

(19) World Intellectual Property
Organization
International Bureau



(43) International Publication Date
25 March 2004 (25.03.2004)

PCT

(10) International Publication Number
WO 2004/025841 A3

(51) International Patent Classification⁷: **H04B 1/02**, 1/04

(21) International Application Number:
PCT/US2003/028126

(22) International Filing Date:
9 September 2003 (09.09.2003)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
60/409,677 10 September 2002 (10.09.2002) US
10/457,293 9 June 2003 (09.06.2003) US

(71) Applicant (for all designated States except US):
COGNIO, INC. [US/US]; 101 Orchard Ridge Drive,
Suite 350, Gaithersburg, MD 20878 (US).

(72) Inventors; and

(75) Inventors/Applicants (for US only): **VAIDYANATHAN, Chandra** [IN/US]; 10411 Montrose Avenue, #202, Bethesda, MD 20814 (US). **SUGAR, Gary, L.** [US/US]; 15307C Diamond Cove Terrace, Rockville, MD 20850 (US).

(74) Agent: **FLOAM, D., Andrew**; Cognio, Inc., 101 Orchard Ridge Drive, Suite 350, Gaithersburg, MD 20878 (US).

(81) Designated States (national): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, 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, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, OM, PH, PL, PT, RO, RU, SD, SE, SG, SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZM, ZW.

(84) Designated States (regional): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

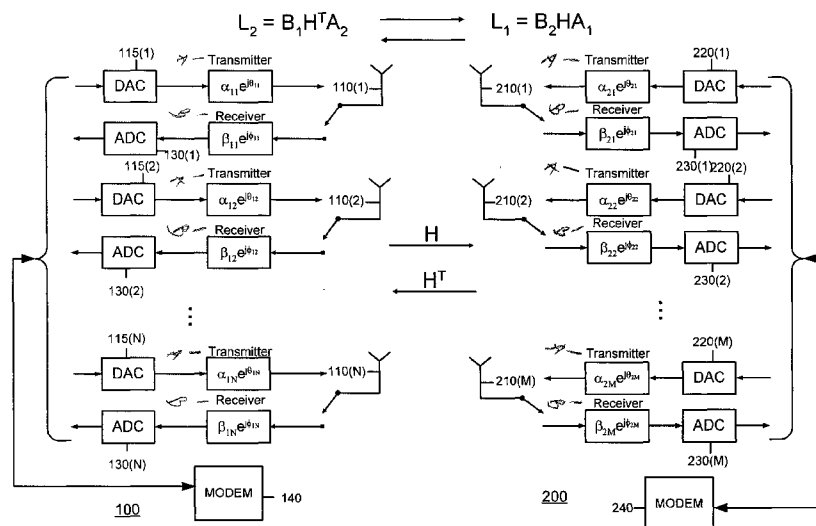
Published:

— with international search report
— before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments

(88) Date of publication of the international search report:
27 May 2004

[Continued on next page]

(54) Title: TECHNIQUES FOR CORRECTING FOR PHASE AND AMPLITUDE OFFSETS IN A MIMO RADIO DEVICE



(57) Abstract: Techniques are provided to correct for phase and amplitude mismatches in a radio device in order to maintain channel symmetry when communicating with another device using a multiple-input multiple output radio communication. Correction for the amplitude and phase mismatches among the plurality of transmitters and plurality of receivers of a device may be made at baseband using digital logic in the receiver path, the transmitter path or both paths of that device. Amplitude and phase offsets are determined among the plurality of radio transmitter and radio receiver paths by measuring phase and amplitude responses when supplying a signal to a transmitter in a first antenna path of the device and coupling the radio signal from a first antenna to a second antenna path of that device where the signal is down-converted by a receiver associated with the second antenna path.



For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.