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Datasheet for the decision of 9 September 2008

Case Number: T 0159/06 - 3.5.02

Application Number: 98300556.2

Publication Number: 0932259

IPC: H03M 13/00

Language of the proceedings: EN

Title of invention:
Iterative decoding on demand

Applicant:
Lucent Technologies Inc.

Opponent:
-

Headword:
-

Relevant legal provisions:
EPC Art. 54, 56

Relevant legal provisions (EPC 1973):
-

Keyword:
"Inventive step - after amendment (yes)"

Decisions cited:
-

Catchword:
-

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Beschwerdekammern | Boards of Appeal | Chambres de recours

Case Number: T 0159/06 - 3.5.02

D E C I S I O N
of the Technical Board of Appeal 3.5.02
of 9 September 2008

Appellant: Lucent Technologies Inc.
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Decision under appeal: **Decision of the Examining Division of the European Patent Office posted 1 July 2005 refusing European application No. 98300556.2 pursuant to Article 97(1) EPC 1973.**

Composition of the Board:

Chairman: M. Ruggiu
Members: J.-M. Cannard
H. Preglau

Summary of Facts and Submissions

I. The appellant contests the decision of the examining division to refuse European patent application No. 98 300 556.2. The reason given for the refusal was that the subject-matter of the claims then on file did not involve an inventive step in the sense of Article 56 EPC.

II. The following documents of the state of the art, which have been cited in the first instance proceedings,:

D1: G. Bauch et al., "Iterative Equalization and Decoding in Mobile Communications Systems", in Proceedings of European Personal and Mobile Communications Conference, EPMCC'97, 1997, pages 307 to 312, XP002060630,

D2: US-A-5 249 290, and

D3: P. Reljonen, "GSM Base Station Development", in Telecommunications, vol. 24, September 1990, no. 9, pages 85 to 88, 90 and 92, XP000471873,

are considered in the present decision.

III. Independent claims 1 and 2 of the current request filed in the oral proceedings held on 9 September 2008 before the Board read as follows:

Claim 1:

"A base station for a wireless communication system, the base station including apparatus for iteratively

decoding signals of a plurality of calls in parallel comprising:

signal processing units (40a, 40b...40k); and

iterative decoding resources for running an iterative decoding process comprising at least one decoding iteration on a signal characterised in that

the iterative decoding resources are located in a central pool (41) in the base station and are allocated to the signal processing units when an iterative decoding process is required, and are arranged such that after an iteration on a signal a further iteration is made on the signal if a bit error rate BER target is not met and a maximum latency for the signal has not elapsed, each call having a BER target and maximum latency which are set dependent upon the type of data being communicated, wherein each signal processing unit includes a control unit (42a, 42b...42k) which requests the iterative decoding resources from the central pool, and each signal processing unit (40a, 40b...40k) is allocated iterative decoding resources from the central pool (41) upon a request from the respective control unit, wherein the iterative decoding resources allocated to a signal processing unit are altered during the decoding of the call."

Claim 2:

"A method of iteratively decoding signals of a plurality of calls in parallel in a base station of a wireless communication system comprising signal processing units each having a respective control unit, the method

comprising the steps of accepting a plurality of signals for decoding in the base station, using iterative decoding resources to run at least one iterative decoding process on each signal characterised in that

the iterative decoding resources are requested (40a, 40b...40k, 42a, 42b...42k) from a central pool (41) contained at the base station and are allocated when an iterative decoding process is required, after an iteration on a signal a further iteration is made on the signal if a bit error rate BER target is not met and a maximum latency for the signal has not elapsed, each call having a BER target and maximum latency which are set dependent upon the type of data being communicated, wherein each signal processing unit includes a control unit (42a, 42b...42k) which requests the iterative decoding resources from the central pool, and each signal processing unit (40a, 40b...40k) is allocated iterative decoding resources from the central pool (41) upon a request from the respective control unit, and the allocated iterative decoding resources are altered as the signal is decoded during the call."

IV. The appellant requested that the decision under appeal be set aside and that a patent be granted in the following version:

Description: pages 1 and 5 as originally filed, page 3 filed with the letter of 10 May 2002, pages 2a and 6 filed with the letter of 29 July 2008, pages 2 and 4 received during the oral proceedings of 9 September 2008.

Claims: No. 1 and 2 received during the oral proceedings of 9 September 2008.

Drawings: sheets 1/4 to 4/4 as originally filed.

V. Essentially, the appellant submitted that altering the decoding resources allocated to a signal processing unit as the signal was decoded provided for fewer iterations or iterative processes if signal quality improved during the call.

Reasons for the Decision

1. The appeal is admissible.

Current request - Admissibility of the amendments

2. The Board is satisfied that the claims and the description according to the current request meet the requirements of Article 84 and do not contravene Article 123(2) EPC.

2.1 This applies particularly to claim 1 whose features are disclosed in the original claims 1 to 5 and at page 1, lines 2 to 4, page 2, lines 12 to 23, and page 5, lines 21 to 23 of the application as originally filed, and to claim 2 whose features are disclosed in the original claims 6 to 8 and in said passages of the originally filed application.

2.2 The description has been adapted to the amended claims and to mention the prior art known from document D2.

Current request - Novelty and inventive step

Document D1, which is cited in the application as filed, can be taken as the closest prior art. D1, which relates to "Iterative Equalization and Decoding in Mobile Communications Systems", describes more specifically a decoding unit which can be used for iterative decoding of codes in a receiving channel of a mobile system with coded transmission (page 307, Introduction) and clearly concerns a base station for a wireless communication system. A base station having an apparatus for iteratively decoding signals of a plurality of calls in parallel, which comprises signal processing units and iterative decoding resources for running an iterative decoding process comprising at least one decoding iteration on a signal, thus derives directly and unambiguously from D1. Hence, the features recited in the pre-characterising part of claim 1 are known from D1.

2.3 However, the iterative decoding units disclosed in D1 are arranged such that iterations are performed until no improvement in the bit error rate (BER) is achieved or a maximum number of iterations has been made (page 310, section V and page 311, sections B and D). The iterative decoding resources of D1 are not part of a central pool of a base station. Nor are these decoding resources altered during the decoding of a call. The features specified in the characterising part of claim 1 thus are not disclosed in D1. Document D3, which only contains general considerations about the design of GSM base stations, does not describe any iterative decoding resources located in a central pool of a base station and is less relevant than D1. The subject-matter of claim 1 is novel (Article 54 EPC).

3. Starting from the disclosure of D1 and having regard to the effects provided by the features specified in the characterising part of claim 1, the objective technical problem addressed by the invention can be seen as optimising the use of the iterative decoding resources of a base station to reduce the costs and complexity.

4. There is no suggestion in any of the cited prior art documents of the feature "the iterative decoding resources allocated to a signal processing unit are altered during the decoding of a call" which is recited in the characterising part of claim 1 and in particular contributes to solving the objective technical problem.

4.1 D1 describes methods to reduce complexity of decoding to reduce the average number of iterations needed for the same BER performance by stopping the iterations when it is recognized that the decoding result of a block cannot be improved by further iterations (page 307, "Abstract" and "Introduction"). Moreover, as appears from foregoing paragraph 2.3, it does not disclose allocating iterative decoding resources to the signal processing units of a mobile communication system. D1 therefore does not suggest to a skilled person the idea of altering iterative decoding resources allocated to a signal decoding unit during the decoding of signals.

4.2 Document D2 relates to a method and an apparatus for allocating, upon request, processing resources (hard disk, printer and fax) which are located in a central pool to the various computers in a computer network and more specifically discloses a network server having an improved performance. According to the invention of D2,

"the server uses a workload indication of a server process to determine when to assign a received client service request to another server process" to provide an improved allocation of the resources to the computer clients (figure 1; column 1, lines 8 to 11 and lines 46 to 49; column 2, lines 21 to 65). D2 (column 1, lines 14 to 41) thus may confirm that, at the priority date of the application in suit, it was commonly known that costs and complexity of data processing can generally be reduced by sharing resources. However, the teaching of D2 does not suggest the idea of altering iterative decoding resources allocated to processing units from a central pool during the decoding of a signal.

4.3 Document D3 neither describes, nor suggests, altering iterative decoding resources allocated to a decoding unit. Hence, the cited prior art documents, taken alone or in combination, would not have led the person skilled in the art to the base station of claim 1 of the current request.

5. Corresponding considerations apply *mutatis mutandis* to independent claim 2 according to the current request which relates to a method of iteratively decoding signals of a plurality of calls in parallel in a base station of a wireless communication system and specifies *inter alia* that "the allocated iterative decoding resources are altered as the signal is decoded during the call".

6. For the foregoing reasons, in the Board's judgment, the subject-matter of the claims of the current request is considered to be new and involve an inventive step

within the meaning of Articles 54 and 56 EPC. The application as amended meets the requirements of the EPC.

Order

For these reasons it is decided that :

1. The decision under appeal is set aside.

2. The case is remitted to the department of first instance with the order to grant a patent in the following version:

Description: pages 1 and 5 as originally filed, page 3 filed with the letter of 10 May 2002, pages 2a and 6 filed with the letter of 29 July 2008, pages 2 and 4 received during the oral proceedings of 9 September 2008.

Claims: No. 1 and 2 received during the oral proceedings of 9 September 2008.

Drawings: sheets 1/4 to 4/4 as originally filed.

The registrar: The Chairman:

U. Bultmann M. Ruggiu