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WORLD INTELLECTUAL PROPERTY ORGANIZATION
International Bureau

INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification ⁶ : G01S 5/14	A1	(11) International Publication Number: WO 99/54752 (43) International Publication Date: 28 October 1999 (28.10.99)
(21) International Application Number: PCT/US99/07989 (22) International Filing Date: 12 April 1999 (12.04.99) (30) Priority Data: 09/064,673 22 April 1998 (22.04.98) US (71) Applicant: SNAPTRACK, INC. [US/US]; Suite 250, 4040 Moorpark Avenue, San Jose, CA 95117 (US). (72) Inventor: SHEYNBLAT, Leonid; 1208 North Road, Belmont, CA 94002 (US). (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). Published <i>With international search report.</i>
(54) Title: SATELLITE POSITIONING SYSTEM AUGMENTATION WITH WIRELESS COMMUNICATION SIGNALS		
(57) Abstract		
A method and apparatus for processing position information from satellite positioning system satellites and from cellular based communication signals. In one example of a method according to the invention, a SPS receiver receives SPS signals from at least one SPS satellite. This SPS receiver is coupled to and typically integrated with a communication system which receives and transmits messages in a cell based communication system. In this method, a message is transmitted in the cell based communication signals between a communication system and a first cell based transceiver. A time measurement which represents a time of travel of a message in the cell based communication signals between the cell based transceiver and the communication system is determined. Another time measurement which represents a time of travel of the SPS signals is also determined. A position of the SPS receiver is determined from a combination of at least the time measurement which represents the time of travel of a message in the cell based communication signals and from a time measurement which represents a time of travel of the SPS signals. The cell based communication signals are capable of communicating data messages in a two-way direction in one embodiment between the cell based transceiver and the communication system.		<pre> graph TD 201[Receive GPS Signals and Determine at Least One Pseudorange Which Represents a Time of Travel of a GPS Signal From a GPS Satellite to the Mobile GPS Receiver] --> 203[Transmit Wireless Cell Based Communication Signals Between a Communication System Which is Integrated With the Mobile GPS Receiver and a First Wireless Cell Based Transceiver (Such as a Cellular Telephone Cell Site)] 203 --> 205[Determine Time Measurement Which Represents a Time of Travel of a Message in the Wireless Cell Based Communication Signals Between the Communication System and the First Wireless Cell Based Transceiver] 205 --> 207[Determine Position of GPS Satellite and Position of 1st Wireless Cell Based Transceiver] 207 --> 209[Determine Position of GPS Receiver From Pseudorange to GPS Satellite, Time Measurement of Message in Wireless Cell Based Communication Signals, GPS Satellite Ephemeris and Position of First Wireless Cell Based Transceiver and at Least one of (a) Another Pseudorange to Another GPS Satellite, or (b) Another Time Measurement of Wireless Cell Based Signals Between the Communication System and Another Wireless Cell Based Transceiver] </pre>