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CA, CH, CL, CN, CO, CR, CU, CV, CZ, DE, DJ, DK, DM,
DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT,
HN, HR, HU, ID, IL, IN, IQ, IR, IS, IT, JM, JO, JP, KE, KG,
KH, KN, KP, KR, KW, KZ, LA, LC, LK, LR, LS, LU, LY,
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NG, NI, NO, NZ, OM, PA, PE, PG, PH, PL, PT, QA, RO,
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(54) Title: RECEIVER STATE BASED ANTENNA TUNING

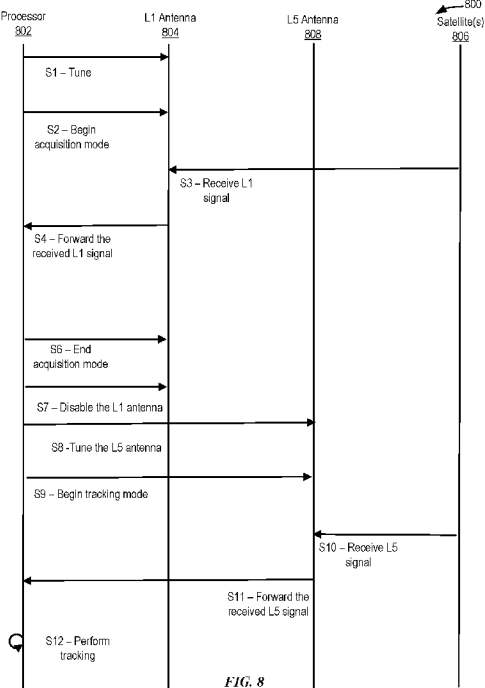


FIG. 8

(57) Abstract: In some implementations, the disclosed techniques may include tuning a first antenna element to a first tuning state during an acquisition mode for establishing communication channels with satellites. The first tuning state can configure the first antenna element to receive signals in a first frequency range. The techniques may include establishing the communication channels using the first antenna element in the first tuning state during the acquisition mode. The techniques may include transitioning from the acquisition mode to a tracking mode. The techniques may include changing the tuning state of the first antenna element. The techniques may include determining a location of the mobile device during the tracking mode: (1) using the first antenna element and a second antenna element of the mobile device or (2) not using the first antenna element and using the second antenna element that is configured to receive signals in a second frequency range.

SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN,
GQ, GW, KM, ML, MR, NE, SN, TD, TG).

Published:

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- *before the expiration of the time limit for amending the
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INTERNATIONAL SEARCH REPORT

International application No

PCT/US2024/031317

A. CLASSIFICATION OF SUBJECT MATTER				
INV.	G01S19/24	G01S19/32	G01S19/34	G01S19/36
ADD.				
According to International Patent Classification (IPC) or to both national classification and IPC				
B. FIELDS SEARCHED				
Minimum documentation searched (classification system followed by classification symbols)				
G01S				
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched				
Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)				
EPO-Internal				
C. DOCUMENTS CONSIDERED TO BE RELEVANT				
Category*	Citation of document, with indication, where appropriate, of the relevant passages			Relevant to claim No.
X	US 2022/283551 A1 (ATMATZAKIS GEORGIOS			1-9,22,
	[US] ET AL) 8 September 2022 (2022-09-08)			23
Y	par. 2, 34, 50-52, 71, 72			10-12,
	-----			22,23
	- / - -			
☒ Further documents are listed in the continuation of Box C.				
☒ See patent family annex.				
* Special categories of cited documents :				
"A" document defining the general state of the art which is not considered to be of particular relevance				
"E" earlier application or patent but published on or after the international filing date				
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"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention				
"X" document of particular relevance;; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone				
"Y" document of particular relevance;; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art				
"&" document member of the same patent family				
Date of the actual completion of the international search			Date of mailing of the international search report	
12 February 2025			25/02/2025	
Name and mailing address of the ISA/ European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016			Authorized officer González Moreno, J	

INTERNATIONAL SEARCH REPORT

International application No

PCT/US2024/031317

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	LENNEN GARY ET AL: "Deep Integration of GNSS Receiver Functions into High Volume Platforms", GNSS 2019 - PROCEEDINGS OF THE 32ND INTERNATIONAL TECHNICAL MEETING OF THE SATELLITE DIVISION OF THE INSTITUTE OF NAVIGATION (ION GNSS+ 2019), THE INSTITUTE OF NAVIGATION, 8551 RIXLEW LANE SUITE 360 MANASSAS, VA 20109, USA, 20 September 2019 (2019-09-20), pages 200-220, XP056015579, DOI: 10.33012/2019.16980	1-6,8,9, 22,23
Y	p. 202, 207; fig. 4	10-12, 22,23

X	Turetzky Greg ET AL: "A Pure L5 Mobile Receiver", Inside GNSS, 30 September 2020 (2020-09-30), XP093021789, Retrieved from the Internet: URL:https://insidegnss.com/a-pure-l5-mobile-receiver/ [retrieved on 2023-02-07]	1-9
Y	p. 5, paragraph "Extra receive chain"	10-12, 22,23

Y	EP 2 120 061 B1 (RESEARCH IN MOTION LTD [CA]) 23 March 2011 (2011-03-23) par. 16-47	10-12, 22,23

X	US 2017/177045 A1 (SEO EUI SEONG [KR] ET AL) 22 June 2017 (2017-06-22)	13-19, 21-23
A	fig. 2; par. 100-323	20

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2024/031317

Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:
2. ☐ Claims Nos.:
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:
3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

see additional sheet

1. ☒ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying an additional fees, this Authority did not invite payment of additional fees.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims;; it is covered by claims Nos.:

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.
- ☐ The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.
- ☒ No protest accompanied the payment of additional search fees.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claims: 1-9 (completely); 22, 23 (partially)

Power saving and increased accuracy techniques for positioning of a mobile device with reception of different frequency bands

2. claims: 10-12 (completely); 22, 23 (partially)

Adapting multi-frequency GNSS reception to thermal states to mitigate errors

3. claims: 13-21 (completely); 22, 23 (partially)

Implementing thermal stability of a mobile device receiving GNSS signals.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/US2024/031317

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2022283551	A1	08-09-2022	NONE
EP 2120061	B1	23-03-2011	AT E503197 T1 15-04-2011
		CA 2665540 A1	09-11-2009
		EP 2120061 A1	18-11-2009
US 2017177045	A1	22-06-2017	NONE