

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

PCT

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY
(PCT Rule 43bis.1)

To:

see form PCT/ISA/220

Date of mailing
(day/month/year) see form PCT/ISA/210 (second sheet)

Applicant's or agent's file reference
see form PCT/ISA/220

FOR FURTHER ACTION
See paragraph 2 below

International application No.
PCT/US2008/077194

International filing date (day/month/year)
22.09.2008

Priority date (day/month/year)
19.05.2008

International Patent Classification (IPC) or both national classification and IPC
INV. H04B17/00 H04L25/02 H04B7/08

Applicant:
QUALCOMM INCORPORATED

1. This opinion contains indications relating to the following items:

- Box No. I Basis of the opinion
- Box No. II Priority
- Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- Box No. IV Lack of unity of invention
- Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- Box No. VI Certain documents cited
- Box No. VII Certain defects in the international application
- Box No. VIII Certain observations on the international application

2. **FURTHER ACTION**

If a demand for international preliminary examination is made, this opinion will usually be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

3. For further details, see notes to Form PCT/ISA/220.

Name and mailing address of the ISA:



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Date of completion of
this opinion

see form
PCT/ISA/210

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**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

International application No.
PCT/US2008/077194

Box No. I Basis of the opinion

1. With regard to the **language**, this opinion has been established on the basis of:
 - the international application in the language in which it was filed
 - a translation of the international application into , which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1 (b)).
2. This opinion has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43bis.1(a))
3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application and necessary to the claimed invention, this opinion has been established on the basis of:
 - a. type of material:
 - a sequence listing
 - table(s) related to the sequence listing
 - b. format of material:
 - on paper
 - in electronic form
 - c. time of filing/furnishing:
 - contained in the international application as filed.
 - filed together with the international application in electronic form.
 - furnished subsequently to this Authority for the purposes of search.
4. In addition, in the case that more than one version or copy of a sequence listing and/or table relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.
5. Additional comments:

Box No. II Priority

1. The validity of the priority claim has not been considered because the International Searching Authority does not have in its possession a copy of the earlier application whose priority has been claimed or, where required, a translation of that earlier application. This opinion has nevertheless been established on the assumption that the relevant date (Rules 43bis.1 and 64.1) is the claimed priority date.
2. This opinion has been established as if no priority had been claimed due to the fact that the priority claim has been found invalid (Rules 43bis.1 and 64.1). Thus for the purposes of this opinion, the international filing date indicated above is considered to be the relevant date.
3. Additional observations, if necessary:

Box No. IV Lack of unity of invention

1. In response to the invitation (Form PCT/ISA/206) to pay additional fees, the applicant has, within the applicable time limit:
- paid additional fees
 - paid additional fees under protest and, where applicable, the protest fee
 - paid additional fees under protest but the applicable protest fee was not paid
 - not paid additional fees
2. This Authority found that the requirement of unity of invention is not complied with and chose not to invite the applicant to pay additional fees.
3. This Authority considers that the requirement of unity of invention in accordance with Rule 13.1, 13.2 and 13.3 is
- complied with
 - not complied with for the following reasons:
see separate sheet
4. Consequently, this report has been established in respect of the following parts of the international application:
- all parts.
 - the parts relating to claims Nos. 1-36

Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes: Claims	<u>2, 5-9, 14-16, 20-22, 26-28, 31-34, 36</u>
	No: Claims	<u>1, 3-4, 10-13, 17-19, 23-25, 29-30, 35</u>
Inventive step (IS)	Yes: Claims	
	No: Claims	<u>1-36</u>
Industrial applicability (IA)	Yes: Claims	<u>1-36</u>
	No: Claims	

2. Citations and explanations

see separate sheet

Box No. VI Certain documents cited

1. Certain published documents (Rules 43*bis*.1 and 70.10)
and /or
2. Non-written disclosures (Rules 43*bis*.1 and 70.9)
see form 210

Box No. VII Certain defects in the international application

The following defects in the form or contents of the international application have been noted:

see separate sheet

Box No. VIII Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

see separate sheet

Re Item IV.

This Authority considers that there are 2 inventions covered by the claims indicated as follows:

I: Claims 1 - 10, 17 - 20, 23 - 26, 29, 30 - 35 directed to a method and an apparatus for wireless communication, comprising (means for) estimating channel gain and noise variance based on received pilot; and (means for) estimating a data - to - pilot ratio based on received data and the estimated channel gain and noise variance.

II: Claims 11 - 16, 21, 22, 27, 28 directed to a method for wireless communication, comprising: receiving pilot via multiple receive antennas; receiving data via the multiple receive antennas; combining the received data across the multiple receive antennas to obtain combined data;

estimating signal - to - noise and - interference ratio (SINR) based on the received pilot from the multiple receive antennas; and

estimating a data - to - pilot ratio based on the combined data and the estimated SINR.

The reasons for which the inventions are not so linked as to form a single general inventive concept, as required by Rule 13.1 PCT, are as follows:

The common concept linking together the first and second invention, represented by independent claims 1 and 11, respectively, is the step of estimating of a data - to - pilot ratio. This common concept is, however, known from document D1 = WO2008/042946 A2, see e.g. the abstract and Figure 4.

The problem to be solved by the first invention is to provide an accurate estimation of the data - to - pilot - ratio in a receiver, when this is not known. The data - to - pilot - ratio is estimated based on an equation given in claim 4, depending on the estimated channel gain, the noise variance and on received data.

The problem to be solved by the second invention is to provide an estimation of the data - to - pilot - ratio in a receiver, the receiver having multiple antennas. This is achieved by combining the received data across the multiple receive antennas to obtain combined data; estimating signal - to - noise - and interference ratio, SINR, based on the received pilot from the multiple receive antennas; and

estimating a data - to - pilot ratio based on the combined data and the estimated SINR.

Hence, the problems to be solved and the special technical features (Rule 13.2 PCT) representing the contribution over the prior art are different. Therefore, the inventions are not so linked as to form a single general inventive concept as required by Rule 13.1 PCT.

Re Item V.

1 Reference is made to the following documents:

- D1 WO 2008/042946 A (QUALCOMM INC [US]; PALANKI RAVI [US]) 10 April 2008 (2008-04-10)
- D2 EP 1 971 093 A (MITSUBISHI ELECTRIC INF TECH [NL]; MITSUBISHI ELECTRIC CORP [JP]) 17 September 2008 (2008-09-17)
- D3 WO 2006/132593 A (ERICSSON TELEFON AB L M [SE]) 14 December 2006 (2006-12-14)
- D4 MINGXI FAN; GHOSH D; BHUSHAN N; ATTAR R; LOTT C; AU J: "On the reverse link performance of cdma2000 1xEV-DO revision a system" COMMUNICATIONS, 2005. ICC 2005. 2005 IEEE INTERNATIONAL CONFERENCE ON SEOUL, KOREA 16-20 MAY 2005, 20050516 - 20050520 PISCATAWAY, NJ, USA, IEEE, vol. 4, 16 May 2005 (2005-05-16) , pages 2244-2250, XP010826268 ISBN: 978-0-7803-8938-0
- D5 US 2006/229089 A1 (TOKGOZ YELIZ [US]; FAN MINGXI [US]; SMEE JOHN E [US]; HOU JILEI [US]) 12 October 2006 (2006-10-12)

2 INDEPENDENT CLAIM 1

2.1 The present application does not meet the criteria of Article 33(1) PCT, because the subject-matter of claim 1 is not new in the sense of Article 33(2) PCT.

Document D1 discloses (the references in parentheses applying to this document):

A method for wireless communication, comprising:

estimating channel gain and noise variance based on received pilot (see the abstract and page 21); and

estimating a data-to-pilot ratio based on received data and the estimated channel gain and noise variance (page 21 and Figure 4).

Hence, all the steps of claim 1 are known from D1.

3 INDEPENDENT CLAIM 17

The present application does not meet the criteria of Article 33(1) PCT, because the subject-matter of claim 17 is not new in the sense of Article 33(2) PCT.

Claim 17 is an apparatus claim corresponding to method claim 1. Therefore, document D1 also discloses all the features of claim 17.

4 INDEPENDENT CLAIM 23

The same applies to independent claim 23, which comprises the same features as claim 17.

5 INDEPENDENT CLAIM 29

The present application does not meet the criteria of Article 33(1) PCT, because the subject-matter of claim 29 is not new in the sense of Article 33(2) PCT.

Claim 29 is a computer program product claim, which comprises code for carrying out the method of claim 1. Therefore, the same arguments apply, mutatis mutandis, to claim 29.

6 INDEPENDENT CLAIM 30

The present application does not meet the criteria of Article 33(1) PCT, because the subject-matter of claim 30 is not new in the sense of Article 33(2) PCT.

Document D1 discloses (the references in parentheses applying to this document):

A method of transmitting data and pilot for wireless communication, comprising:

sending power at a predetermined power level to multiple terminals (see page 12, paragraphs [0046], [0047]); and

sending data to each of the multiple terminals at a power level determined based on a data-to-pilot ratio for the terminal (see paragraphs [0008], each terminal estimating the data-to-pilot ratio for the terminal based on the data sent to the terminal and the pilot sent to the multiple terminals (see e.g. the abstract and Figure 4).

7 INDEPENDENT CLAIM 35

The present application does not meet the criteria of Article 33(1) PCT, because the subject-matter of claim 35 is not new in the sense of Article 33(2) PCT.

Claim 35 is an apparatus claim, which corresponds to method claim 30. Therefore, document D1 discloses all the features of claim 35, too.

8 INDEPENDENT CLAIM 11 (Second invention)

Document D4 discloses a method for wireless communication, comprising:

receiving pilot via multiple (two or four) receive antennas (see the abstract);

receiving data via the multiple receive antennas;

combining the received data across the multiple receive antennas to obtain combined data (maximal ratio combining; see page 2247, left-hand column);

estimating signal-to-noise-and-interference ratio (SINR; see page 2247, left-hand column) based on the received pilot from the multiple receive antennas; and

estimating a data-to-pilot ratio (see page 2246, left-hand column) based on the combined data and the estimated SINR.

Hence, the subject-matter of claim 11 is not novel in the light of document D4.

9 DEPENDENT CLAIMS 2-4, 9, 10, 12-16, 18, 19, 20-22, 24, 25, 26-28

Dependent claims 2-4, 9, 10, 12-16, 18, 19, 20-22, 24, 25, 26-28 do not contain any features which, in combination with the features of any claim to which they refer, meet the requirements of the PCT in respect of novelty and/or inventive step (Article 33(2) and (3) PCT), see the passages cited in the International Search Report.

Re Item VI.

Certain published documents

Application No	Publication date	Filing date	Priority date (<i>valid claim</i>)
Patent No	(<i>day/month/year</i>)	(<i>day/month/year</i>)	(<i>day/month/year</i>)
EP 1971093 A1	17.09.2008	15.03.2007	--

Re Item VII.

Contrary to the requirements of Rule 5.1(a)(ii) PCT, the relevant background art disclosed in the documents D1 and D4 is not mentioned in the description, nor is this document identified therein.

Re Item VIII.

1. Although claims 17 and 23 have been drafted as separate independent claims, they appear to relate effectively to the same subject-matter and to differ from each other only with regard to the definition of the subject-matter for which protection is sought and/or in respect of the terminology used for the features of that subject-matter. The aforementioned claims therefore lack conciseness and as such do not meet the requirements of Article 6 PCT.

2. The vague and imprecise statement in the description on page 17, last paragraph implies that the subject-matter for which protection is sought may be different to that defined by the claims, thereby resulting in lack of clarity (Article 6 PCT) when used to interpret them.