



INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification ⁶ : H04B 1/00	A2	(11) International Publication Number: WO 99/66645 (43) International Publication Date: 23 December 1999 (23.12.99)
(21) International Application Number: PCT/SE99/01040 (22) International Filing Date: 11 June 1999 (11.06.99) (30) Priority Data: 09/097,916 16 June 1998 (16.06.98) US (71) Applicant: TELEFONAKTIEBOLAGET LM ERICSSON (publ) [SE/SE]; S-126 25 Stockholm (SE). (72) Inventor: POPOVIC', Branislav, M.; Ankdammsgatan 33, S-171 67 Solna (SE). (74) Agent: ERICSSON RADIO SYSTEMS AB; Common Patent Dept., S-164 80 Stockholm (SE).		(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>Without international search report and to be republished upon receipt of that report.</i>  *G00002*
(54) Title: QUADRI PHASE SPREADING CODES IN CODE DIVISION MULTIPLE ACCESS COMMUNICATIONS (57) Abstract Optimal code sequences are generated for use in spreading and de-spreading functions in a code division multiple access (CDMA) communications system. In particular, a family of quadriphase spreading codes is employed that provides a maximal number of spreading codes to achieve a high capacity in the CDMA communications system while at the same time having a minimal peak cross-correlation between any two spreading codes within that family to ensure cross-correlation interference is kept at or below acceptable levels. That optimal quadriphase spreading code family is the S(2) family of four phase code sequences of length $L = 2^{m-1}$, where m is an integer greater than or equal to 5. The size of the S(2) family of quaternary spreading codes is $(L + 2)(L + 1)^2$, and the maximum cross-correlation is $1 + 4\sqrt{L + 1}$. The spreading codes are preferably allocated to base stations using specific code subsets of the S(2) family having the same cross-correlation properties of the S(0) and/or S(1) family of codes. Spreading codes are advantageously extended by one or more code symbols as necessary or otherwise desirable. For example, to support variable transmission rate services, it is desirable to employ spreading codes whose length may be expressed as an integer multiple of each spreading factor in the mobile communications system. Since individual spreading codes have a length of $2^m - 1$, one code symbol is added to the generated spreading code.  *162162*		