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Datasheet for the decision of 25 September 2023

Case Number: T 1389/21 - 3.5.05

Application Number: 11774139.7

Publication Number: 2625807

IPC: H04L1/06

Language of the proceedings: EN

Title of invention:
SPARSE CODES FOR MIMO CHANNEL AND DETECTOR ALTERNATIVES FOR SPARSE CODE

Applicant:
BlackBerry Limited

Headword:
Detection of MIMO Sparse codes/BLACKBERRY

Relevant legal provisions:
EPC Art. 84
RPBA 2020 Art. 12(4)

Keyword:
Claims - clarity - main request (yes)
Amendment to case - amendment within meaning of Art. 12(4) RPBA 2020

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Case Number: T 1389/21 - 3.5.05

D E C I S I O N
of Technical Board of Appeal 3.5.05
of 25 September 2023

Appellant: (Applicant)	BlackBerry Limited 2200 University Avenue East Waterloo, ON N2K 0A7 (CA)
Representative:	Vigand, Philippe Novagraaf International SA Chemin de l'Echo 3 1213 Onex - Genève (CH)
Decision under appeal:	**Decision of the Examining Division of the European Patent Office posted on 18 March 2021 refusing European patent application No. 11774139.7 pursuant to Article 97(2) EPC.**

Composition of the Board:

Chair	A. Ritzka
Members:	P. Cretaine
	K. Kerber-Zubrzycka

Summary of Facts and Submissions

I. This appeal is against the examining division's decision posted on 18 March 2021 refusing European patent application No. 11774139.7. The application was refused for lack of clarity (Article 84 EPC) of the independent claims of the main request and of the auxiliary request.

II. Notice of appeal was received on 17 May 2021 and the appeal fee was paid on the same date. The statement setting out the grounds of appeal was received on 20 July 2021. The appellant requested that the decision under appeal be set aside and that a patent be granted based on the claims of a new main request filed with the statement setting out the grounds of appeal. Oral proceedings were requested as an auxiliary measure.

III. A summons to oral proceedings was issued on 5 December 2022. In a communication pursuant to Article 15(1) RPBA, sent on 12 July 2023, the board announced that it was minded to admit the new main request into the appeal proceedings under the provisions of Article 12(4) RPBA but that its preliminary opinion was that this request did not meet the requirements of Article 84 EPC.

IV. By letter dated 11 September 2023, the appellant submitted a new auxiliary request and maintained the request already on file as its main request.

V. Oral proceedings were held on 25 September 2023. During the oral proceedings, the appellant withdrew its auxiliary request and requested that the decision under appeal be set aside and that a patent be granted based

on the main request filed with the statement setting out the grounds of appeal. The board's decision was announced at the end of the oral proceedings.

VI. Claim 1 of the main request reads as follows:

"A communication method comprising:
receiving a complex vector, y, corresponding to a transmitted s-sparse codeword, having s non-zero elements, at M receive antennas (512);
processing (516), the received complex vector and a plurality of candidate received sparse codeword vectors, wherein the processing (516) comprises computing the location of said received vector in a complex space of dimension M and computing the distance between the location of said received complex vector and the location of each candidate received sparse codeword vector in said complex space,
wherein the processing (516) of said complex vector codeword comprises:
generating matrix data corresponding to a MxN channel estimation matrix, where M corresponds to the number of receive antennas (512) and N corresponds to the number of transmit antennas (510),
the method further comprising:
normalizing each of the candidates;
computing inner product of the received codeword with each normalized candidate;
ranking the inner products by magnitude from largest to smallest;
identifying a non-zero position in the transmit codeword as the index of a normalized candidate which yielded the highest ranking inner product;
augmenting an estimated basis matrix for y with the column, h, of the channel estimation matrix which yielded the highest ranking inner product;

computing a complex value corresponding to the received codeword from which is subtracted the value corresponding to the index of the normalized candidate which yielded the highest ranking inner product in the augmented basis matrix with the identified column h; comparing the complex value with all possible constellation symbols to identify a selected constellation symbol, x."

The main request contains a further independent claim (claim 5) which is directed to a corresponding device.

Reasons for the Decision

1. Main request - admission

The pending main request was filed for the first time with the statement setting out the grounds of appeal. Independent claims 1 and 5 had been slightly amended with respect to independent claims 1 and 5 of the auxiliary request on which the decision was based. The amendment relates to the single feature of claims 1 and 5 of the original auxiliary request to which an objection was made under Article 84 EPC in the decision.

Since this clarity objection was the sole ground for the refusal of the original auxiliary request and since this is the second appeal based solely on a clarity objection, the board has decided to exercise its discretion under Article 12(4) RPBA and admit the main request filed with the statement setting out the grounds of appeal into the appeal proceedings.

2. Main request - Article 84 EPC

2.1 The decision to refuse the original auxiliary request, on which the present main request is based, was based solely on a clarity objection to the following feature of claim 1:

"computing a complex value based on the augmented basis matrix with the entitled column h, by estimating an amplitude for the index of the normalized candidate which yielded the highest ranking inner product".

The reasons for this were essentially that the wording "based on" did not clearly define the relationship between the complex value and the augmented basis matrix, and therefore the claimed complex value encompassed an almost infinite number of values (see Reasons for the decision, 27.1 and 28.1).

Additionally, the decision objected that the wording "by estimating an amplitude for the index of the normalized candidate which yielded the highest ranking inner product" did not clarify the calculation of the complex value. In particular, the decision stated that if this wording were understood as meaning that the estimation of the amplitude was made based on the augmented matrix, this would contradict the single example in the description that is based on a QPSK modulation, since for this modulation, all symbols had the same amplitude, and therefore estimating the amplitude alone would not help in differentiating the symbols (see Reasons for the decision, 28.1).

2.2 In order to clarify the computing of the complex value, in claim 1 of the present main request the appellant replaced the above-mentioned feature with the following feature:

"computing a complex value corresponding to the received codeword from which is subtracted the value corresponding to the index of the normalized candidate which yielded the highest ranking inner product in the augmented basis matrix with the identified column h".

The appellant plausibly argued that the steps of claim 1 corresponded to the steps implemented in the basis pursuit process defined in paragraph [0072] of the description. In particular, the step for computing a complex value in claim 1 corresponded to step 6 of paragraph [0072], the complex value in claim 1 being the residual value ri+1 in paragraph [0072], corresponding to the preceding residual value ri minus the value corresponding to the index dJi of the normalised candidate which yielded the highest ranking inner product in the augmented basis matrix (ΩHi)j.

The board agrees with the appellant that the amendment finds support in paragraph [0072] and overcomes the clarity objection raised in the decision with respect to the relationship between the complex value and the augmented basis matrix.

However, since claim 1 specifies that the step for computing a complex value uses the received codeword as the starting point of the calculation of the complex value, it is clear that claim 1 defines only the first iteration of the process described in [0072], using the received complex vector y as r0.

2.3 In response to the examining division's objection relating to the case of QPSK modulation, the appellant argued that the invention was concerned with the identification of a selected constellation symbol at a

receiver, not at a transmitter. While QPSK symbols had the same amplitude at the transmitter, this was not the case at the receiver due to noise and the effects of the multiple transmission paths between the N transmit antennas and the M receive antennas, i.e. the transmission paths corresponding to the channel estimation matrix in claim 1. The appellant plausibly argued that since claim 1 now recited that the complex value was computed based on the received highest ranking inner product in the augmented basis matrix, the result of such a computation was still a complex value which could be compared with all possible constellation symbols to identify a selected QPSK constellation symbol.

3. The board thus holds that the clarity objections forming the basis of the refusal have been overcome by the amendments submitted in the appeal proceedings.

Since neither the decision nor the appended obiter dictum address issues relating to Article 56 EPC, the board considers it appropriate to remit the case to the examining division for further prosecution in that respect.

Order

For these reasons it is decided that:

The decision under appeal is set aside.
The case is remitted to the examining division for further prosecution.

The Registrar: The Chair:

K. Götz-Wein A. Ritzka

Decision electronically authenticated