

(19) World Intellectual Property Organization
International Bureau



(43) International Publication Date
18 October 2007 (18.10.2007)

PCT

(10) International Publication Number
WO 2007/118132 A3

(51) International Patent Classification:

H04L 25/02 (2006.01) **H04B 1/707** (2006.01)
H04L 25/03 (2006.01)

(21) International Application Number:

PCT/US2007/066028

(22) International Filing Date: 5 April 2007 (05.04.2007)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:

60/789,347 5 April 2006 (05.04.2006) US

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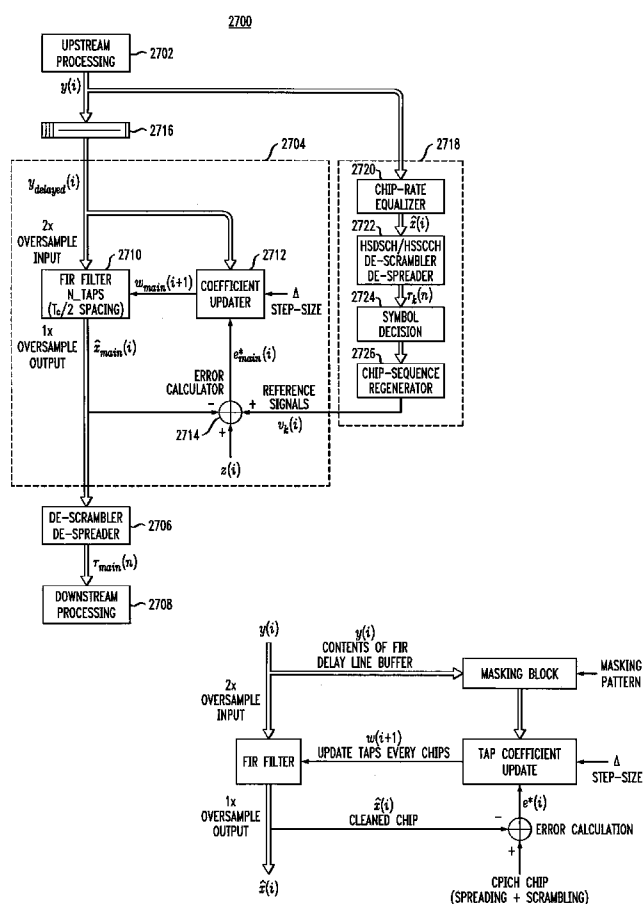
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(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ, CA, CH,

[Continued on next page]

(54) Title: HSDPA CO-PROCESSOR FOR MOBILE TERMINALS



(57) Abstract: In one embodiment, an HSDPA co-processor for 3GPP Release 6 Category 8 (7.2 Mb/s) HSDPA that provides all chip-rate, symbol-rate, physical-channel, and transport-channel processing for HSDPA in 90nm CMOS. The co-processor design is scalable to all HSDPA data rates up to 14 Mb/s. The coprocessor implements an Advanced Receiver based on an NLMS equalizer, supports RX diversity and TX diversity, and provides up to 6.4 dB better performance than a typical single-antenna rake receiver. Thus, 3GPP R6 HSDPA functionality can be added to a legacy R99 modem using an HSDPA co-processor consistent with embodiments of the present invention, at a reasonable incremental cost and power.



CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RS, RU, SC, SD, SE, SG, SK, SL, SM, SV, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:

- *with international search report*
- *before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments*

(84) Designated States (*unless otherwise indicated, for every kind of regional protection available*): ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LT, LU, LV, MC, MT, NL, PL,

(88) Date of publication of the international search report:
6 December 2007

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

INTERNATIONAL SEARCH REPORT

International application No

PCT/US2007/066028

A. CLASSIFICATION OF SUBJECT MATTER

INV. H04L25/02 H04L25/03 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)

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, INSPEC

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	EP 1 372 308 A (TEXAS INSTRUMENTS INC [US]) 17 December 2003 (2003-12-17) abstract column 6, paragraph 21 - column 7, paragraph 23 column 7, paragraph 29 figure 2 ----- -/--	1,2,4,9, 15,16

☒ 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)

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

Date of the actual completion of the international search

13 August 2007

Date of mailing of the international search report

23/10/2007

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INTERNATIONAL SEARCH REPORT

International application No

PCT/US2007/066028

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	EP 1 276 248 A (ERICSSON TELEFON AB L M [SE]) 15 January 2003 (2003-01-15) page 2, line 27 - line 28 page 1, line 37 - line 38 page 1, paragraph 7 - page 2, paragraph 9 page 2, paragraph 14 - paragraph 15 page 2, paragraph 17 - page 3, paragraph 17 page 5, paragraph 21 - paragraph 27 page 6, line 26 - line 27 page 6, line 39 - line 41 page 6, paragraph 35 - page 7, paragraph 36 page 7, paragraph 39 - paragraph 41	1,2,4,9, 15,16
A	US 2004/127164 A1 (MONDRAGON-TORRES ANTONIO F [US] ET AL) 1 July 2004 (2004-07-01) page 2, paragraph 22 page 2, paragraph 25 - paragraph 26 page 2, paragraph 27 - paragraph 28 page 3, paragraph 30 page 3, paragraph 32 - paragraph 35 figure 2b	1,2,4,9, 15,16
A	US 2006/039330 A1 (HACKETT WILLIAM C [US] ET AL) 23 February 2006 (2006-02-23) page 1, paragraph 2 page 4, paragraph 43	7

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2007/066028

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.:

1-7, 9, 10, 14, 15, 16

Remark on Protest

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

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

1. claims: 1-7,9,10,14,15,16

Realization of a HARQ system

2. claim: 8

Power control in receiver

3. claims: 11-13

Decoding of received data

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/US2007/066028

Patent document cited in search report		Publication date		Patent family member(s)		Publication date
EP 1372308	A	17-12-2003	US	2003227960 A1		11-12-2003
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US 2006039330	A1	23-02-2006	NONE			