Datasheet for the decision
of 12 April 2010

Case Number: T 0684/06 - 3.5.02
Application Number: 99308371.6
Publication Number: 0998047
IPC: H03M 13/39
Language of the proceedings: EN

Title of invention:
Reduced-state device and method for decoding data

Applicant:
LUCENT TECHNOLOGIES INC.

Headword:
-

Relevant legal provisions:
EPC Art. 83

Relevant legal provisions (EPC 1973):
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Keyword:
"Insufficiency of disclosure - (yes)"

Decisions cited:
-

Catchword:
-
Case Number: T 0684/06 - 3.5.02

DECISION of the Technical Board of Appeal 3.5.02 of 12 April 2010

Appellant: LUCENT TECHNOLOGIES, INC.
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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 of 28 September 2005 to refuse European patent application No. 99 308 371.6. The reason for the refusal was that the application did not meet the requirements of Article 84 EPC.

II. In a communication dated 23 January 2009, the Board observed, inter alia, that the application did not appear to disclose the invention in a manner sufficiently clear and complete for it to be carried out by a person skilled in the art, in particular because it did not give any indication regarding the data that were to be stored initially in an array 90 or regarding the selection of the non-selected states that should have a PQV ("predetermined quantized value") stored under the corresponding index in the array 90 (point 2.2 of the communication).

III. With a letter dated 27 May 2009, the appellant filed sets of claims according to amended main and first auxiliary requests and a second auxiliary request and replacement pages 10 and 12 of the description. Oral proceedings before the Board were not requested.

IV. It can be understood from the written submissions of the appellant that he requests that the decision under appeal be set aside and that a patent be granted on the basis of claims 1 to 14 of the main request filed with the letter dated 27 May 2009, description pages 1 to 9, 11, 13 to 17 as originally filed and description pages 10 and 12 filed with the letter dated 27 May 2009, and sheets 1/6 to 6/6 of the drawings as originally filed,
subsidiarily on the basis of claims 1 to 14 of the first auxiliary request, or claims 1 to 14 of the second auxiliary request, both filed with the letter dated 27 May 2009.

V. Claim 1 of the present main request reads as follows:

"A method for decoding encoded data (CC0, CC1), comprising the steps of:

sequentially counting all possible states of a shift register;

calculating, for each current state of the shift register, a pair of two possible previous states (PS1, PS2) of the shift register, one of the two possible previous states being a state of the shift register immediately preceding the current state of the shift register;

selecting one of the two possible previous states and a predetermined value (PQV) based on a control signal (ENA, DIS); wherein

for each selected pair of possible previous states, the method includes,

generating a pair of theoretical coefficients (TC0, TC1) corresponding to the pair of possible previous states,

generating conditional probability of each pair of theoretical coefficients for the encoded data,"
adding a pair of values derived from the conditional probabilities with a corresponding value (ACP) to generate updated accumulated values for the current state,

comparing the accumulated values for the current state to identify a winning accumulated value and associated winning previous state among the pair of possible, and

outputting one of the winning accumulated value and the predetermined value, along with the associated winning previous states for the current state; and

decoding the encoded data based on the stored previous states."

VI. Claim 1 of the first auxiliary request reads as follows:

"A method for decoding encoded data (CC0, CC1), comprising the steps of:

sequentially counting all possible states of a shift register;

calculating, for each current state of the shift register, a pair of two possible previous states (PS1, PS2) of the shift register, one of the two possible previous states being a state of the shift register immediately preceding the current state of the shift register;

selecting one of the two possible previous states and a predetermined quantized value (PQV) based on a control signal (ENA, DIS); wherein
for each selected pair of possible previous states, the method includes,

generating a pair of theoretical coefficients (TC0, TC1) corresponding to the pair of possible previous states,

generating conditional probability of each pair of theoretical coefficients for the encoded data,

quantizing the conditional probabilities to generate a pair of quantized values,

adding each of the quantized values with a corresponding quantized value (ACP) to generate updated accumulated quantized values for the current state,

comparing the accumulated quantized values for the current state to identify a winning accumulated quantized value and associated winning previous state among the pair of possible previous states, and

outputting one of the winning accumulated quantized value and the predetermined quantized value, along with the associated winning previous states for the current state;

and decoding the encoded data based on the stored previous states."

VII. Claim 1 of the second auxiliary request comprises all features of claim 1 of the first auxiliary request, except the feature:
"comparing the accumulated quantized values for the current state to identify a winning accumulated quantized value and associated winning previous state among the pair of possible previous states, and", which now reads:

"comparing the accumulated quantized values for the current state to identify a winning accumulated quantized value and associated winning previous state among the pair of possible (sic), and",

and the last feature of the claim "and decoding the encoding data based on the stored previous states", which now is replaced by the additional features:

"storing the winning accumulated quantized values and associated winning previous states for each of the possible states;

generating a threshold value (h) based on a user input and one of the winning accumulated quantized value and the predetermined quantized value;

comparing the threshold value to one of the winning accumulated quantized value and the predetermined quantized value; wherein

if the winning accumulated quantized value is greater than the threshold, the method includes,

storing the associated winning previous state,

decoding the encoded data based on the stored associated winning previous states."
VIII. As regards the objection of insufficiency of disclosure raised in point 2.2 of the communication of the Board, the appellant's arguments can be summarized as follows:

According to the example embodiment, the process of storing in the data array 92 of array 90 took place until all 256 possible states (ACPs and PQVs) were stored in data area 92 (e.g., starting at state 1 and ending at state 256). The disclosure made clear that the PQVs were "predetermined quantized values". It was unnecessary to specify how the PQVs were predetermined since it was "neither necessary nor desirable that details of well-known ancillary features should be given" (EPO Guidelines C.II.4.9.). At least one essential feature was manipulation of the PQVs, not how to predetermine values.

Reasons for the Decision

1. The appeal is admissible.

2. The application does not disclose the invention in a manner sufficiently clear and complete for it to be carried out by a person skilled in the art (Article 83 EPC).

2.1 According to page 12, lines 6 to 11, of the description as filed, "the memory unit 60A includes other circuits for outputting the enable and disable signals ENS and DIS to the state selector 46 based on the data stored in the array 90. If the PQV is stored in the data area 92 corresponding to the index number matching the
current state count, then the disable signal DIS is output to the state selector 46. Otherwise, the memory unit 60A outputs the enable signal ENS to the state selector 46" (emphasis added). Page 12, lines 20 to 23, states: "If the maximum selector 58 receives the PQVs prestored in the memories 75A and 75B of the state selector 46 for the current state count, the maximum selector 58 updates the ACP/PQV currently stored under index 5 with the PQV" (emphasis added). The index 5 corresponds to the current state count (state 5) as appears from page 12, line 12. Thus, the originally filed description indicates that, if a PQV is stored in the array 90 of the first memory unit 60A under the index matching the current state count, then the same PQV is stored again under the same index. This implies that the states for which a PQV is stored in the array 90 are predetermined and are not changed by the decoder (see also page 1, lines 2 to 5 and page 6, lines 3 to 9 of the description as filed). However, the original application does not seem to give any indication regarding the data that are to be stored initially in the array 90 or regarding the selection of the non-selected states that should have a PQV stored under the corresponding index in the array 90.

2.2 Initially storing data in the array 90, and selecting the non-selected states appear, however, to be essential steps of the invention, particularly because the "present invention is directed to a reduced-state device and method for decoding data that uses less memory for storing winning previous states (PSs) associated with accumulated conditional probabilities (ACPs) because less ACPs are generated. The reduced-state device and method select only certain current
states from all possible states of an encoder for each encoded data based on a control signal, and generate ACPs for the selected current states" (see page 6, lines 3 to 8 of the application as filed, emphasis added). Moreover, such essential steps are comprised in the only embodiment disclosed in the description as filed and the method set out in the original claims.

2.3 The method according to claim 1 of the present main request and first and second auxiliary requests comprises steps of:

- sequentially counting all possible states of a shift register,

- calculating, for each current state of the shift register, a pair of two possible previous states,

- selecting one of the two possible previous states and a predetermined quantized value \( \text{PQV} \) based on a control signal \( \text{ENA}, \text{DIS} \),

- and further steps for each selected pair of possible previous states.

Therefore, in order to carry out the method according to claim 1 of any of the present requests, it is necessary to determine which data are initially stored in the array 90 so as to determine the non-selected states.

The appellant submits that it is neither necessary nor desirable to give details of well-known ancillary features. However, the appellant does not give any information or evidence about which features should be
well-known. The determination of the non-selected states is consistently presented in the application as an essential feature of the invention.

2.4 The application does not include any indication of the data initially stored in the array 90 or of how the non-selected states should be determined and thereby fails to disclose the claimed invention in a manner sufficiently clear and complete for it to be carried out by a person skilled in the art. Accordingly, the application contravenes Article 83 EPC.

3. Since the application does not meet the requirements of the EPC, the appeal has to be dismissed.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar: The Chairman:

U. Bultmann M. Ruggiu