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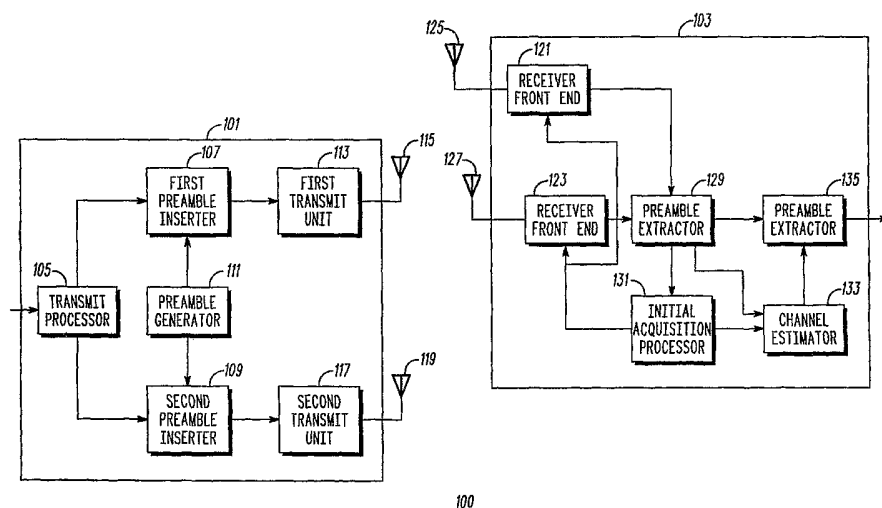
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Published:

— with international search report

[Continued on next page]

(54) Title: A TRANSMITTER AND A RECEIVER FOR COMMUNICATING A SIGNAL FROM MULTIPLE ANTENNAS USING A PREAMBLE



(57) Abstract: A transmitter comprises a transmit processor (105), preamble inserters (107, 109) and transmit units (113, 117) which are operable to transmit sub-signals from the antennas (115, 119). A preamble set comprising an individual preamble for each antenna generated by a preamble generator (111). Each of the individual preambles comprise first and second sections. The first section comprises a first data sequence, different for each antenna, and is selected from a predetermined set of preamble sequences. The first data sequence may comprise only time domain symbols belonging to the alphabet [1, -1, i, -i, 0]. The second section comprises repetitions of a predetermined second data sequence where each repetition is weighted by a coefficient that is different for each antenna. Weighting may be by coefficients of different rows of a Walsh Hadamard matrix. The second data sequence may comprise only frequency domain symbols belonging to the alphabet of [1, -1, 0].



— *before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments*

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INTERNATIONAL SEARCH REPORT

International application No.

PCT/US05/40076

A. CLASSIFICATION OF SUBJECT MATTER

IPC(8) - H04B 1/02 (2006.01)

USPC - 455/103

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)

U.S. : 455/447, 446, 296, 501, 63.1, 63.3, 103, 104, 105; 370/337, 347; 375/142

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
NONE

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

PUBWEST--PGPB, USPT, EPAB and JPAB--searched preamble, section, training symbol, walsh-Hadamard

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 5,828,662 A (JALALI et al.) 27 October 1998 (27.10.1998), entire document.	1-5, and 19-24
Y	US 5,353,352 A (DENT et al.) 04 October 1994 (04.10.1994), entire document	1-5, and 19-24
A	US 2004/0041635 A1 (VADAS et al.) 22 January 2004, entire document.	1-5, and 19-24
A	US 2002/0118771 A1 (LARSSON) 29 August 2002 (29.08.2002), entire document.	1-5, and 19-24
A	US 2004/0132454 A1 (TROTT et al) 08 July 2004 (08.07.2004), entire document.	1-5, and 19-24
A, P	US 2005/0047530 A1 (LEE et al.) 03 March 2005 (03.03.2005), entire document.	1-5, and 19-24

☐ 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 application or patent but published on or after the international filing date

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"O" document referring to an oral disclosure, use, exhibition or other means

"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

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INTERNATIONAL SEARCH REPORT

International application No.

PCT/US05/40076

Box No. 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.: 6-18
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box No. 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:

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 additional fees, this Authority did not invite payment of additional fees.
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.:

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.
- ☐ The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.
- ☐ No protest accompanied the payment of additional search fees.