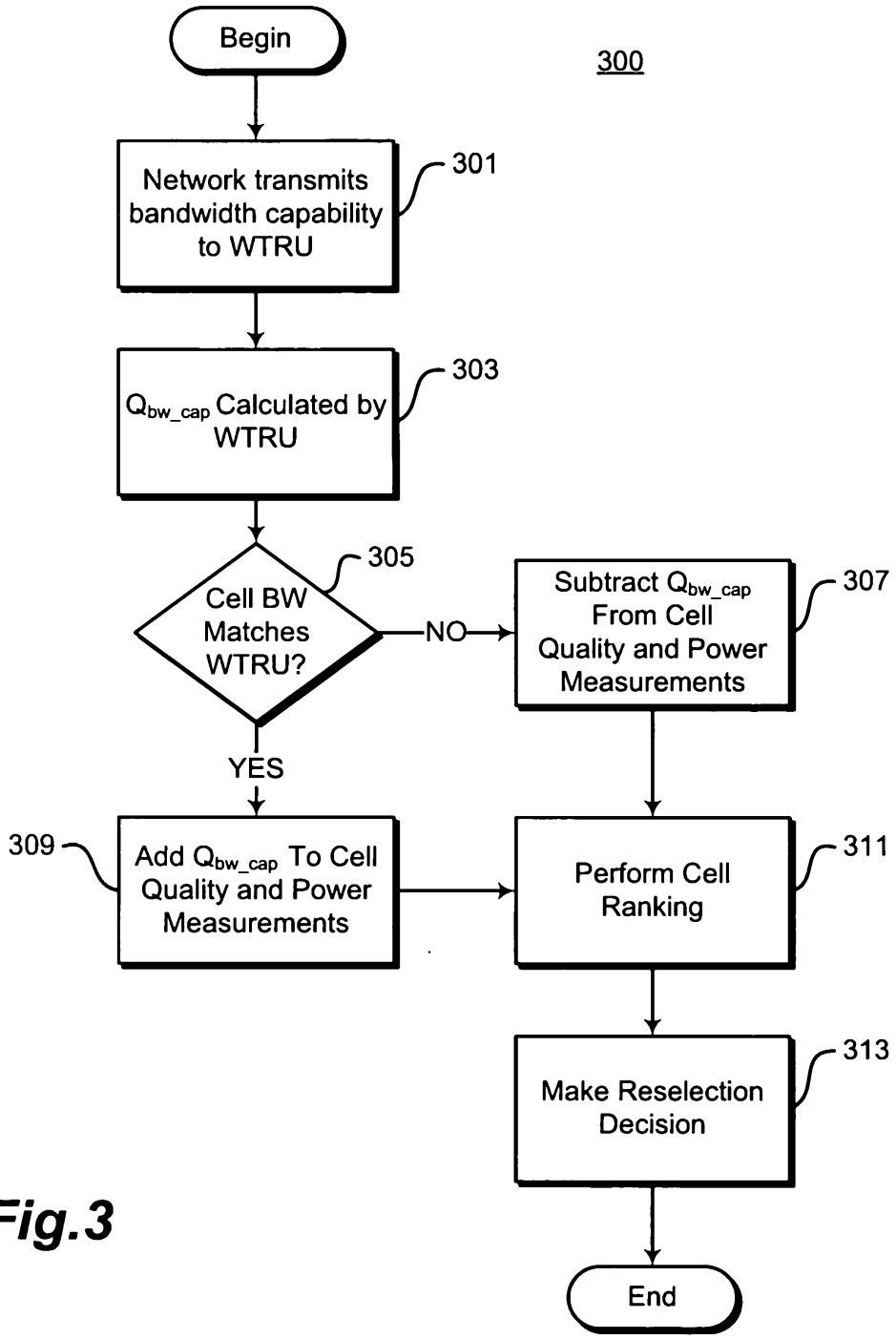
Begin
300
Network transmits bandwidth capability to WTRU
301
Q_{bw_cap} Calculated by WTRU
303
Cell BW Matches WTRU?
305
NO
YES
Subtract Q_{bw_cap} From Cell Quality and Power Measurements
307
Add Q_{bw_cap} To Cell Quality and Power Measurements
309
Perform Cell Ranking
311
Make Reselection Decision
313
End

Fig.3

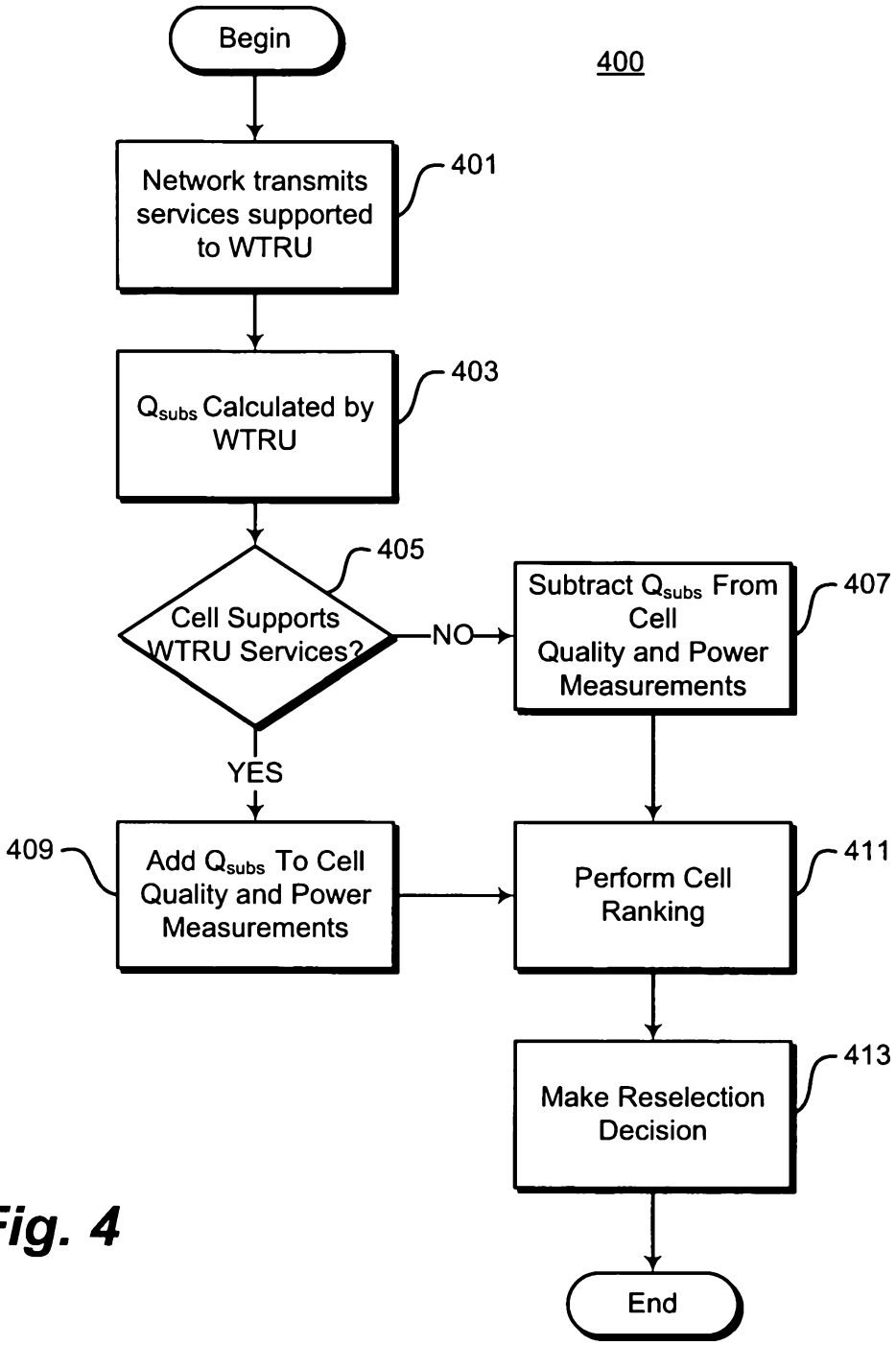
Begin
400
Network transmits services supported to WTRU
401
Q_{subs} Calculated by WTRU
403
Cell Supports WTRU Services?
405
NO
Subtract Q_{subs} From Cell Quality and Power Measurements
407
YES
Add Q_{subs} To Cell Quality and Power Measurements
409
Perform Cell Ranking
411
Make Reselection Decision
413
End

Fig. 4

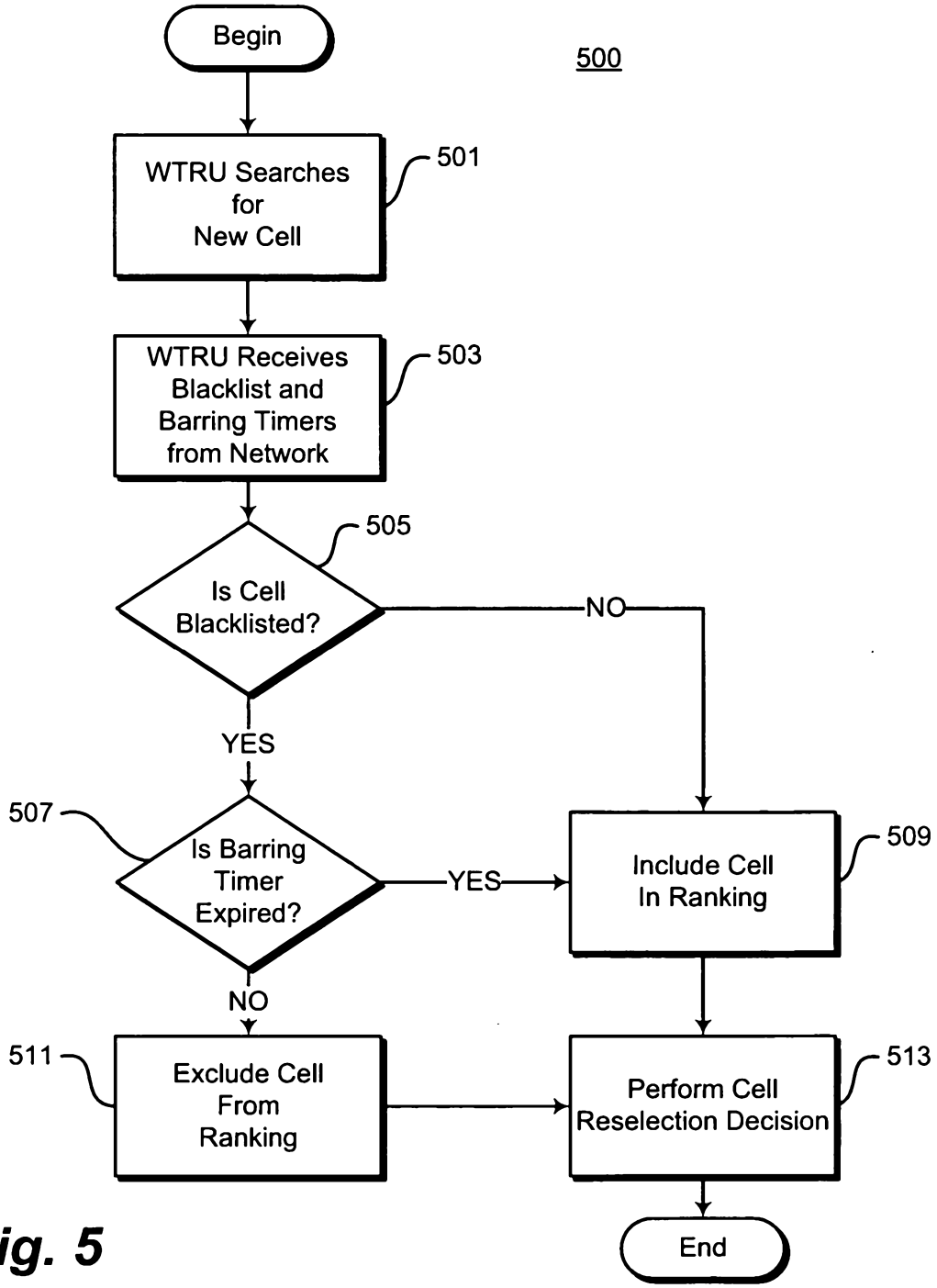
Begin
500
WTRU Searches for New Cell
501
WTRU Receives Blacklist and Barring Timers from Network
503
Is Cell Blacklisted?
505
NO
YES
Is Barring Timer Expired?
507
YES
Include Cell In Ranking
509
NO
Exclude Cell From Ranking
511
Perform Cell Reselection Decision
513
End

Fig. 5

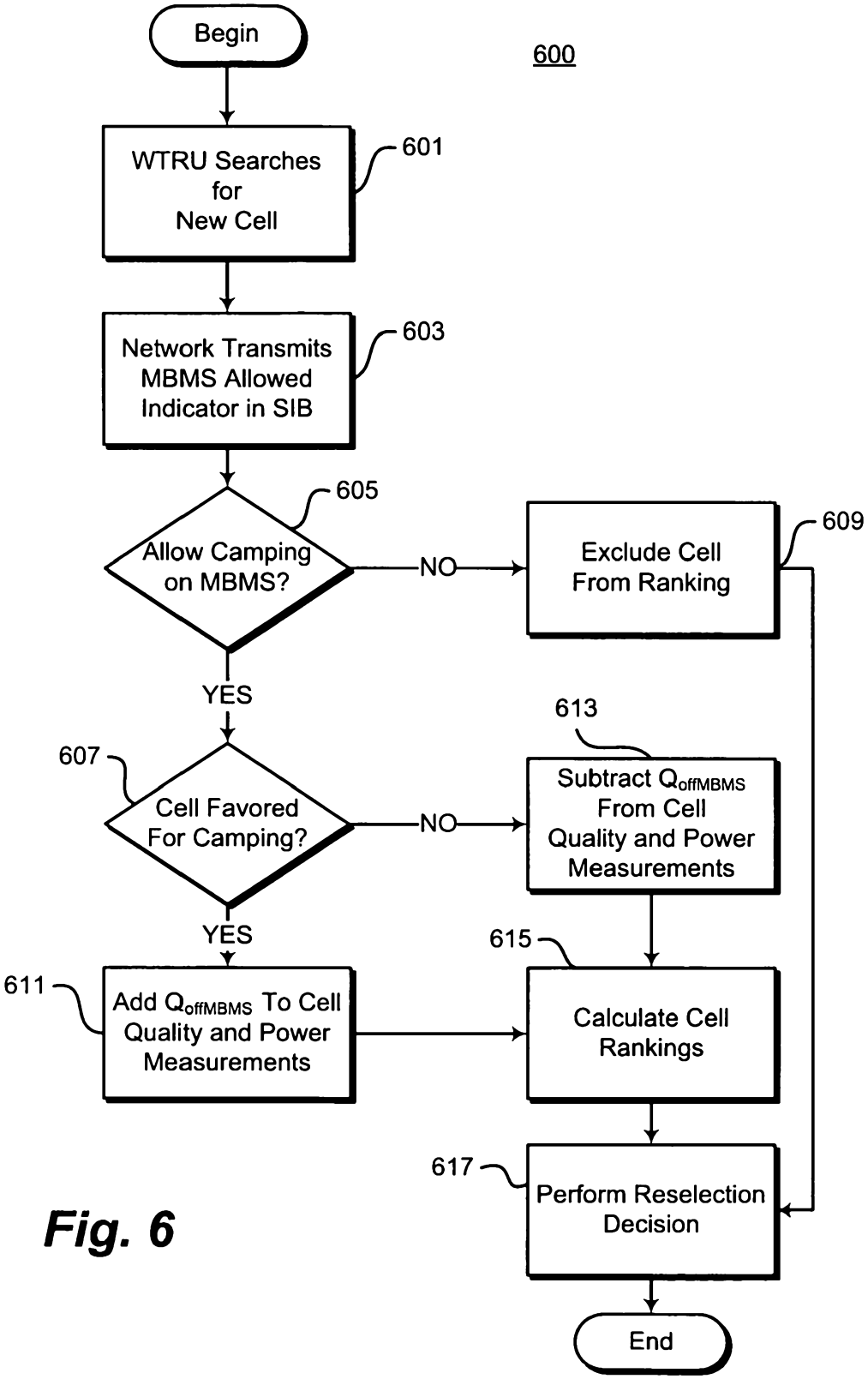
Begin
600
WTRU Searches for New Cell
601
Network Transmits MBMS Allowed Indicator in SIB
603
Allow Camping on MBMS?
605
NO
Exclude Cell From Ranking
609
YES
Cell Favored For Camping?
607
NO
Subtract $Q_{offMBMS}$ From Cell Quality and Power Measurements
613
YES
Add $Q_{offMBMS}$ To Cell Quality and Power Measurements
611
Calculate Cell Rankings
615
Perform Reselection Decision
617
End

Fig. 6

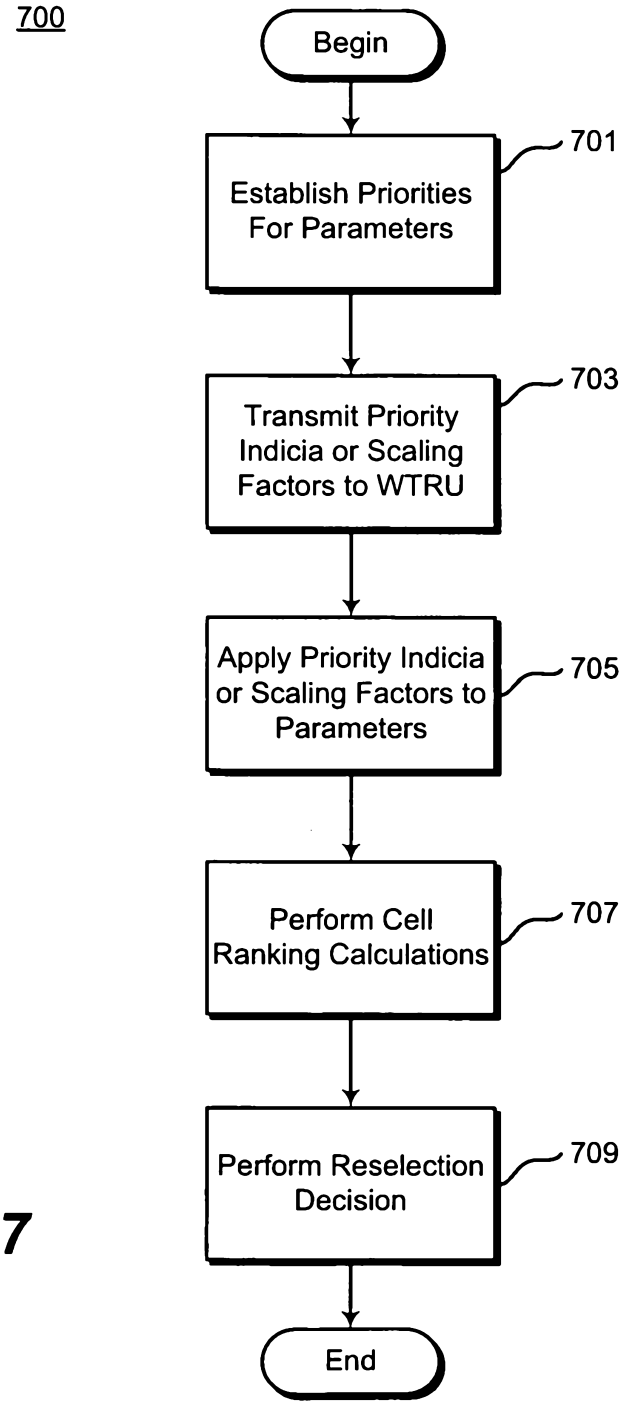
700
Begin
Establish Priorities For Parameters
701
Transmit Priority Indicia or Scaling Factors to WTRU
703
Apply Priority Indicia or Scaling Factors to Parameters
705
Perform Cell Ranking Calculations
707
Perform Reselection Decision
709
End

Fig. 7