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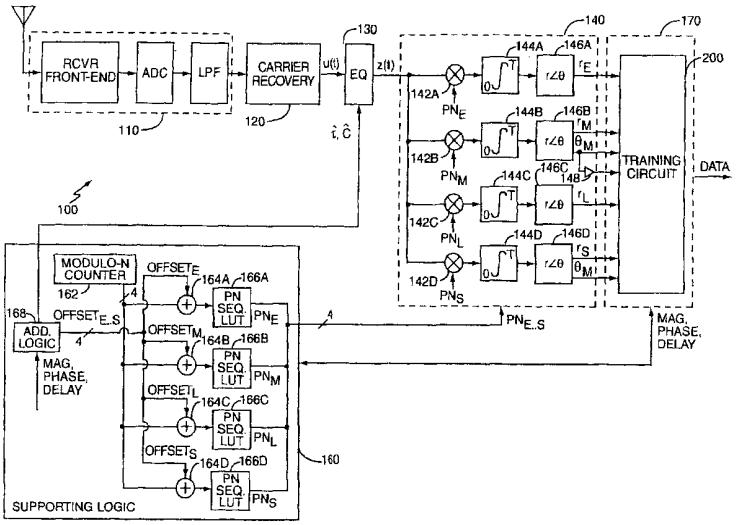
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(54) Title: METHOD AND APPARATUS FOR MULTIPATH PARAMETER ESTIMATION IN SPREAD-SPECTRUM COMMUNICATIONS SYSTEMS



(57) Abstract: A training method provides and advantageous technique for estimating secondary propagation path parameters based on learning propagation path characteristics for a selected number of secondary propagation path signals. In a multipath environment, a received radio signal comprises multiple received signals, each received through a different signal propagation path. The training method includes a course search technique that yields initial identification of the significant secondary path signals, and further includes techniques for characterizing the magnitude, phase, and path delay, all relative to the main path signal for secondary path signal of interest. The training method employs differential decoding and sample phase slicing to improve parameter estimation accuracy, and further includes phase correlation operations to determine secondary path delay, where such delays may have spreads that exceed a transmitted signal symbol period.

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INTERNATIONAL SEARCH REPORT

Inte ional Application No
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A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 H04B1/707

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)
IPC 7 H04B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
EPO-Internal, INSPEC

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	FUENTE M P ET AL: "A new scheme for direct sequence spread spectrum radio LANs" SPREAD SPECTRUM TECHNIQUES AND APPLICATIONS PROCEEDINGS, 1996., IEEE 4TH INTERNATIONAL SYMPOSIUM ON MAINZ, GERMANY 22-25 SEPT. 1996, NEW YORK, NY, USA,IEEE, US, 22 September 1996 (1996-09-22), pages 1320-1324, XP010208831 ISBN: 0-7803-3567-8 the whole document ---	1,18,35, 36
A	US 5 361 276 A (SUBRAMANIAN RAVI) 1 November 1994 (1994-11-01) abstract claim 1 figures 1,3,4A,4B,7 ---	1,18,35, 36

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[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

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"A" document defining the general state of the art which is not considered to be of particular relevance

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"P" document published prior to the international filing date but later than the priority date claimed

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"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
18 April 2002	24/04/2002

Name and mailing address of the ISA	Authorized officer
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PCT/US 01/23726

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication,where appropriate, of the relevant passages	Relevant to claim No.
A	CARL ANDREN ET AL: "CCK Modulation delivers 11 Mbps for high Rate IEEE 802.11 Extension" WIRELESS SYMPOSIUM/PORTABLE BY DESIGN, 14 March 2000 (2000-03-14), XP002147321 the whole document -----	18-22

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INTERNATIONAL SEARCH REPORT

.nformation on patent family members

Inte ional Application No
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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 5361276 A	01-11-1994	CA 2123735 A1	14-03-1995
		EP 0643506 A2	15-03-1995
		JP 7115387 A	02-05-1995