

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property
Organization
International Bureau

(43) International Publication Date
07 July 2022 (07.07.2022)



(10) International Publication Number
WO 2022/144869 A1

(51) International Patent Classification:

H04L 43/0864 (2022.01) *H04W 88/02* (2022.01)
H04W 4/029 (2022.01) *H04W 24/10* (2022.01)
G01S 5/14 (2022.01)

(21) International Application Number:

PCT/IL2021/051484

(22) International Filing Date:

13 December 2021 (13.12.2021)

(25) Filing Language:

English

(26) Publication Language:

English

(30) Priority Data:

279913 31 December 2020 (31.12.2020) IL

(71) Applicant: **ELTA SYSTEMS LTD.** [IL/IL]; 100 Yitzchak Hanassi Blvd., P.O.B. 330, 7710201 Ashdod (IL).

(72) Inventors: **FIREAIZEN, Moshe**; 55 HaCarmel Street, 4420519 Kfar Saba (IL). **LIPKIN, Yiftah**; 5 Tsfanya Street, 4433605 Kfar Saba (IL). **RAZON, Aharon**; 3 Bet-Zuri Eliyahu St., 6912203 Tel-Aviv (IL). **ELMAKIAS, Michael**; 10 Safiach St., 7763010 Ashdod (IL).

(74) Agent: **DYM, Susie**; REINHOLD COHN AND PARTNERS, P.O. Box 13239, 6113102 Tel Aviv (IL).

(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DJ, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IR, IS, IT, JO, JP, KE, KG, KH, KN, KP, KR, KW, KZ, LA, LC, LK, LR, LS, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA, SC, SD, SE, SG, SK, SL, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, WS, ZA, ZM, ZW.

(84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, ST, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, KM, ML, MR, NE, SN, TD, TG).

(54) Title: POSITIONING SYSTEM, METHOD AND COMPUTER PROGRAM PRODUCT UTILIZING INPUTS FROM GEOSTATIONARY COMMUNICATION SATELLITES

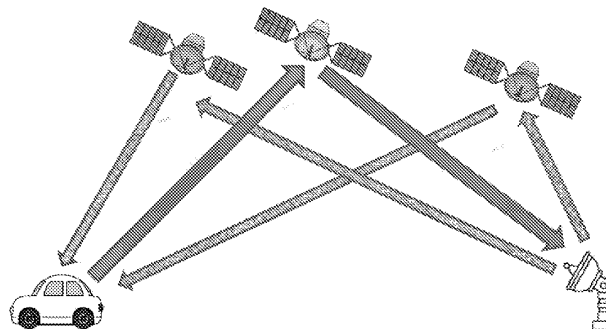


Figure 7

(57) Abstract: A navigation system comprising at least one terminal configured to at least once transmit, to a communicant, e.g. via $n \geq 1$ satellite/s, a request for a reply transmission and wherein the communicant, responsively, at least once transmits a response transmission to the terminal. The terminal measures the response transmission's time of arrival and/or round-trip time and determines a round-trip time characterizing the terminal's own communication, via each of the satellite/s, with the communicant, and/or the terminal's own range (aka distance) from each of the satellite/s. The terminal is configured to derive self-orientation data from at least said round-trip time and from internal delay data characterizing the at least one satellite and/or the communicant.

[Continued on next page]

WO 2022/144869 A1

Declarations under Rule 4.17:

— *of inventorship (Rule 4.17(iv))*

Published:

— *with international search report (Art. 21(3))*