



- (51) **International Patent Classification:**
H04W 88/04 (2009.01) **H04J 11/00** (2006.01)
H04B 7/14 (2006.01) **H04L 27/26** (2006.01)
- (21) **International Application Number:**
PCT/SG2011/000036
- (22) **International Filing Date:**
26 January 2011 (26.01.2011)
- (25) **Filing Language:** English
- (26) **Publication Language:** English
- (30) **Priority Data:**
201000591-6 26 January 2010 (26.01.2010) SG
- (71) **Applicant (for all designated States except US):** **AGENCY FOR SCIENCE, TECHNOLOGY AND RESEARCH** [SG/SG]; 1 Fusionopolis Way, #20-10 Connexis, Singapore 138632 (SG).
- (72) **Inventors; and**
- (75) **Inventors/Applicants (for US only):** **FUNG, Ho Wang, Patrick** [SG/SG]; c/o PKM, Institute for Infocomm Research, 1 Fusionopolis Way, #21-01, Connexis South Tower, Singapore 138632 (SG). **SUN, Sumei** [SG/SG]; c/o PKM, Institute for Infocomm Research, 1 Fusionopolis Way, #21-01, Connexis South Tower, Singapore 138632 (SG). **HO, Chin, Keong** [SG/SG]; c/o PKM, Institute for Infocomm Research, 1 Fusionopolis Way, #21-01, Connexis South Tower, Singapore 138632 (SG).
- (74) **Agent:** **POH, Chee, Kian, Daniel**; Marks & Clerk Singapore LLP, Tanjong Pagar, P.O. Box 636, Singapore 910816 (SG).
- (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, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PE, PG, PH, PL, PT, RO, RS, RU, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, 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, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, 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, ML, MR, NE, SN, TD, TG).

Declarations under Rule 4.17:

— of inventorship (Rule 4.17(iv))

Published:

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

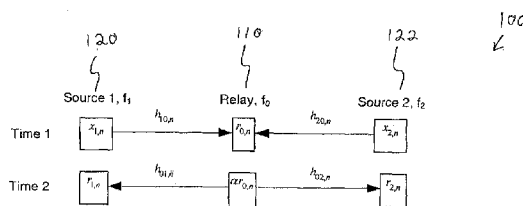
(54) **Title:** METHOD AND DEVICE FOR ESTIMATING CARRIER FREQUENCY OFFSET

Figure 1

(57) **Abstract:** A method (500) for estimating a carrier frequency offset in a communication system (100) is disclosed herein. In a described embodiment, the communications system (100) comprises a first communications device (120), a second communications device (122) and a relay (110). The method (500) comprises rotating (530) at the first communications device (120) a first generated block of signals by a first plurality of different rotation angles to form a corresponding first set of preambles (410), rotating (530) at the second communications device (122) a second generated block of signals by a second plurality of different rotation angles to form corresponding second set of preambles (420), transmitting (540) from each of the first and second communications devices (120,122) the respective first and second sets of preambles (410, 420) as time domain signals to the relay (110), receiving at the first communications device (120) a retransmitted time domain signal from the relay (110), the retransmitted signal being a combination of the first and second sets of preambles (410, 420) and estimating (550) the channel frequency offset based on the received retransmitted time domain signal. A device and an integrated circuit for estimating a carrier frequency offset in a communication system are also disclosed.