



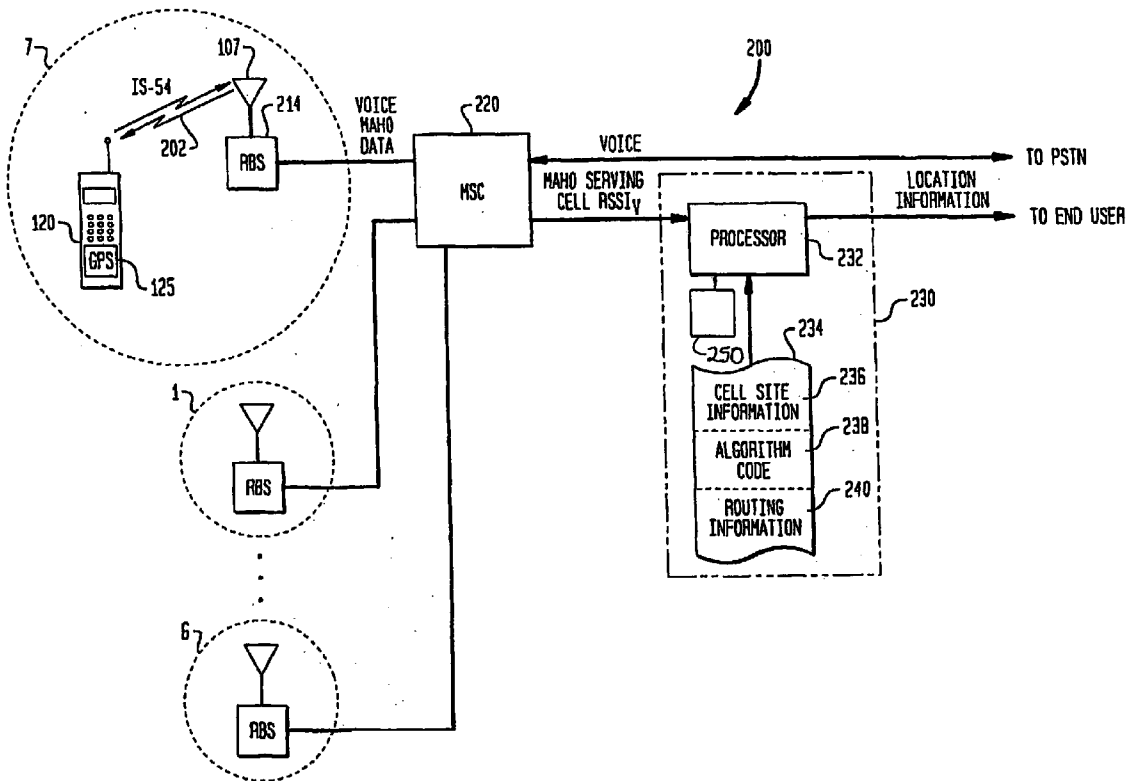
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(19) **United States**(12) **Patent Application Publication**  
**MacDonald et al.**(10) **Pub. No.: US 2004/0152471 A1**(43) **Pub. Date: Aug. 5, 2004**(54) **METHODS AND APPARATUS FOR MOBILE  
STATION LOCATION ESTIMATION****Publication Classification**(76) Inventors: **Alan Denis MacDonald**, Bellevue, WA  
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(US); **John Lawrence Snapp**,  
Sammamish, WA (US)(51) **Int. Cl.<sup>7</sup> ..... H04Q 7/00**(52) **U.S. Cl. .... 455/456.1; 455/456.5**Correspondence Address:  
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**PORTLAND, OR 97204 (US)**(57) **ABSTRACT**

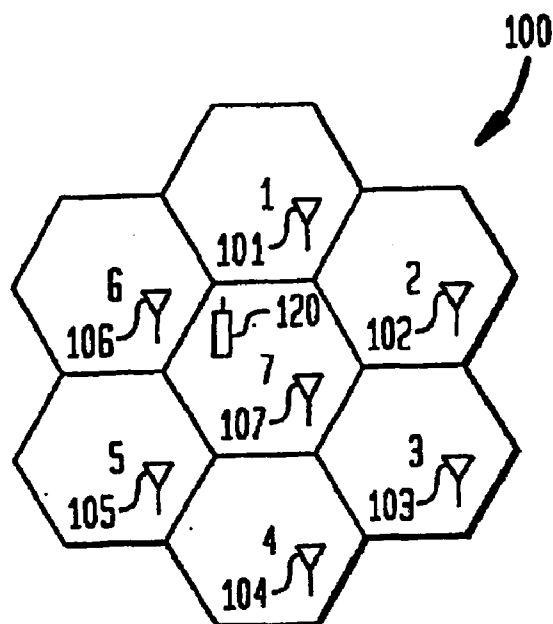
Methods and apparatus for estimating mobile station location include receiving reported signal strengths or other attachment indicator values from a mobile station. The reported signal strengths are compared with characteristic received signal strength values in a coverage area of a mobile network. A mobile switching center determines if a location function is requested and initiates a location estimation process by a mobile location module (MLM). The MLM receives the reported signal strength contours associated with the attachment points. Based on a comparison of the reported attachment indicator values with characteristic values, the MLM provides a mobile location estimate.

(21) Appl. No.: **10/473,926**(22) PCT Filed: **Apr. 3, 2002**(86) PCT No.: **PCT/US02/10791****Related U.S. Application Data**

(60) Provisional application No. 60/281,147, filed on Apr. 3, 2001.



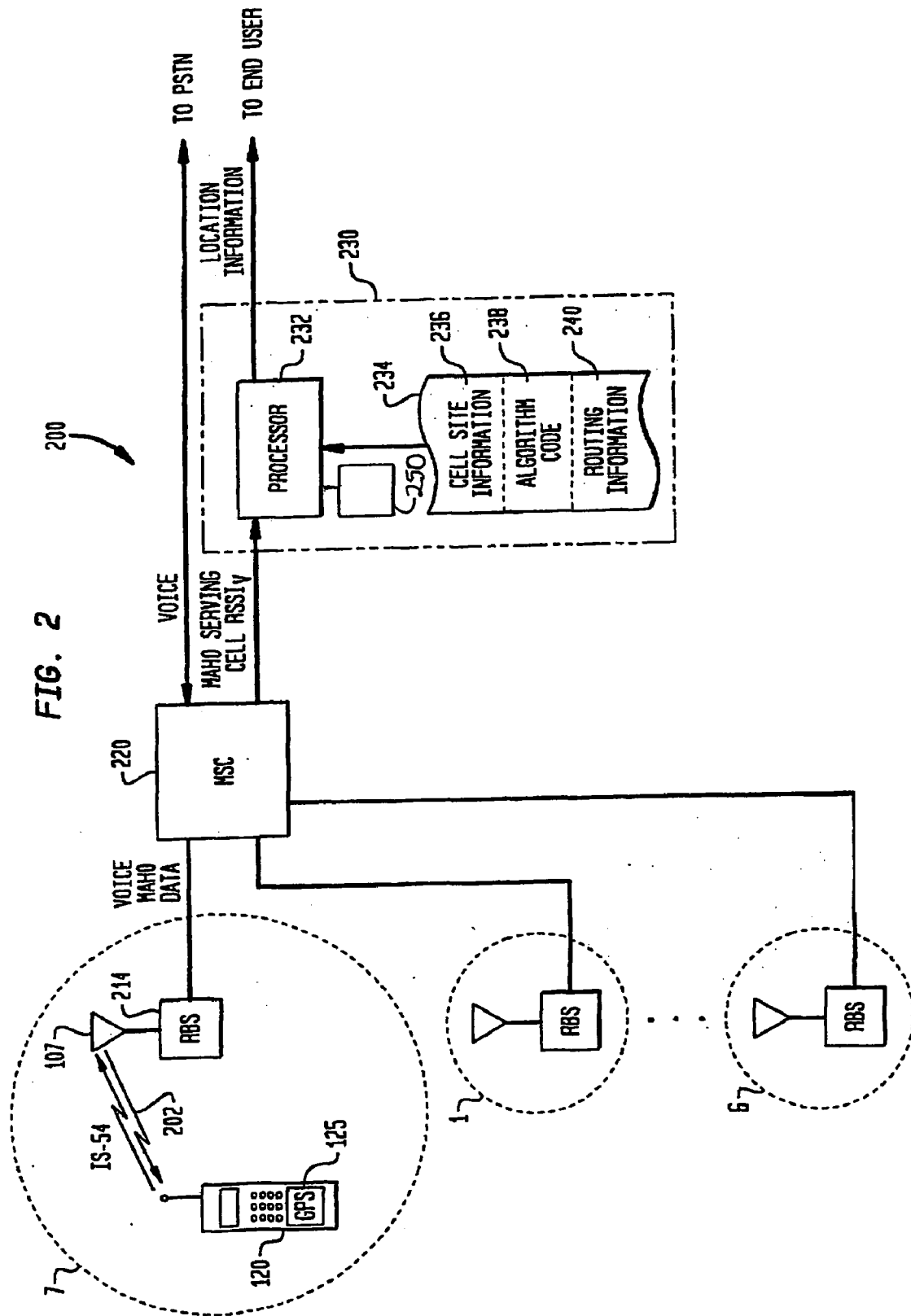
**FIG. 1**



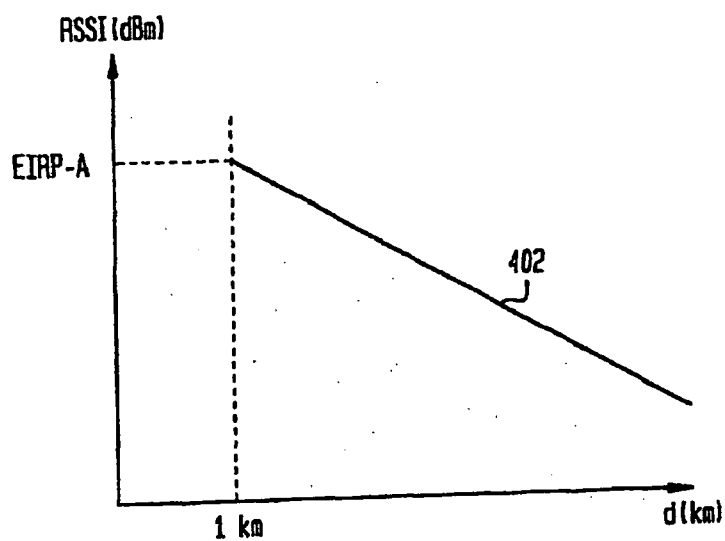
**FIG. 3**

Diagram illustrating a table 300 mapping cells to SS values. The table has two columns: CELL and SS. The rows are numbered 1 through 6, corresponding to the cells in FIG. 1. The SS values are RSSI<sub>1</sub> through RSSI<sub>6</sub>.

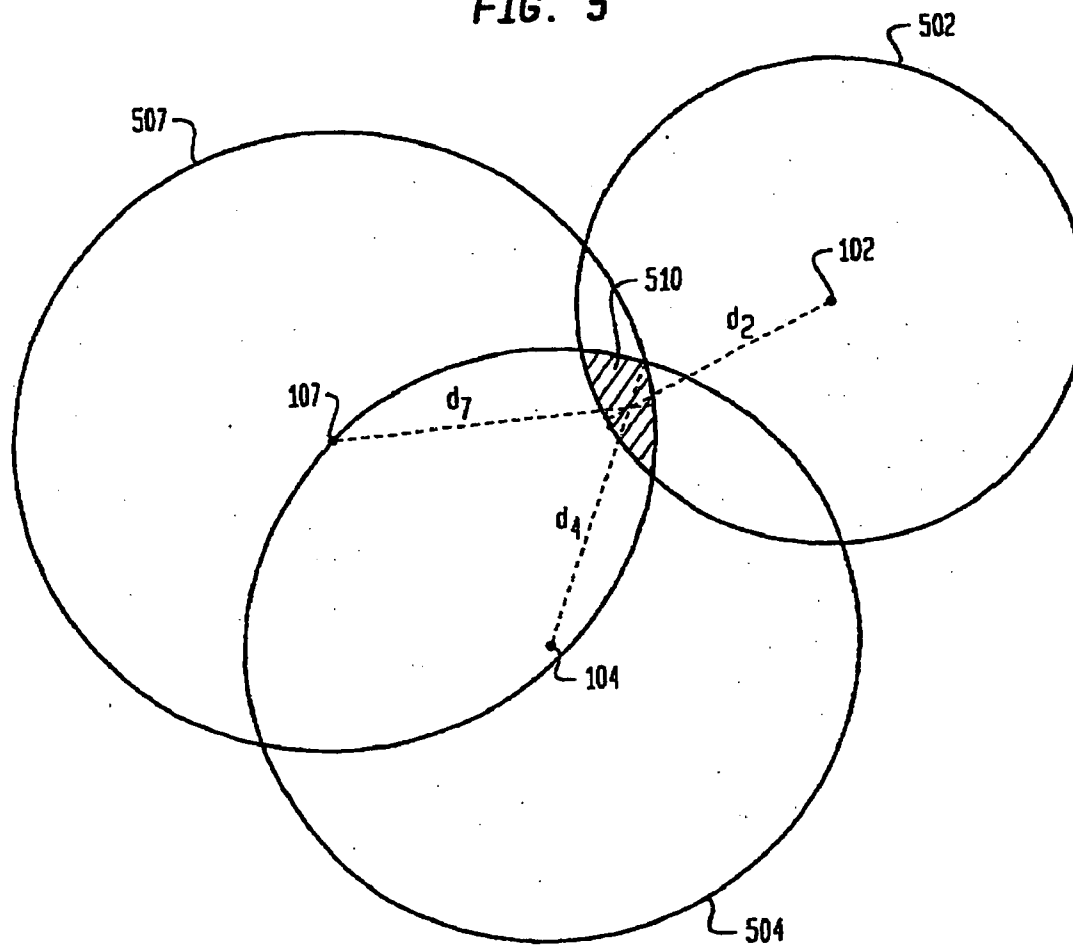
CELL	SS
1	RSSI <sub>1</sub>
2	RSSI <sub>2</sub>
3	RSSI <sub>3</sub>
4	RSSI <sub>4</sub>
5	RSSI <sub>5</sub>
6	RSSI <sub>6</sub>



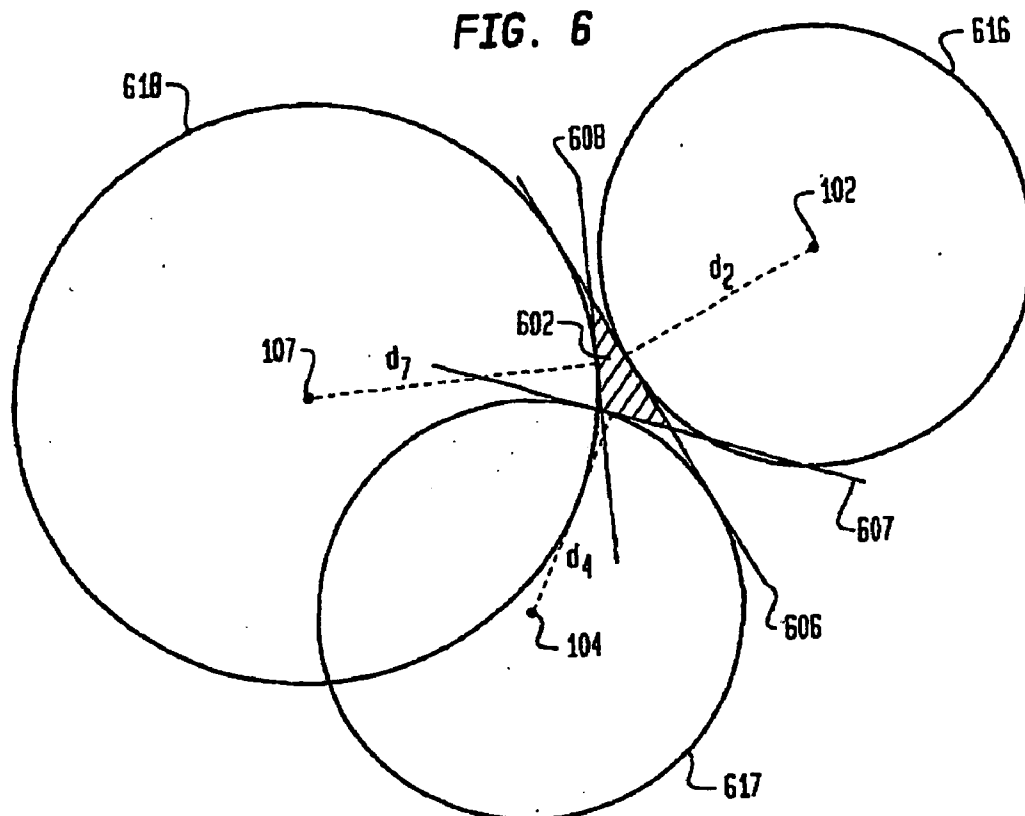
**FIG. 4**



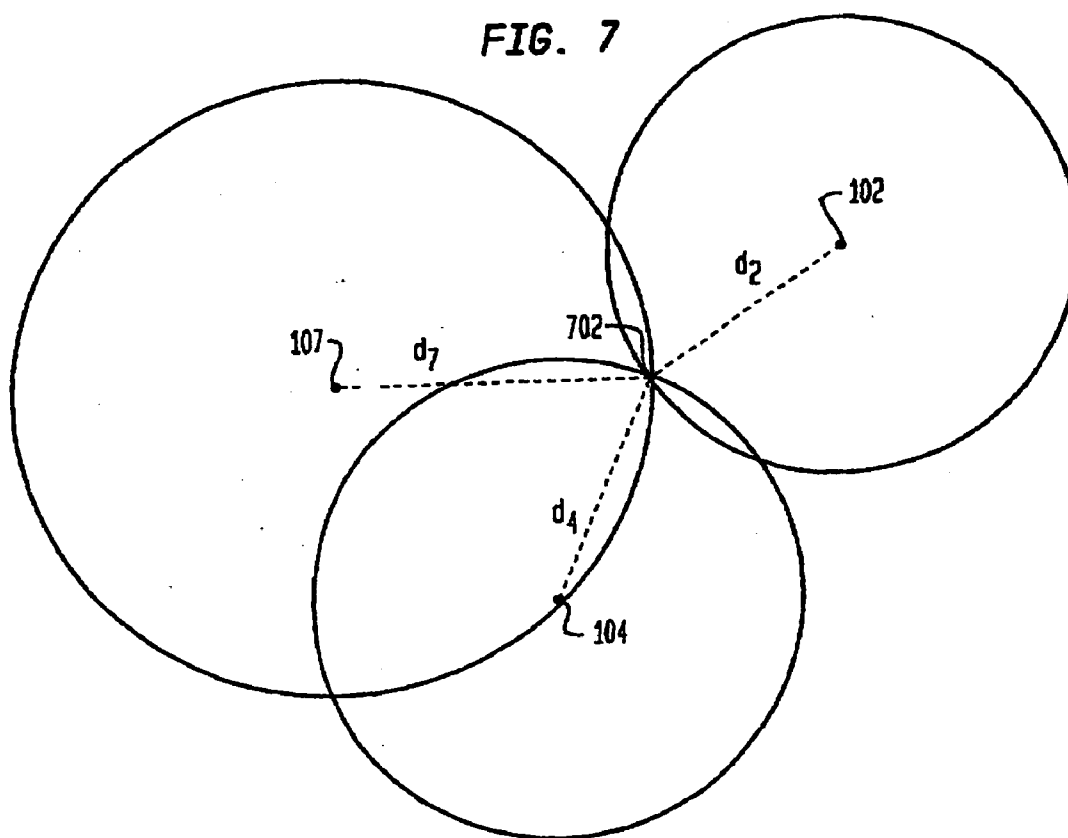
**FIG. 5**



**FIG. 6**



**FIG. 7**



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