

CORRECTED  
VERSION\*

PCT

WORLD INTELLECTUAL PROPERTY ORGANIZATION  
International Bureau



INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |  |    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|----|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| (51) International Patent Classification <sup>6</sup> :<br><b>G01S 5/00</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |  | A2 | (11) International Publication Number: <b>WO 99/57575</b><br>(43) International Publication Date: 11 November 1999 (11.11.99)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| (21) International Application Number: PCT/US99/08270<br>(22) International Filing Date: 13 April 1999 (13.04.99)<br>(30) Priority Data:<br>09/073,107 5 May 1998 (05.05.98) US<br>(71) Applicant: SNAPTRACK, INC. [US/US]; Suite 250, 4040 Moorpark Avenue, San Jose, CA 95117 (US).<br>(72) Inventor: SHEYNBLAT, Leonid; 1208 North Road, Belmont, CA 94002 (US).<br>(74) Agents: SCHELLER, James, C., Jr. et al.; Blakely, Sokoloff, Taylor & Zafman LLP, 7th floor, 12400 Wilshire Boulevard, Los Angeles, CA 90025 (US).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |  |    | (81) Designated States: AE, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, UZ, VN, YU, ZA, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SL, SZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).<br><br><b>Published</b><br><i>Without international search report and to be republished upon receipt of that report.</i> |
| (54) Title: METHOD AND SYSTEM FOR USING ALTITUDE INFORMATION IN A SATELLITE POSITIONING SYSTEM                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |  |    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| (57) Abstract<br><p>A method and apparatus for determining a position of a mobile satellite positioning system (SPS) receiver. In one example of a method, a cell object information is determined; this cell object information comprises at least one of a cell object location or a cell object identification. An altitude is determined from the cell object information which is selected based upon a cell site transmitter which is in wireless communication with a cell based communication system which is coupled to (and typically integrated with) the mobile SPS receiver. The position of the mobile SPS receiver is calculated using the altitude which is determined from the cell object information. In another example of a method, an altitude pseudomeasurement is determined from an estimate of an altitude of the mobile SPS receiver. This estimate of the altitude may be from a cell based information source in a cell based system or may be an average altitude of the area of radio coverage of a wireless base station in the non-cell based system. The altitude pseudomeasurement may be used as a redundant measurement with fault detection and isolation techniques to determine whether at least one pseudorange has a faulty condition. Alternatively (or in addition), a comparison of the estimated altitude to a calculated altitude determines a condition of at least one pseudorange between an SPS satellite and the mobile SPS receiver. In one embodiment of this example, the position is determined from a position solution algorithm, and if the condition is a first state (not a fault state) the at least one pseudorange is used in the position solution algorithm.</p> |  |    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |

\*(Referred to in PCT Gazette No. 8/2000, Section II)