United States Patent [19]

Rudrapatna et al.

[11] Patent Number: **6,052,598**

[45] Date of Patent: **Apr. 18, 2000**

[54] **METHOD FOR PREDICTING THE LOCATION OF A MOBILE STATION IN A MOBILE COMMUNICATIONS NETWORK**

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[21] Appl. No.: **08/941,231**

[22] Filed: **Sep. 30, 1997**

[51] **Int. Cl.**[7] **H04Q 7/20**

[52] **U.S. Cl.** **455/456**; 455/441; 455/436

[58] **Field of Search** .... 455/429, 432, 455/436, 438, 437, 439, 440, 441, 442, 443, 422, 456, 525, 38.3, 524, 435, FOR 101, FOR 102, FOR 103; 379/FOR 105

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[57] **ABSTRACT**

The approximate position of a mobile station in a cell can be predicted by measuring the signal strength between the mobile station and the base station of the cell in which it is located and the base stations of the neighboring cells. After a series of instantaneous signal strength measurements have been collected, the velocity and direction of the mobile unit can be determined. Based on the velocity and direction of the mobile unit, future locations of the mobile unit can be predicted including the projected signal strength between the mobile station and the base stations of the cell in which it is located and neighboring cells. Analyzing the projected signal strength values, the time when the mobile unit will require handover to a neighboring cell can be determined and if desired, resources in a neighboring cell can be allocated in anticipation of the mobile unit being handed over to that cell. New signal strength measurements are periodically collected and new projections are made to increase the accuracy of the estimate of when handover will occur and to what neighboring cell.

15 Claims, 3 Drawing Sheets
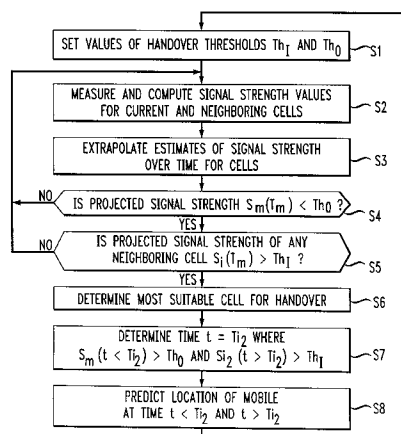
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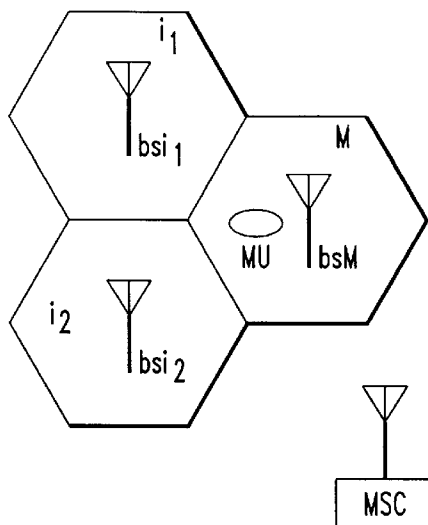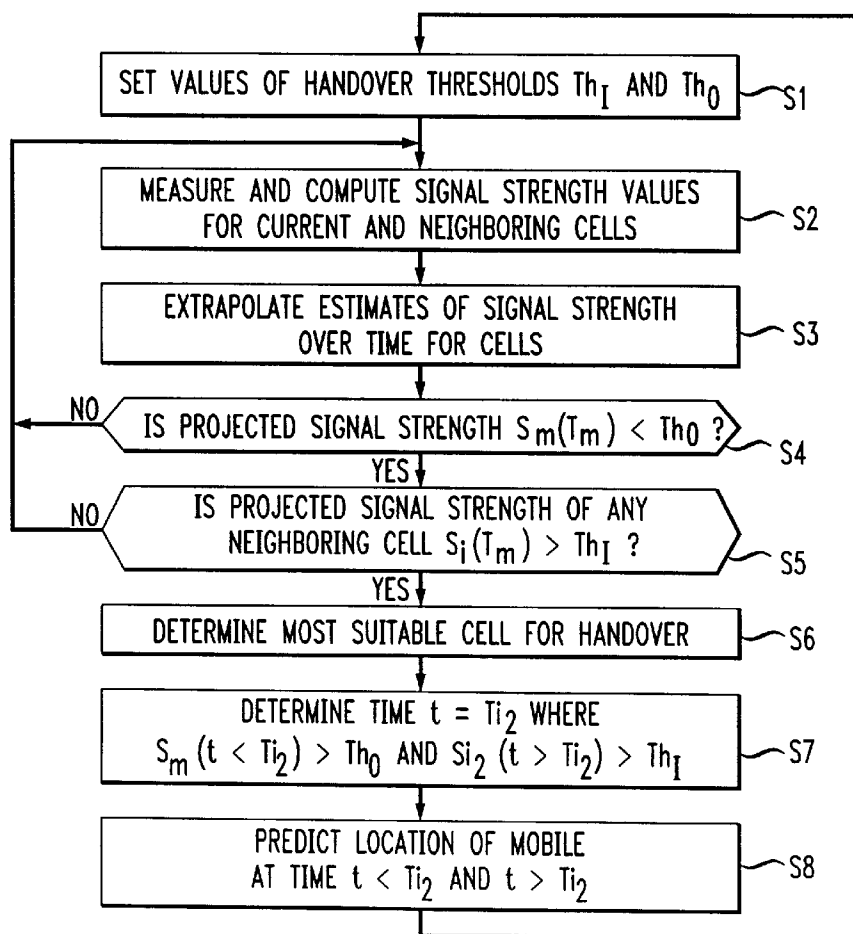
FIG. 1

FIG. 2

SET VALUES OF HANDOVER THRESHOLDS Th_I AND Th_0 — S1

MEASURE AND COMPUTE SIGNAL STRENGTH VALUES FOR CURRENT AND NEIGHBORING CELLS — S2

EXTRAPOLATE ESTIMATES OF SIGNAL STRENGTH OVER TIME FOR CELLS — S3

IS PROJECTED SIGNAL STRENGTH $S_m(T_m) < Th_0$? — S4

NO

YES

IS PROJECTED SIGNAL STRENGTH OF ANY NEIGHBORING CELL $S_i(T_m) > Th_I$? — S5

NO

YES

DETERMINE MOST SUITABLE CELL FOR HANDOVER — S6

DETERMINE TIME $t = T_{i2}$ WHERE $S_m(t < T_{i2}) > Th_0$ AND $Si_2(t > T_{i2}) > Th_I$ — S7

PREDICT LOCATION OF MOBILE AT TIME $t < T_{i2}$ AND $t > T_{i2}$ — S8
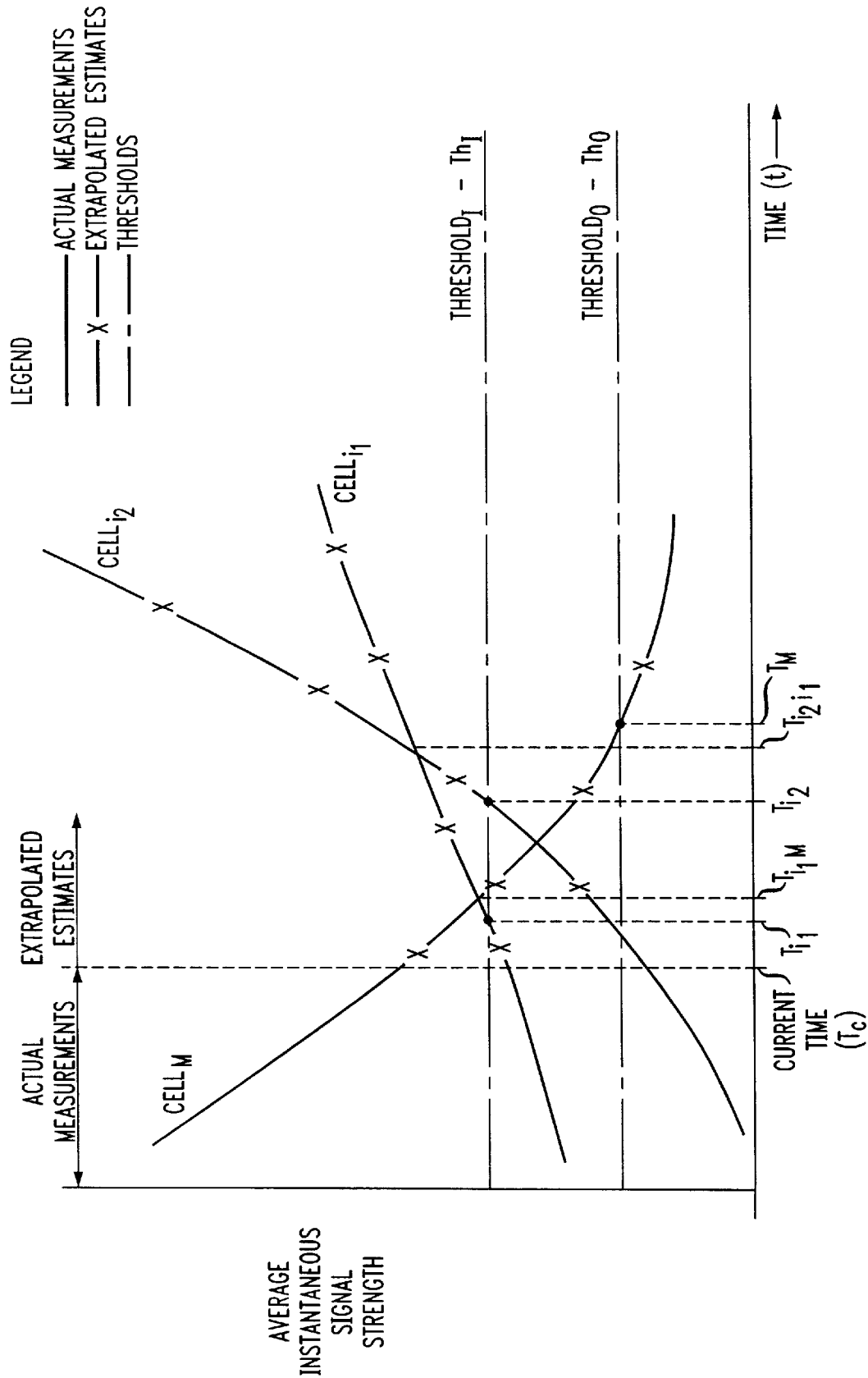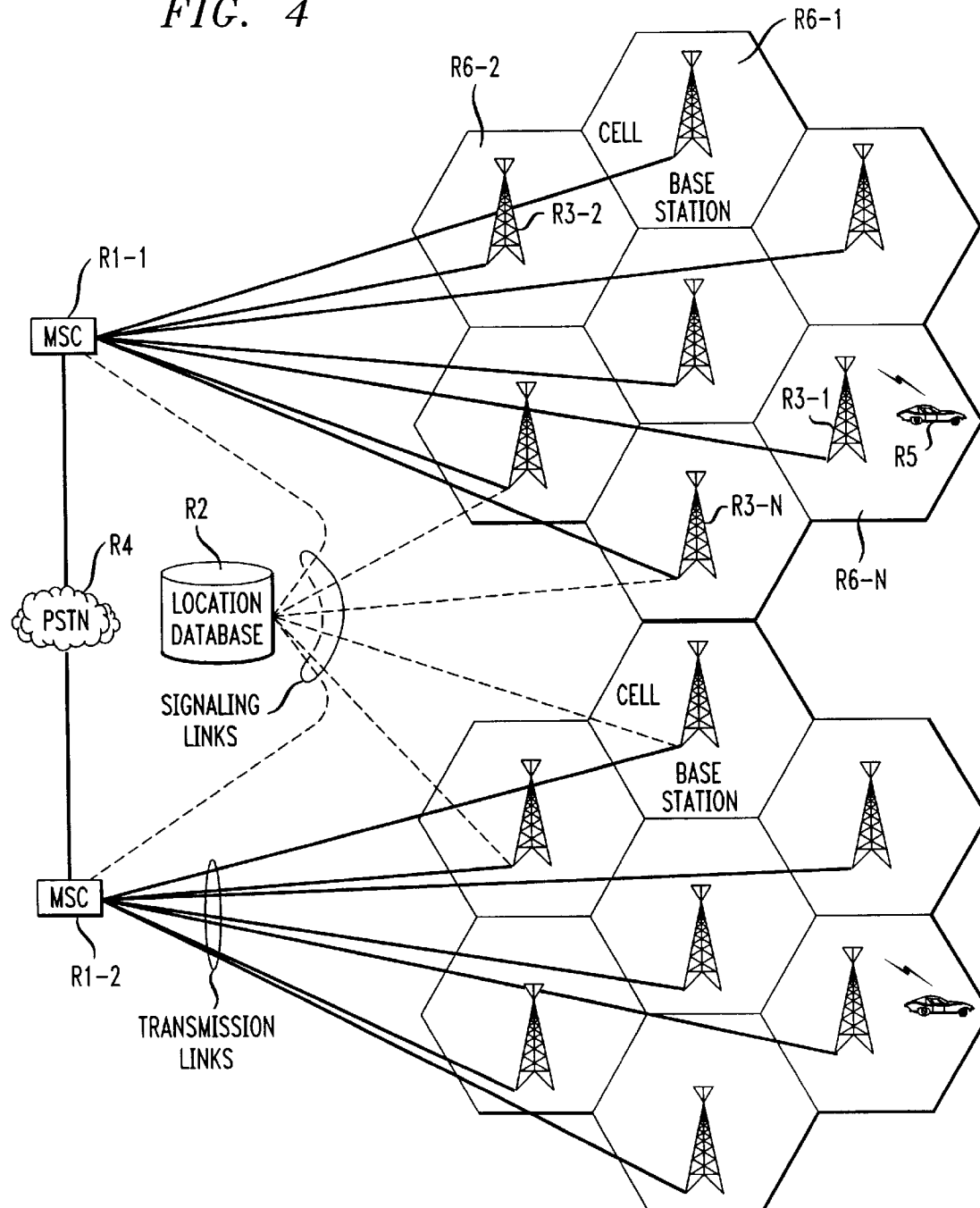
FIG. 3

FIG. 4

DOCKET ALARM

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