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**Datasheet for the decision  
of 24 October 2022**

**Case Number:** T 2194/19 - 3.5.03

**Application Number:** 04720810.3

**Publication Number:** 1611685

**IPC:** H03M13/00

**Language of the proceedings:** EN

**Title of invention:**

Error-correcting code interleaver

**Applicant:**

Terayon Communication Systems, Inc.

**Headword:**

Error correction/TERAYON

**Relevant legal provisions:**

EPC Art. 84 sentence 2, 111(1), 123(2)  
RPBA 2020 Art. 11

**Keyword:**

Added subject-matter - (no, after amendment)

Support by the description - (yes, after amendment)

Adaptation of the description: objection of examining division  
not justified

Remittal - special reasons (yes): novelty and inventive step  
not decided yet

**Decisions cited:**

T 1808/06, T 0944/15, T 2293/18

**Catchword:**

The requirement that the claims are to be supported by the description under Article 84, second sentence, EPC does not necessarily mean that all the "embodiments" of the description of a patent application have to be covered by the (independent) claims, i.e. that all the embodiments must fall within the scope of those claims (see point 6.2.2 of the Reasons).



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Case Number: T 2194/19 - 3.5.03

**D E C I S I O N**  
**of Technical Board of Appeal 3.5.03**  
**of 24 October 2022**

**Appellant:** Terayon Communication Systems, Inc.  
(Applicant) 4988 Great America Parkway  
Santa Clara, CA 95054 (US)

**Representative:** Openshaw & Co.  
8 Castle Street  
Farnham, Surrey GU9 7HR (GB)

**Decision under appeal:** **Decision of the Examining Division of the  
European Patent Office posted on 24 January 2019  
refusing European patent application  
No. 04720810.3 pursuant to Article 97(2) EPC.**

**Composition of the Board:**

**Chair** K. Bengi-Akyürek  
**Members:** K. Peirs  
F. Bostedt

## Summary of Facts and Submissions

- I. The appeal is against the decision of the examining division to refuse the present application based on a sole claim request. The examining division did not deem this request allowable in view of Articles 84 and 123(2) EPC.
- II. The appellant was summoned to oral proceedings before the board. The board issued a communication under Article 15(1) RPBA 2020 including its negative preliminary opinion concerning added subject-matter (Article 123(2) EPC) and support by the description (Article 84 EPC).
- III. Oral proceedings before the board were held on 24 October 2022 by videoconference. At their end, the board announced its decision.
- IV. The appellant's final requests were that the decision under appeal be set aside and that a patent be granted on the basis of the claims of a sole claim request. The claims of this claim request were filed as a "sixth auxiliary request" during the oral proceedings before the board.
- V. Claim 1 of the **claim request underlying the decision under appeal** reads as follows (labels (a) to (d) introduced by the board):
  - (a) "A method for conducting convolutional interleaving of symbols of an error-correcting code having  $I$  symbols in a set, the method comprising:

- (b) setting a placeholder (400, 500, 600) to an initial location in a memory of size  $(I(I-1)*J)/2+1$ , wherein  $J$  is a delay value;
- (c) setting a read pointer to at least one of a write pointer or a write pointer-1 for every  $I$  symbols received;
- (d) repetatively [sic] counting from a step of 0 to a step of  $I-1$ , performing the following:
  - a) setting a write pointer equal to said placeholder;
  - b) if step is 0, setting (404) said placeholder equal to a read pointer;
  - c) if step is not 0, advancing (406) said placeholder  $step*J$  memory locations, wrapping around if said placeholder value would be past an end of said memory;
  - d) setting said read pointer (408) equal to said placeholder;
  - e) reading out (410, 504, 604) from a location in said memory indicated by said read pointer; and
  - f) writing a next (412, 506) of said  $I$  symbols to a location in said memory indicated by said write pointer, unless step is 0, in which case it is bypassed".

VI. Claim 1 of the sole **claim request on file** reads as follows (amendments vis-a-vis claim 1 of the claim request underlying the appealed decision highlighted by the board):

"A method for conducting convolutional interleaving of symbols of an error-correcting code having  $I$  symbols in a set, the method comprising:

- setting a placeholder (400, 500, 600) to an initial location in a memory of size  $(I(I-1)*J)/2+1$ , wherein  $J$  is a delay value;

setting a read pointer to ~~at least one of a write pointer or a write pointer -1~~ for every  $I$  symbols received:

repetatively counting from a step of 0 to a step of  $I-1$ , performing the following:

- a) setting a write pointer equal to said placeholder;
- b) if  $step$  is 0, setting (404) said placeholder equal to ~~a~~ the read pointer;
- c) if  $step$  is not 0, advancing (406) said placeholder  $step * J$  memory locations, wrapping around if said placeholder value would be past an end of said memory;
- d) setting said read pointer (408) equal to said placeholder;
- e) reading out (410, 504, 604) from a location in said memory indicated by said read pointer, unless  $step$  is 0, in which case the reading out is bypassed; and
- f) writing a next (412, 506) of said  $I$  symbols to a location in said memory indicated by said write pointer, unless  $step$  is 0, in which case ~~it~~ the writing is bypassed".

VII. Independent claim 5 of the sole **claim request on file** reads as follows:

"An apparatus for conducting convolutional interleaving of symbols of an error-correcting code having  $I$  symbols in a set, the apparatus comprising:

means (704, 804) for setting a placeholder to an initial location in a memory of size  $(I(I-1)*J)/2+1$ , wherein  $J$  is a delay value;

means for setting a read pointer to a write pointer for every  $I$  symbols received and,

for every  $I$  symbols received:  
means (706, 806) for repetitively counting from a  
*step* of 0 to a *step* of  $I-1$ , performing the  
following:

- a) setting a write pointer equal to said placeholder;
- b) if *step* is 0, setting said placeholder equal to the read pointer;
- c) if *step* is not 0, advancing said placeholder  $step \cdot J$  memory locations, wrapping around if said placeholder value would be past an end of said memory;
- d) setting said read pointer equal to said placeholder;
- e) reading out from a location in said memory indicated by said read pointer, unless *step* is 0, in which case the reading out is bypassed; and
- f) writing a next of said  $I$  symbols to a location in said memory indicated by said write pointer, unless *step* is 0, in which case the writing is bypassed".

## **Reasons for the Decision**

### 1. *Technical background*

The present application concerns digital communication systems in which communication data is transmitted via interleaving using error correction. According to the application as filed, the invention provides "for a very efficient and reliable use of memory for error-correcting code interleaving" (paragraph [0011]).

2. *Decision under appeal: added subject-matter, clarity and support by the description*

2.1 In Reasons 2.1 of the appealed decision, the examining division raised an objection under Article 123(2) EPC against **feature (c)** of claim 1 (cf. point V above). In particular, the examining division considered that this feature was not disclosed in a combination of original Figures 2 and 3 and it noted that these figures related to realisations of convolutional interleaving using different memory sizes, namely " $(I(I-1)*J)/2+1$ " and " $(I(I-1)*J)/2+\underline{I}+1$ " (emphasis added by the board) respectively.

2.2 In Reasons 2.2 of the appealed decision, the examining division raised an objection under Article 123(2) EPC against independent claim 5 of the claim request underlying the impugned decision for the same reasons as set out for feature (c) of claim 1.

2.3 In Reasons 3.1 of the appealed decision, the examining division justified its objection against reading-out operation e) of **feature (d)** in view of "*an apparent inconsistency between claim 1 on the one hand and §§[0020]-[0026] on the other hand, which inconsistency renders claim 1 unclear and raises doubts about its support by the description, contrary to the requirements of Article 84 EPC*". The examining division observed in particular that claim 1 required this reading-out operation e) to be performed for each "step" of "0" to "I-1". It considered this to be inconsistent with Table 1 in paragraph [0024] of the present description. From the column labelled by "cycle 0" of this Table, it appeared, in the examining division's view, that no reading-out operation is to be



performed when "step" is 0.

2.4 In Reasons 3.2 of the impugned decision, the same objection under Article 84 EPC as for claim 1 was raised against independent claim 5.

3. *Communication under Article 15(1) RPBA 2020: added subject-matter and support by the description*

3.1 In point 4.1.2 of the board's communication under Article 15(1) RPBA 2020, the board considered, in view of the first sentence of original paragraph [0027] of the present application, that the examining division had correctly observed in Reasons 2.1 of its decision that Figures 2 and 3 indeed concern *different* embodiments which relate to different memory sizes (cf. point 2.1 above).

3.2 In addition, the board noted in point 4.1.3 of its communication under Article 15(1) RPBA 2020 that the term "a read pointer" occurred not only in feature (c) but also in setting operation b) of feature (d). As a result, two *different* read pointers could be used according to the claimed method for conducting convolutional interleaving. However, there was no direct and unambiguous disclosure for this in the application as filed.

3.3 Moreover, in point 4.2.1 of the communication under Article 15(1) RPBA 2020, the board agreed with the examining division that

- Table 1 in original paragraph [0024] implied, in the case of "step 0", that the read operation is bypassed, i.e. that no read operation is performed

and that

- this was inconsistent with claim 1 requiring reading-out operation e) of feature (d) to be performed also when "step" is "0" (cf. Reasons 3.1 of the appealed decision and point 2.3 above).

4. *Independent claims 1 and 5 of the sole claim request on file - added subject-matter, clarity and support by the description*

4.1 The subject-matter of claim 1 of the sole claim request on file is disclosed in claim 1, Figure 2 and paragraph [0006] in conjunction with paragraphs [0022] and [0024] to [0026] of the present application as filed. The subject-matter of independent claim 5 of this request is disclosed in original claim 18 and the above-mentioned figure and passages of the original description. The board is also satisfied that independent claims 1 and 5 of the sole claim request on file now are supported by the description and are clear.

4.2 Regarding the objections referred to in points 2 and 3 above, the board observes the following:

4.2.1 Concerning the objection mentioned in points 2.1 and 3.1 above, the alternative "a write pointer-1" of **feature (c)** was struck out in claim 1. As a result, this feature only relates to the embodiment associated with original Figure 2 and no longer to a combination of original Figures 2 and 3.

4.2.2 The objection referred to in point 3.2 above was overcome by replacing the term "a read pointer" with the expression "the read pointer" in operation b) of

**feature (d) .**

- 4.2.3 The objection to which points 2.3 and 3.3 above relate is overcome by introducing the clause "unless step is 0, in which case the reading out is bypassed" in reading-out operation e) of **feature (d)**. This ensures conformity between this reading-out operation and Table 1 given in paragraph [0024] of the description. It thus resolves the objected-to inconsistency, which, in the examining division's view, rendered claim 1 not clear and raised doubts as to whether the requirement of support by the description was fulfilled.
- 4.2.4 Independent claim 5 of the sole claim request on file was amended in a similar way as claim 1. Therefore, the objections mentioned in points 2.2 and 2.4 above are also overcome in relation to that claim.
- 4.3 In conclusion, the objections regarding added subject-matter (Article 123(2) EPC) and lack of clarity and support by the description (Article 84 EPC) raised in Reasons 2.1, 2.2, 3.1 and 3.2 of the appealed decision and in point 4.1.3 of the board's communication against independent claims 1 and 5 are overcome by the present independent claims of the sole claim request on file.
5. *Reasons 2.3 of the appealed decision: description - added subject-matter*
- 5.1 In Reasons 2.3 of the appealed decision, the examining division raised an objection under Article 123(2) EPC related to the insertion of the expression "*an embodiment of the present invention alternative to the embodiment as claimed in the present invention*" in amended pages 14 and 23 of the description relating to

original Figures 3 and 9 respectively. They considered that those figures did not relate to subject-matter that falls within the scope of the invention as claimed in the independent claims.

5.2 The board does not agree that the mere insertion of this expression adds subject-matter that was not disclosed in the application as filed. This is because it would have been directly and unambiguously apparent to the skilled reader that original Figures 3 and 9 and their respectively associated paragraphs [0027] and [0043] concern convolutional interleaving using a memory size of " $(I(I-1)*J)/2+\underline{I}+1$ " (emphasis added by the board). The convolutional interleaving described in these figures and their associated paragraphs therefore differs from the convolutional interleaving that is claimed in independent claims 1 and 5. This remains to be also the case with the expression "*an embodiment of the present invention alternative to the embodiment as claimed in the present invention*" being inserted in original paragraphs [0027] and [0043]. The board also notes that the examining division did not indicate in Reasons 2.3 of the appealed decision *which* subject-matter they considered to have been added compared to the application as filed.

5.3 Consequently, the objection raised in Reasons 2.3 of the appealed decision is unfounded.

6. *Reasons 4 of the appealed decision: adaptation of the description to the claims*

6.1 In items (a) and (a1) to (a3) of the Reasons 4 of the appealed decision, the examining division observed that the following paragraphs of the description, namely

- paragraph [0027], relating to Figure 3;
- paragraph [0033], relating to Figure 5;
- paragraph [0035], relating to Figure 6;
- paragraphs [0039] and [0041], relating to Figure 8;
- paragraph [0043], relating to Figure 9,

concern convolutional interleaving using a memory size of " $(I(I-1)*J)/2+\underline{I}+1$ " (emphasis added by the board). The examining division regarded this to be at odds with the smaller memory size of " $(I(I-1)*J)/2+1$ " used in independent claim 1.

It is apparent from item (a6) of Reasons 4 that the examining division equated the term "embodiment" with subject-matter that has to fall "within the scope of the invention as defined by the claims". They concluded that the description so adapted was not in conformity with the independent claims, contrary to Rule 42(1)(c) EPC, because the term "embodiment" was used in parts of the description that describe subject-matter that was not part of the subject-matter of these independent claims. Moreover, the examining division held that the "invention" must always be the "invention claimed" and the "invention" was defined by the independent claims (cf. Reasons 1, referred to in Reasons 4, item (b2) of the appealed decision).

6.2 The board does not endorse the objection raised in Reasons 4 of the impugned decision for the following reasons:

6.2.1 First, the board is not convinced that, according to the EPC, the "invention" is necessarily and always to be equated with the "invention claimed" (see e.g. **T 944/15**, Reasons 17).

6.2.2 Secondly, this board takes issue with the conclusion that the requirement that the claims are to be supported by the description (Article 84, second sentence, EPC) necessarily means that *all* the "embodiments" of the description of a patent application have to be covered by the (independent) claims, i.e. that all the embodiments must fall within the scope of those claims. This conclusion cannot be derived from the EPC. It can also not be derived from the jurisprudence of the Boards of Appeal, according to which merely inconsistencies or contradictions between the claims and the underlying description are to be avoided in that context (see e.g. **T 1808/06**, Reasons 2; **T 2293/18**, Reasons 3.3.5). The board considers that it may well be that, in a given case, there is such an inconsistency or contradiction between the claims and an "embodiment" of the description. But this has to be *justified* by the examining division. The mere indication that the embodiment does not or no longer fall under the respective claim(s) is not sufficient in this regard.

6.2.3 Thirdly, the board considers that in particular Rule 42(1)(c) EPC cannot be the legal basis for establishing such a general and broad requirement for an adaptation of the description to the claims. It is simply not what this provision says. Rule 42(1)(c) EPC requires that the description discloses the invention, as claimed, in such terms that the technical problem and its solution can be understood, and that it states any advantageous effects of the invention with reference to the background art. These requirements set out in Rule 42(1)(c) EPC, however, cannot be taken to mean that *all* the embodiments described in the description of a patent application have to fall within

the scope of the claims.

6.3 Hence, the objections raised in Reasons 4 of the appealed decision are likewise unfounded.

7. *Remittal to the examining division*

7.1 For the reasons set out above, the board holds that the objections raised in the decision under appeal do not apply to independent claims 1 and 5 of the sole claim request on file. Hence, the grounds for refusal are considered to be overcome and therefore cannot carry the refusal of the present application.

7.2 Given that the appealed decision was confined to the assessment of compliance with Article 123(2) EPC and Article 84, second sentence, EPC, the board deems "special reasons" to present themselves which justify a remittal of the case to the examining division under Article 11 RPBA 2020 for further prosecution on the basis of the claims of the sole claim request on file (Article 111(1) EPC).

7.3 The board notes in passing that, in this further prosecution, the examining division should not only consider the compliance with Articles 54 and 56 EPC of the independent claims but should examine the set of claims as to all requirements of the EPC. For example, the board did not have to address, and indeed did not decide on, the following points:

- whether the dependent claims, especially dependent claims 4 and 8, comply with Articles 84 and 123(2) EPC;

- whether the provision of Article 83 EPC is met, particularly regarding whether there is sufficient disclosure in the application for choosing any arbitrary "next (412, 506) of said *I* symbols" in writing operation f) of the present independent claims.

## 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 Chair:



B. Brückner

K. Bengi-Akyürek

Decision electronically authenticated