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**Datasheet for the decision
of 30 January 2012**

Case Number: T 2083/09 - 3.5.03

Application Number: 98308520.0

Publication Number: 0918430

IPC: H04M 11/06

Language of the proceedings: EN

Title of invention:

Echo cancellation in the network for data applications

Applicant:

LUCENT TECHNOLOGIES INC.

Headword:

Echo cancellation/LUCENT

Relevant legal provisions:

EPC Art. 56

Keyword:

"Inventive step - no"

Decisions cited:

T 0130/89



Case Number: T 2083/09 - 3.5.03

D E C I S I O N
of the Technical Board of Appeal 3.5.03
of 30 January 2012

Appellant: LUCENT TECHNOLOGIES, INC.
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Decision under appeal: Decision of the Examining Division of the
European Patent Office posted 23 March 2009
refusing European patent application
No. 98308520.0 pursuant to Article 97(2) EPC.

Composition of the Board:

Chairman: A. S. Clelland
Members: B. Noll
M.-B. Tardo-Dino

Summary of Facts and Submissions

- I. This appeal is against the decision of the examining division to refuse European patent application No. 98308520.0, inter alia on the grounds that the subject-matter of claim 1 of a main request lacked novelty (Article 54 EPC) and that of claim 1 of each of three auxiliary requests lacked an inventive step (Article 56 EPC).
- II. In the notice of appeal the appellant requested that the decision be set aside and that a patent be granted.
- III. A set of amended claims 1 to 5 was filed together with the statement of grounds of appeal.
- IV. In a communication of 22 July 2011 the board gave a preliminary opinion in which it was considered that claim 1 lacked clarity and support (Article 84 EPC) and that its subject-matter lacked an inventive step (Article 56 EPC). The following documents were referred to in the communication:
- D2: US 4,757,527 A1
D3: EP 0766412 A2
D6: WO 97/21312 A2.
- D6 was introduced into the procedure by the board in exercise of its discretion pursuant to Article 114(1) EPC.
- V. With a response to the board's communication received on 3 November 2011, the appellant filed a replacement set of claims 1 to 5.

Claims 1 reads as follows:

"An echo canceller CHARACTERIZED BY:

a fixed echo canceler (220, 225, 275, 285) for processing a digital signal to provide an echo-canceled signal for a current data call before performing a companding operation on the current data call;

an adaptive echo canceler (225, 235, 280, 240) for determining the tap coefficient values for a future data call,

a comparator (245, 260, 265) for comparing the performance of the fixed echo canceler and the performance of the adaptive echo canceler and determining whether the adaptive echo canceler is providing increased echo cancellation compared with the echo cancellation provided by the fixed echo canceler,

wherein, prior to transmission companding, the echo canceler uses the coefficient values determined by the adaptive echo canceler during a previous data call for the current data call provided the comparison determines that the coefficient values of the adaptive echo canceler provide increased echo cancellation;

a coder (200) for coding the echo-canceled signal into a companded signal; and

a memory element (230, 235) for storing the tap coefficient values detected by the adaptive echo canceler such that the stored tap coefficient values used by the fixed echo canceler are not adapted during the current data call."

VI. The appellant implicitly requests that the impugned decision be set aside and that a patent be granted on the basis of claims 1 to 5 as received on 3 November 2011. No request was made for oral proceedings.

Reasons for the decision

1. *Claim 1 - inventive step (Article 56 EPC)*

1.1 The invention generally relates to echo cancellation in data communication between modems over a communication network. The invention specifically aims at improving echo cancellation when the analogue local loop signal output by the modem is converted into a digital signal and further companded for the purpose of transmission over the communication network.

1.2 D3 is in the same technical field as the application and refers to the problem of properly training an echo canceller using inter alia a half-duplex approach when the transmitted signal is additionally subjected to a non-linear compression / expansion operation (cf. column 1, lines 37 to 58). D3 is therefore considered by the board as the single most relevant prior art document for assessing inventive step.

Each modem 100 and 300 in D3 is separately configured to cancel echo in the transmitted signal (column 5, line 30 to column 6, line 7). An echo canceller 650 (figure 6) as provided in modem 100 is operated in time sequence either as a fixed echo canceller, for cancelling echo during data exchange (step 735 in figure 3) or as an adaptive echo canceller, for determining the filter coefficients for the subsequent data exchange phase during a training phase (step 725 in figure 3). The fact that the echo cancellers are solely trained during the training phase, which is before data exchange, is understood by the board as

meaning that the filter coefficients of the echo canceller are not modified during the data call.

1.3 Accordingly, the echo canceller of claim 1 differs from that of D3 as regards the following features:

(a) providing a separate adaptive echo canceller, a comparator for determining whether the adaptive echo canceller is providing increased echo cancellation in comparison to the fixed echo canceller and a memory element for storing the tap coefficient values detected by the adaptive echo canceller; and

(b) providing an echo-cancelled signal before performing a companding operation on the current data call.

1.4 In the board's view the claim defines an aggregation or collocation of features, in which the technical problem when starting out from D3 as the most relevant prior art is composed of two separate, mutually independent sub-problems: the first sub-problem, addressed by feature (a), is to provide a concrete configuration for the echo canceller and the second sub-problem, addressed by feature (b), consists in having an appropriate location for the echo canceller in the signal path. According to the established jurisprudence of the boards of appeal the contribution to inventive step of features (a) and (b) has therefore to be considered separately (cf. T 130/89, OJ 1991, 514).

1.5 Regarding feature (a), D2 discloses a configuration of an echo canceller (figure 4) including a programmable filter 22, an adaptive filter 20 and a transfer control logic 23. The programmable filter performs echo cancelling on an outgoing signal, the adaptive filter

determines filter coefficients for updating the coefficients of the programmable filter (column 5, lines 17-22) and the transfer control logic compares the performance of echo cancellation achieved by the adaptive filter with that achieved by the programmable filter. The D2 echo canceller implicitly contains a memory for storing the filter coefficients of the programmable filter since it is said that the filter coefficients are not allowed to be updated during periods of doubletalk (column 5 lines 23 to 30). Thus, in operation the programmable filter uses coefficients which were earlier determined by the adaptive filter. It is noted that the echo canceller of D2 does not mention whether the coefficients of the fixed echo canceller can be updated during a call if the adaptive echo canceller provides better echo cancellation. In the board's view it is however a matter of non-inventive design choice for the skilled person whether the filter coefficients are allowed to be updated during a call or whether they are only updated after the call for use during the subsequent call. The skilled person, seeking for an appropriate configuration of the echo canceller of D3, would be led by D2 to a configuration according to feature (a).

Regarding feature (b), D6 discloses a telephony system in which echo canceller 116 is provided at a location in the signal path at which the received and transmitted signals Rx, Tx are present in a linear version (cf. figure 11 and page 8 line 30 to page 9 line 12 of D6). Starting out from D3, the skilled person would therefore be led by D6 to a configuration of the echo canceller such that an echo-cancelled

signal is provided before performing a companding operation on the current data call.

- 1.6 In the letter received on 3 November 2011 the appellant took the view that the echo canceller according to claim 1 was configured for processing a digital signal whereas the echo cancellers disclosed in D3 and D6 were not.

The board notes that echo canceller 655 in D3 is positioned at the signal path downstream of A/D-converter 625 from which the board concludes that the signal at the echo canceller is present in a digital version. Similarly, the signal at the echo canceller 116 in figure 11 of D6 is a signal within digital signal processor DSP1 and is therefore implicitly in a digital version.

The appellant's argument that echo cancellation would not be carried out on a digital signal in either of D3 or D6 must therefore fail.

- 1.7 In conclusion, the skilled person, starting out from D3 and having regard to D2 and D6 would be led to the echo canceller of claim 1 without the exercise of inventive skill (Article 56 EPC).
2. There is accordingly no request on file on the basis of which the appeal could be allowed. The appeal must therefore be dismissed.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar:

The Chairman:

G. Rauh

A. S. Clelland