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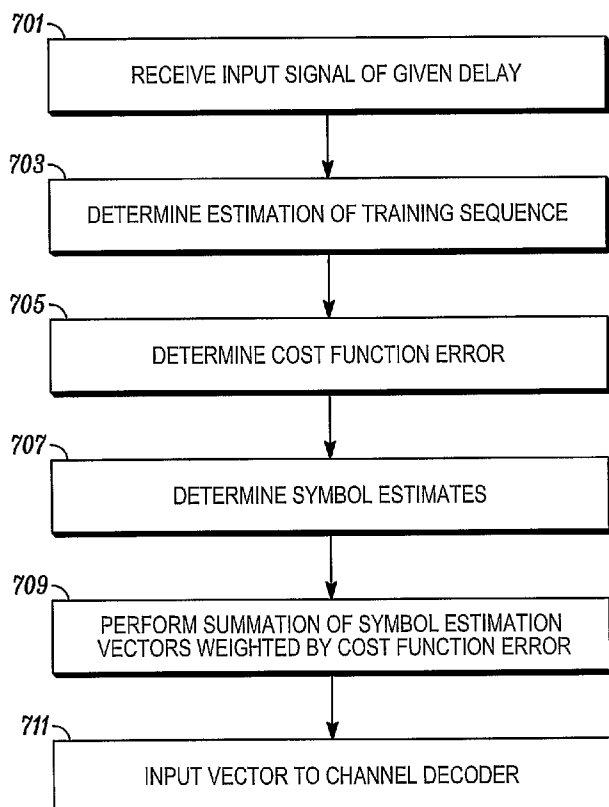
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[Continued on next page]

(54) Title: COMMUNICATIONS CHANNEL SYMBOL RECOVERY BY COMBINING OUTPUTS AT DIFFERENT DECISION DELAYS



(57) Abstract: A method and apparatus for communications channel symbol recovery that improves equalizer performance adds together the log-likelihood ratios (LLRs) of different decision delays rather than using LLRs corresponding only to a single decision delay. A low complexity method comprises, determining an initial coarse delay and a set of fine delays (1003), estimating a training sequence and filter taps set for each fine delay (1007), determining an error function for each fine delay (1009), and linearly combining the filter taps (1013) for determining the symbol estimates (1017).

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FR, GB, GR, HU, IE, IS, IT, LT, LU, LV, MC, NL, PL, PT,
RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA,
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INTERNATIONAL SEARCH REPORT

International application No
PCT/US2006/020259

A. CLASSIFICATION OF SUBJECT MATTER

INV. H04L25/02 H04B1/707 H04L25/06
ADD. H04L25/03

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)

H04L 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, WPI Data, IBM-TDB, INSPEC, COMPENDEX

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 00/35111 A (TELEFONAKTIEBOLAGET LM ERICSSON) 15 June 2000 (2000-06-15) page 4, line 10 - line 11 page 5, line 1 - line 7 page 8, line 15 - page 9, line 1; figure 7 -----	1,5
X	US 2003/031234 A1 (SMEE JOHN EDWARD ET AL) 13 February 2003 (2003-02-13) paragraphs [0027], [0043], [0044], [0060], [0065], [0079] -----	1-10
A	US 2004/161063 A1 (STEWART KENNETH A ET AL) 19 August 2004 (2004-08-19) cited in the application paragraph [0036] - paragraph [0053] -----	1-10
A	WO 03/043201 A (INTEL CORPORATION) 22 May 2003 (2003-05-22) page 4, line 8 - line 21 -----	1-10

☐ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

* Special categories of cited documents:

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

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

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

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search

9 October 2006

Date of mailing of the international search report

02.02.06

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2006/020259

Box II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This International Search Report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:
2. ☐ Claims Nos.:
because they relate to parts of the International Application that do not comply with the prescribed requirements to such an extent that no meaningful International Search can be carried out, specifically:
3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

see additional sheet

1. ☐ As all required additional search fees were timely paid by the applicant, this International Search Report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this International Search Report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☒ No required additional search fees were timely paid by the applicant. Consequently, this International Search Report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

1-10

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest.
- ☐ No protest accompanied the payment of additional search fees.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claims: 1-10

method of processing a received signal by determining a channel decoder input as a summation of a plurality of symbol vectors wherein each of said estimated symbol vectors corresponds to a hypothetical delay

2. claims: 11-22

method of processing a received signal by determining a set of filter taps as a summation of a plurality of filter tap sets, each filter tap set corresponding to a hypothetical delay

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/US2006/020259

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