



(12) **United States Patent**  
**Cuffaro et al.**

(10) **Patent No.:** **US 6,418,317 B1**  
(45) **Date of Patent:** **Jul. 9, 2002**

(54) **METHOD AND SYSTEM FOR MANAGING FREQUENCIES ALLOCATED TO A BASE STATION**

(75) Inventors: **Angelo Cuffaro**, Pierrefonds; **Michel Desgagné**, St-Hubert, both of (CA); **Arne Simonsson**, Gammelstad (SE)

(73) Assignee: **Telefonaktiebolaget LM Ericsson (publ)**, Stockholm (SE)

(\*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **09/452,566**

(22) Filed: **Dec. 1, 1999**

(51) **Int. Cl.**<sup>7</sup> ..... **H04Q 7/20**

(52) **U.S. Cl.** ..... **455/450; 455/62; 455/452; 455/509**

(58) **Field of Search** ..... 455/446, 450, 455/451, 452, 453, 447, 509, 62

(56) **References Cited**

**U.S. PATENT DOCUMENTS**

|              |   |         |                   |       |         |
|--------------|---|---------|-------------------|-------|---------|
| 5,280,630 A  | * | 1/1994  | Wang              | ..... | 455/450 |
| 5,490,137 A  | * | 2/1996  | Hulsebosch et al. | ..... | 455/450 |
| 5,666,655 A  | * | 9/1997  | Ishikawa et al.   | ..... | 455/450 |
| 5,701,590 A  |   | 12/1997 | Fujinami          | ..... | 455/62  |
| 5,737,705 A  | * | 4/1998  | Ruppel et al.     | ..... | 455/452 |
| 5,898,928 A  | * | 4/1999  | Karlsson et al.   | ..... | 455/450 |
| 6,295,453 B1 | * | 9/2001  | Desgagne et al.   | ..... | 455/450 |

**FOREIGN PATENT DOCUMENTS**

|    |              |         |
|----|--------------|---------|
| EP | 0 817 521 A2 | 6/1997  |
| EP | 1022921      | 1/2000  |
| WO | WO 9713388   | 4/1997  |
| WO | WO 9732444   | 9/1997  |
| WO | WO 98/48586  | 4/1998  |
| WO | WO 98/56204  | 6/1998  |
| WO | WO 9905878   | 2/1999  |
| WO | WO 0060896   | 10/2000 |

**OTHER PUBLICATIONS**

International Search Report, PCT/SE00/02270, dated May 28, 2001.

\* cited by examiner

*Primary Examiner*—William Trost

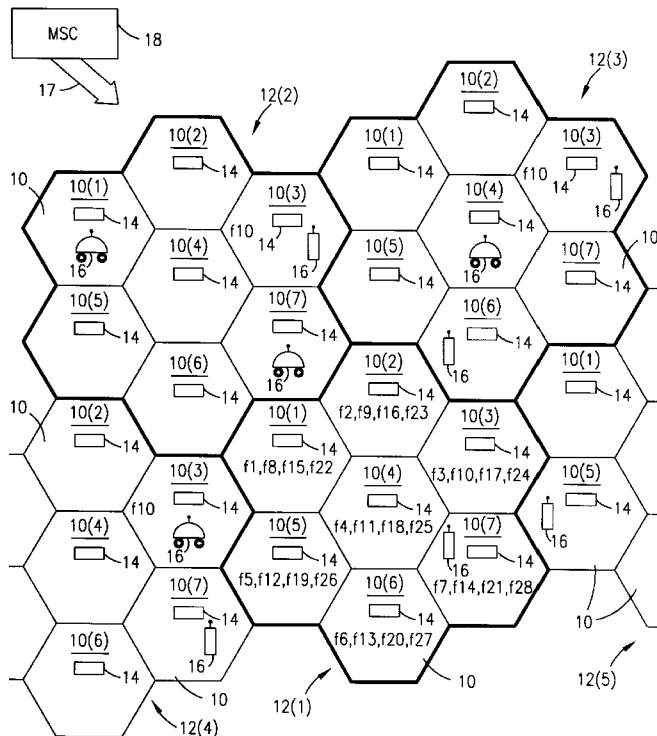
*Assistant Examiner*—Simon Nguyen

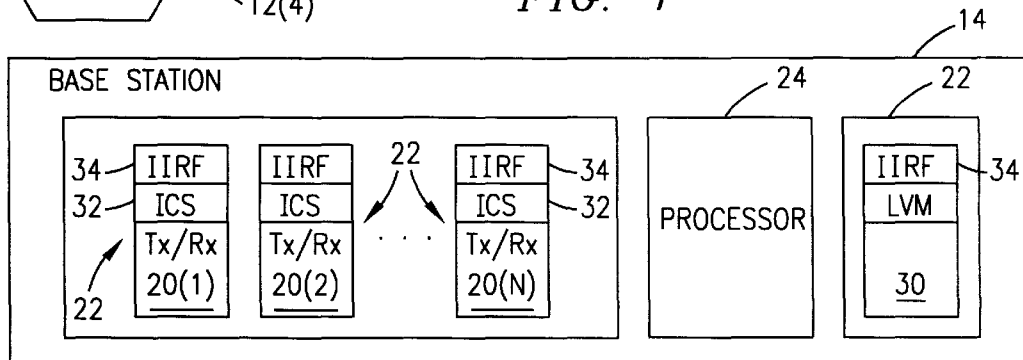
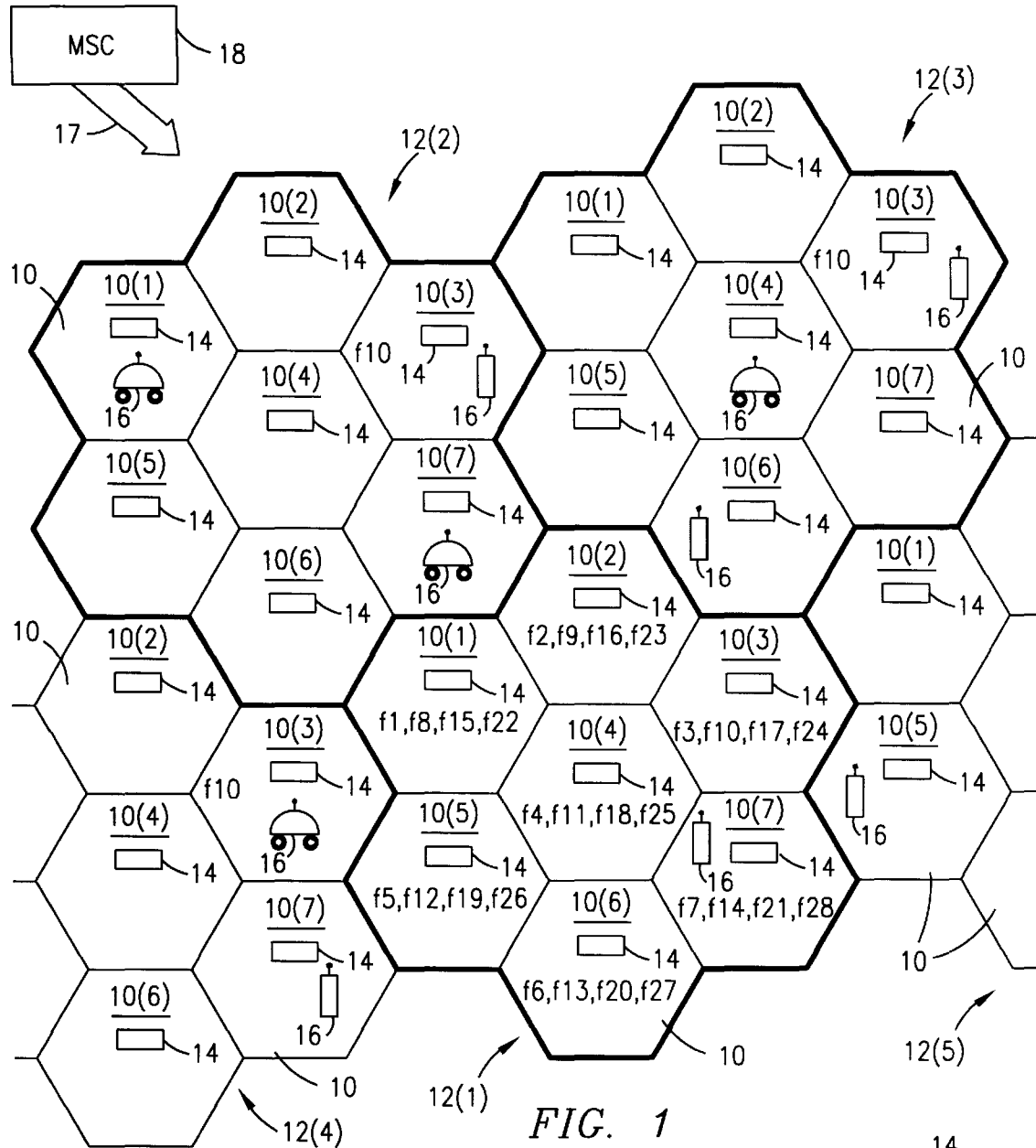
(74) *Attorney, Agent, or Firm*—Jenkins & Gilchrist; Sandra Beauchesne

(57) **ABSTRACT**

The present invention is a method and system for managing frequencies allocated to a cell within a cellular network to assign certain ones of those allocated frequencies for use by channel equipment within that cell. The method measures at least one quality metric for each of the allocated frequencies. At least one measured quality metric for the unassigned frequencies are compared against at least one quality metric for the assigned frequencies. An unassigned frequency is swapped for an assigned frequency based upon the comparison step. Additionally, a voting step is used to indicate that either the unassigned frequency or the assigned frequency has a higher signal quality for communication.

**34 Claims, 6 Drawing Sheets**





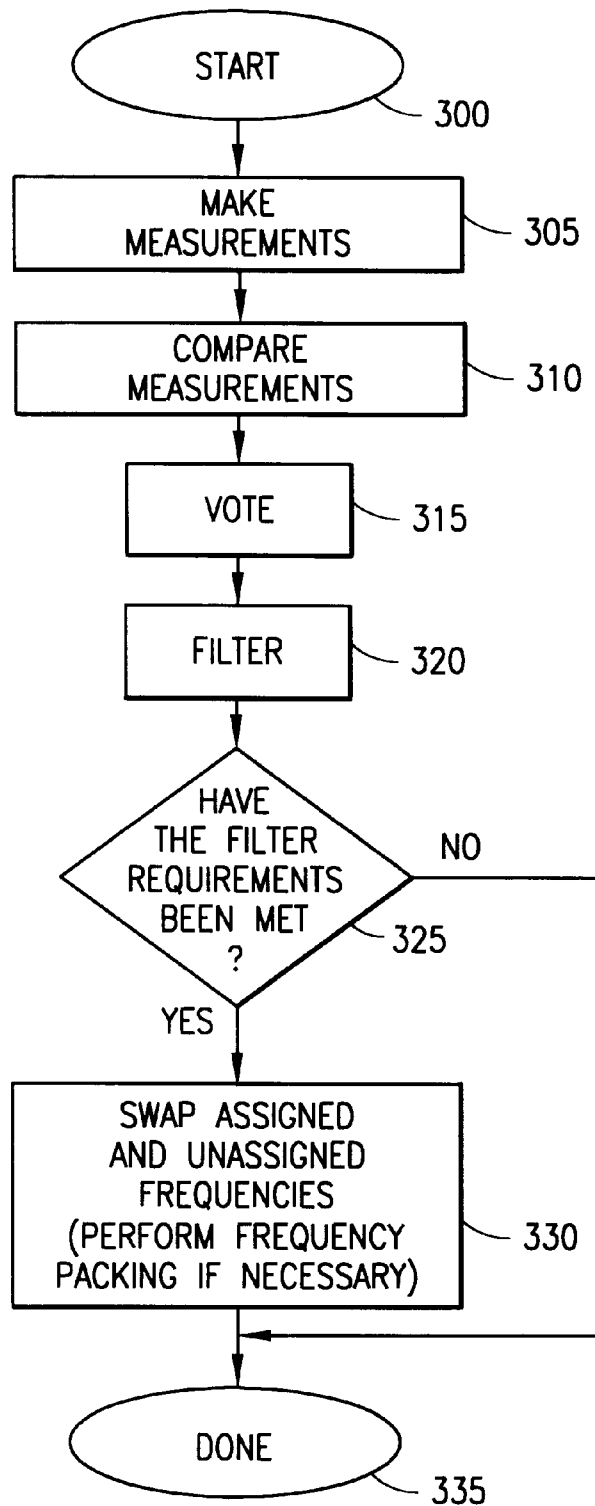


FIG. 3

| 400<br>FREQUENCY | 405<br>INTERFERENCE<br>(dBm) | 410<br>USE | 415<br>ASSIGNED |
|------------------|------------------------------|------------|-----------------|
| F1               |                              | USED       | ASSIGNED        |
| F8               |                              | USED       | ASSIGNED        |
| F15              | -117                         | IDLE       | ASSIGNED        |
| F22              | -106                         | IDLE       | ASSIGNED        |
| F29              | -110                         |            | UNASSIGNED      |
| F36              | -105                         |            | UNASSIGNED      |
| F43              | -118                         |            | UNASSIGNED      |
| F50              | -95                          |            | UNASSIGNED      |

*FIG. 4*

|            |  |      |    |             |           |
|------------|--|------|----|-------------|-----------|
|            |  | USED |    | 510<br>IDLE |           |
| ASSIGNED   |  | F1   | F8 | F15         | F22 ← 505 |
| UNASSIGNED |  |      |    |             |           |
| F29        |  |      |    | -1          | +1        |
| F36        |  |      |    | -1          | -1        |
| 515 → F43  |  |      |    | -1          | +1        |
| F50        |  |      |    | -1          | -1        |

500 ↑

Note: +3dB hysteresis added to each unassigned interference measurement before voting

**FIG. 5A**

|            |  |    |    |     |           |
|------------|--|----|----|-----|-----------|
|            |  |    |    |     |           |
| ASSIGNED   |  | F1 | F8 | F15 | F22 ← 505 |
| UNASSIGNED |  |    |    |     |           |
| F29        |  | +2 | -6 | +2  | -4        |
| F36        |  | -8 | -8 | -6  | -6        |
| 515 → F43  |  | +6 | +6 | +8  | +6        |
| F50        |  | -8 | -8 | -6  | -4        |

500 ↑

**FIG. 5B**

# Explore Litigation Insights

Docket Alarm provides insights to develop a more informed litigation strategy and the peace of mind of knowing you're on top of things.

## Real-Time Litigation Alerts



Keep your litigation team up-to-date with **real-time alerts** and advanced team management tools built for the enterprise, all while greatly reducing PACER spend.

Our comprehensive service means we can handle Federal, State, and Administrative courts across the country.

## Advanced Docket Research



With over 230 million records, Docket Alarm's cloud-native docket research platform finds what other services can't. Coverage includes Federal, State, plus PTAB, TTAB, ITC and NLRB decisions, all in one place.

Identify arguments that have been successful in the past with full text, pinpoint searching. Link to case law cited within any court document via Fastcase.

## Analytics At Your Fingertips



Learn what happened the last time a particular judge, opposing counsel or company faced cases similar to yours.

Advanced out-of-the-box PTAB and TTAB analytics are always at your fingertips.

## API

Docket Alarm offers a powerful API (application programming interface) to developers that want to integrate case filings into their apps.

## LAW FIRMS

Build custom dashboards for your attorneys and clients with live data direct from the court.

Automate many repetitive legal tasks like conflict checks, document management, and marketing.

## FINANCIAL INSTITUTIONS

Litigation and bankruptcy checks for companies and debtors.

## E-DISCOVERY AND LEGAL VENDORS

Sync your system to PACER to automate legal marketing.