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# Datasheet for the decision of 12 December 2017

**Case Number:** T 1167/15 - 3.5.06

**Application Number:** 10848579.8

**Publication Number:** 2438511

**IPC:** G06F7/00, H03M13/29

**Language of the proceedings:** EN

**Title of invention:**
A METHOD OF IDENTIFYING AND PROTECTING THE INTEGRITY OF A SET OF SOURCE DATA

**Applicant:**
LRDC Systems, LLC

**Headword:**
Error detection and correction/LRDC

**Relevant legal provisions:**
EPC Art. 84, 123(2)

**Keyword:**
Amendments - extension beyond the content of the application as filed (no)
Claims - clarity after amendment (yes)
Remittal to the department of first instance

**Decisions cited:**

**Catchword:**

Europäisches Patentamt
European Patent Office
Office européen des brevets

**Beschwerdekammern**

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**Case Number: T 1167/15 - 3.5.06**

# D E C I S I O N
## of Technical Board of Appeal 3.5.06
## of 12 December 2017

| | |
|---|---|
| **Appellant:** (Applicant) | LRDC Systems, LLC<br>1 Marans Drive<br>Little Rock, AR 72223 (US) |
| **Representative:** | Exell, Jonathan Mark<br>Williams Powell<br>Staple Court<br>11 Staple Inn Buildings<br>London<br>WC1V 7QH (GB) |
| **Decision under appeal:** | **Decision of the Examining Division of the European Patent Office posted on 22 December 2014 refusing European patent application No. 10848579.8 pursuant to Article 97(2) EPC.** |

**Composition of the Board:**

| | |
|---|---|
| **Chairman** | W. Sekretaruk |
| **Members:** | M. Müller |
| | A. Teale |

## Summary of Facts and Submissions

I. The appeal lies against the decision of the examining division, with reasons dispatched on 22 December 2014, to refuse European patent application No. 10 848 579.8 for lack of compliance with Articles 84 and 123(2) EPC. Although the decision mentions several prior art documents, *inter alia*

D5: US 5 901 127 A,

it does not rely upon them in its reasons.

II. Notice of appeal was filed on 27 February 2015, the appeal fee being paid on the same day. A statement of grounds of appeal was received on 1 May 2015. The appellant requested that the decision under appeal be set aside and that a patent be granted on the basis of a set of claims according to a main request, or one of two auxiliary requests, all filed with the grounds of appeal, the other application documents on file being drawing sheets 1-9 and description pages 1-4 and 6-24 as published, and description page 5 as filed on 3 July 2013.

III. In an annex to a summons to oral proceedings, the board raised objections under Articles 52(2,3), 84 and 123(2) EPC and indicated that it was minded to remit the case for further prosecution should these objections be overcome.

IV. In response to the summons, the appellant filed amended claims 1-22, 1-21 and 1-19, respectively, to replace the three pending requests on file.

V. In a letter dated 7 December 2017, the board informed the appellant that in the oral proceedings it should be prepared to discuss whether an inventive-step objection raised by the examining division vis-à-vis D5 still applied to the amended claims.

VI. The oral proceedings were held on 12 December 2017, at which the appellant deleted the following clause at the end of claim 1 in the first auxiliary request: "wherein the second EDAC algorithm (300) is the same as the first EDAC algorithm". At the end of the oral proceedings the board announced its decision.

VII. The sole independent claim of the main request (claim 1) reads as follows:

"A method of identifying and protecting the integrity of a set of source data, characterised by executing in a hardware or a hardware and software system the steps of:

(a) passing the source data through a transformation (302) to produce a transformed set of source data (319), the transformation being performed by an interleaver arranged to alter the relative position of portions of the source data;

(b) distorting said transformed set of source data (319) with a distortion function (304) to produce an intermediate set of source data (115);

(c) passing the source data through a first EDAC algorithm (200) to produce a first remainder and attaching said first remainder to the set of source data to produce an encoded set of source data; and

(d) passing the intermediate set of source data through a second EDAC algorithm (300) to produce a second

remainder and attaching said second remainder to the encoded set of source data."

The wording of the independent claims of the two auxiliary requests is immaterial to this decision.

## Reasons for the Decision

*The invention*

1. The application relates to error detection and correction (EDAC) codes and attempts to make them more secure against tampering. This is claimed as "identifying and protecting the integrity" of source data.

1.1 From a given piece of "source data", an EDAC encoder derives some kind of "signature" (also referred to and claimed as a "remainder"; see e.g. page 3, lines 14-16, and page 5, line 28, to page 6, line 3) and attaches it to the source data. At the receiving end, the expected signature is computed from the received data. If it does not match the received signature, the data has been modified, be it accidentally or intentionally (see e.g. original claim 22). EDAC algorithms are generally known (see page 5, line 28, to page 6, line 3). Specifically, it is known, depending on the particular EDAC algorithm, to identify changes in the data and to correct them. The corrective power of an EDAC signature is limited, depending on how much, and in what way, redundant information is added by it (see also page 8, lines 31-32).

1.2 The application seeks to make known EDAC encoders stronger against tampering.

1.3 The general structure of the proposed solution is depicted in figure 1-d (see also the description, page 10, line 8, to page 11, line 2). The message (or "source data") to be protected (see nos. 102 and 104) undergoes two separate, parallel encoding steps. The first of these steps is any given EDAC encoder producing a first remainder (see nos. 200, 206 and 212). The second one uses any second EDAC encoder producing a second remainder (see nos. 308 and 316), which, however, does not operate directly on the given message but on a modified message (see no. 314).

1.4 The modification preceding the second EDAC encoder adds "so many errors as to exceed the capability of the EDAC" (see page 8, line 30, to page 9, line 2). The modification is implemented by a "transformation" followed by a "distortion" (see page 12, lines 15-18, and figure 5a-h). Figures 5-b to 5-h give examples of transformation functions, for instance an interleaver (see figures 5-b to 5-d), and figures 6-a to 6-d give examples of distortion functions.

1.5 The second remainder adds further redundancy to the output signal (110) and thus increases the likelihood of detecting and, to some extent, correcting errors in the received data.

*Article 123(2) EPC*

2. The examining division raised objections under Article 123(2) EPC to the independent claims of the three then requests pending at the time.

2.1 The features ("affine transformation" and "n-by-m flash memory") underlying the objections to claims 12 and 23 of the then main request have been deleted in the present sets of claims. Hence the corresponding objections no longer apply (see the decision, points II.1.1.1, 2.1, 3.1.2 and III of the reasons).

2.2 The objection relating to the "LxL flash memory", raised to the then second auxiliary request (see reasons II.3.1.1), is immaterial to this decision, which deals exclusively with the main request.

*Article 52(2,3) EPC*

3. Amended claim 1 of the main request relates to a method "executing in a hardware or a hardware and software system". According to established jurisprudence of the boards of appeal, this constitutes technical subject-matter and thus an invention within the meaning of Article 52(2,3) EPC. The corresponding objection raised by the board has thus been overcome.

*Clarity, Article 84 EPC, and claim construction*

4. The decision under appeal found that the claimed term "distortion" did not comply with Article 84 EPC, because its meaning was "vague and indefinite" so that its limiting effect was not apparent (see point II.1.2, of the reasons, in particular item (b3d)).

4.1 The board agrees with the examining division's opinion in part. The term "distortion" is very broad and its limiting effect is small. The board understands the claimed "distortion" to mean "modification", so that the step (b) of "distorting" is construed as changing at least (but possibly as little as) one bit of the

"transformed set of source data". The board also considers that the term "distortion" is broader than "interleaving", since, as set out in claim 1, interleaving only involves altering the relative positions of portions of the source data. That is, the distortion according to step (b) could be satisfied by a "transformation" such as that of step (c), but not vice versa.

4.2 The board notes that the broad term "distortion" subsumes two extreme instances. For example, the distortion of step (b) could, theoretically, be the inverse of the interleaving of step (a), in which case the second EDAC in step (d) would operate on the undefined source data. Alternatively, the distortion step could itself be an interleaving step, in which case steps (a) and (b) in combination would implement an interleaver, in which case step (b) would be effectively redundant.

4.3 However, the board considers that these possibilities do not render claim 1 unclear. Firstly, in view of the disclosed goal that steps (a) and (b) add "errors" to the source data, the skilled person would not pick the distortion so as to cancel out the interleaving. And, secondly, the possibility that the second step could also be "interleaving", does not render unclear the fact that two separate steps (a) and (b) are claimed.

4.4 In the board's view, therefore, claim 1 sets out that the source data undergoes, in the second branch, three subsequent processing steps: an interleaving transformation (step (a)); some, possibly minimal, modification (step (b)) and an EDAC algorithm (step (d)). In this context, the term "distortion" has

a clear, albeit very small, limiting effect on the claimed subject-matter.

4.5 No further details about the transformation, the distortion, the second EDAC algorithm or the first EDAC algorithm are known.

4.6 This means that claim 1 is indeed very broad. However, in the board's judgment, the claim is clear, and therefore compliant with Article 84 EPC.

*Article 111(1) EPC*

5. In view of the foregoing, the reasons in the decision under appeal do not apply to claim 1 of the main request. Hence the decision under appeal must be set aside and the board's assessment of the auxiliary requests is not required. Moreover, inventive step (at least vis-à-vis the nine documents mentioned in the decision) was not decided upon or, it seems, exhaustively discussed before the examining division.

6. In deciding upon remittal to the examining division within the discretion conferred by Article 111(1) EPC, the board considered two issues, namely

(a) whether the subject-matter of claim 1 had a discernible effect that could, in principle, be the basis for a finding of an inventive step, and
(b) whether the objection raised by the examining division applied directly to amended claim 1 of the main request.

Arguably, a remittal to the examining division would not serve any purpose if the answer to (a) were negative or if that to (b) were positive.

7. With regard to (a), the board takes the following view.

7.1 Claim 1 of the main request sets out the separate computation of two EDAC "remainders" from "source data". The transformation and distortion steps, their breadth notwithstanding, imply, in the board's judgment, that the input to the second EDAC is different from the first one. Therefore, even if both EDACs were the same, this would mean that the two generated remainders would be different. Hence, the second remainder provides at least some additional redundancy beyond that of the first remainder. For these reasons, the board accepts the appellant's argument that the invention provides at least a slight improvement over the error detection and correction capabilities of any known EDAC algorithm.

7.2 The board also notes, however, that this improvement is essentially due to the fact that two separate remainders for the same source data are computed. Due to the broad claim language, the error detection and correction capabilities of the first and second EDAC are unknown, and so is the extent to which the capability of the second EDAC is affected by the preceding transformation and distortion steps. As a consequence, the board takes the view that the mathematical properties of the second remainder - produced by the serial combination of transformation, distortion and a second EDAC - cannot be distinguished from the effects of a mere undefined EDAC.

8. With regard to (b), the board notes the following.

8.1 In its summons to oral proceedings dated 7 July 2014 (see point 6), the examining division raised an inventive-step objection to the then claim 1.

8.2 That claim specified that the second EDAC algorithm operated on the output of the first EDAC algorithm ("encoded data"), i.e. that the two EDACs were connected in series.

8.3 In its objection, the examining division had considered that the sector forming and scrambling components (nos. 13 and 14 in figure 1) constituted interleaving and distortion components, and that the PO and PI encoders (see nos. 211 and 214 in figure 27) constituted the two EDAC algorithms, as claimed.

8.4 As it appears, these four components are disclosed in D5 as being connected in sequence (see in this respect column 15, lines 35-37). Accordingly, it would seem that at least the two separate, "parallel" processing branches, as now claimed, are not disclosed in D5. Therefore, the examining division's inventive-step argument based on D5 does not apply, as it stands, to claim 1 of the present main request.

9. In view of the foregoing, the board finds it appropriate to remit the case to the examining division for further prosecution.

**Order**

**For these reasons it is decided that:**

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

The Registrar: The Chairman:

B. Atienza Vivancos W. Sekretaruk

Decision electronically authenticated