



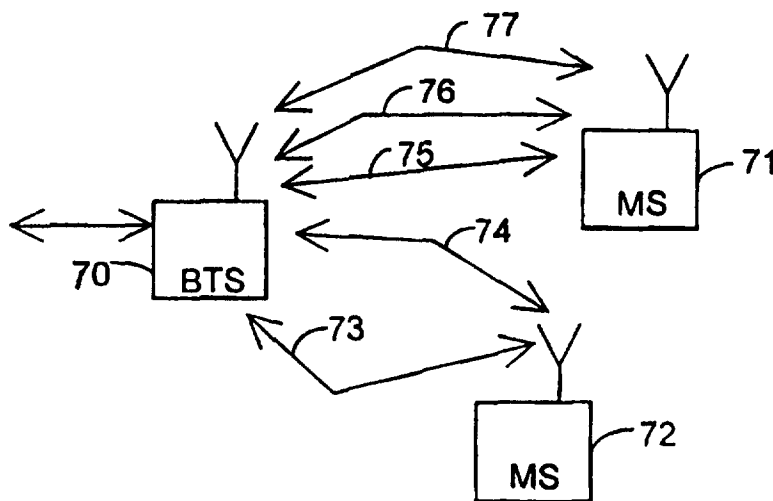
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(21) International Application Number: PCT/FI97/00446 (22) International Filing Date: 11 July 1997 (11.07.97) (30) Priority Data: 962845 12 July 1996 (12.07.96) FI (71) Applicant (for all designated States except US): NOKIA MOBILE PHONES LTD. [FI/FI]; Nakolankatu 8, FIN-24100 Salo (FI). (72) Inventors; and (75) Inventors/Applicants (for US only): LILLEBERG, Jorma [FI/FI]; Mustaherukkatie 1 A, FIN-90800 Oulu (FI). NIEMINEN, Esko [FI/FI]; Maahisentie 3 G 10, FIN-90550 Oulu (FI). (74) Agent: TEKNOPOLIS KOLSTER OY; c/o KOLSTER OY AB, Iso Roobertinkatu 23, P.O. Box 148, FIN-00121 Helsinki (FI).		(81) Designated States: AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GE, GH, HU, IL, 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, US, UZ, VN, YU, ZW, ARIPO patent (GH, KE, LS, MW, SD, SZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG). Published <i>With international search report.</i> <i>Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.</i> (88) Date of publication of the international search report: 26 February 1998 (26.02.98)

(54) Title: A DELAY ESTIMATION METHOD AND A RECEIVER

(57) Abstract

The invention relates to a delay estimation method and a receiver in a radio system. The signals originate from one or several transmitters and they have propagated along several paths. In the method, one of the determined paths (73 - 77) is selected at a time for estimation. The least squares minimization problem between the received signal and the code bank model is solved path by path (73 - 77) and delay by delay. In such a case, when the minimization results are formed, the delay of only one selected path is changed at a time while the delays of the other paths (73 - 77) remain unchanged. The minimization results are used to search for a delay for which the minimized result is at most equal to the results for the other delays. This delay is stored and used as the constant value of the path (73 - 77) when the delays of the other paths are searched for. The method can be repeated if necessary. The method has the advantage that it provides the delays of all the paths (73 - 77) of all the users simultaneously without information on the user symbols or the attenuation coefficients of the channel.



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INTERNATIONAL SEARCH REPORT

International application No.

PCT/FI 97/00446

A. CLASSIFICATION OF SUBJECT MATTER		
IPC6: H04B 1/707, H04B 7/02 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)		
IPC6: H04B, H04J, H04L		
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched		
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Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)		
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C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO 9524086 A2 (PHILIPS ELECTRONICS N.V.), 8 Sept 1995 (08.09.95), page 3, line 19 - page 5, line 7; page 8, line 28 - page 9, line 15 --	1-16
A	US 5231648 A (MARK E. DRIEDGER), 27 July 1993 (27.07.93), column 1, line 49 - column 2, line 7 --	1-16
A	US 5448600 A (PHILIPPE LUCAS), 5 Sept 1995 (05.09.95), column 2, line 60 - column 3, line 38 --	1-16
P,A	EP 0749215 A2 (SHARP KABUSHIKI KAISHA), 18 December 1996 (18.12.96), page 4, line 1 - line 34 --	1-16
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Information on patent family members

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