

**Internal distribution code:**

- (A)  Publication in OJ  
(B)  To Chairmen and Members  
(C)  To Chairmen  
(D)  No distribution

**Datasheet for the decision  
of 28 July 2011**

**Case Number:** T 1879/07 - 3.4.01

**Application Number:** 03762155.4

**Publication Number:** 1518223

**IPC:** G10L 19/00

**Language of the proceedings:** EN

**Title of invention:**

Auditory-articulatory analysis for speech quality assessment

**Applicant:**

LUCENT TECHNOLOGIES INC., et al

**Opponent:**

-

**Headword:**

-

**Relevant legal provisions:**

-

**Relevant legal provisions (EPC 1973):**

EPC Art. 84

**Keyword:**

"Claims - clarity (no)"

**Decisions cited:**

-

**Catchword:**

-



Case Number: T 1879/07 - 3.4.01

**D E C I S I O N**  
of the Technical Board of Appeal 3.4.01  
of 28 July 2011

**Appellant:** LUCENT TECHNOLOGIES INC.  
600 Mountain Avenue  
Murray Hill, NJ 07974-0636 (US)

**Representative:** Sarup, David Alexander  
Alcatel-Lucent Telecom Limited  
Unit 18, Core 3, Workzone  
Innova Business Park  
Electric Avenue  
Enfield EN3 7XU (GB)

**Decision under appeal:** Decision of the Examining Division of the  
European Patent Office posted 5 July 2007  
refusing European patent application  
No. 03762155.4 pursuant to Article 97(1) EPC  
1973.

**Composition of the Board:**

**Chairman:** H. Wolfrum  
**Members:** F. Neumann  
C. Heath

## Summary of Facts and Submissions

- I. The appeal lies from the decision of the examining division to refuse the European patent application number 03 762 155.4. The contested decision was based on a lack of clarity of claim 1.
- II. The appellant has requested, as a main request, that the decision be set aside and a patent be granted on the basis of claims 1 to 13 filed with the letter of 28 June 2011 or, alternatively, on the basis of the claims of auxiliary requests 1 to 3 filed on the same date.
- III. Oral proceedings were held on 28 July 2011. Despite being properly summoned, the appellant failed to appear.
- IV. Independent claim 1 of the main request reads as follows:

*"A method of performing auditory-articulatory analysis comprising the steps of:*  
*comparing an articulation power ( $P_A$ ) and a non-articulation power ( $P_{NA}$ ) for a speech signal  $s(t)$ , wherein the articulation and non-articulation powers are powers associated with articulation and non-articulation frequencies of the speech signal, wherein articulation and non-articulation frequencies each correspond to frequencies ( $f$ ) of modulation spectrums ( $A_i(m, f)$ ) produced by performing a Fourier transform on each of frames  $m$  of a plurality of envelopes ( $a_i(t)$ ) obtained from a plurality of critical band signals obtained by filtering and processing said speech signal ( $s(t)$ ); and*

*assessing speech quality based on the comparison between the articulation and non-articulation powers."*

Dependent claim 2 of the main request reads:

*"The method of claim 1, wherein the articulation frequencies are 2~12.5 Hz, and wherein the non-articulation frequencies are greater than 12.5 Hz."*

Independent claim 1 of the first auxiliary request effectively combines claims 1 and 2 of the main request, the following wording being added to the end of claim 1 of the main request:

*"wherein the articulation frequencies are 2-12.5 Hz and wherein the non-articulation frequencies are greater than 12.5 Hz."*

Independent claim 1 of the second auxiliary request is identical to claim 1 of the main request and independent claim 1 of the third auxiliary request is identical to claim 1 of the first auxiliary request. The claims of the first and third auxiliary requests differ from the claims of the main request and second auxiliary request respectively only in the deletion of certain dependent claims.

- V. The arguments of the appellant, insofar as they are pertinent to the present decision, are set out below in the reasons for the decision.

## Reasons for the Decision

1. In view of the entry into force of the EPC 2000, reference is made to Article 7(1), 2nd sentence of the Revision Act of 29 November 2000 ("Act revising the Convention on the Grant of European Patents (European Patent Convention) of 5 October 1973, last revised on 17 December 1991"), and the transitional provisions for the amended and new provisions of the EPC (Decision of the Administrative Council of 28 June 2001), from which it may be derived which Articles of the EPC 1973 are still applicable to the present application and which Articles of the EPC 2000 shall apply.

2. The claims do not comply with Article 84 EPC 1973 in at least the following three respects.

### 2.1 Articulation frequencies

Claim 1 defines a method of performing an auditory-articulatory analysis which utilizes a comparison between a power associated with an articulation frequency and a power associated with a non-articulation frequency to assess speech quality.

In the contested decision the examining division held that the terms "articulation power", "non-articulation power", "articulation frequencies" and "non-articulation frequencies", all of which are used in claim 1 of all requests, were not well-recognised terms in the field of speech processing and therefore rendered the subject matter of claim 1 unclear.

In the statement of grounds of appeal, the appellant explained that "*[a]rticulation power is defined as the power associated with articulation frequency ranges of the speech signal. [...] In one embodiment, articulation power is associated with speech signal frequencies ranging from 2-12.5 Hz based on the fact that signal speed of human articulation is between 2 and 12.5 Hz. Stated another way, the sounds that humans make while speaking yield signals that travel at between 2 and 12.5 Hz. This is an articulation frequency. The power associated with this range, for example, may be an articulation power.*" However, no attempt was made to demonstrate, for example with reference to the relevant literature, that the terms were indeed well-recognised or that they had a well-accepted meaning. In the letter of 28 June 2011, no further explanation of these terms was provided but amendments were made to the independent claim of both auxiliary request 1 and auxiliary request 3 to define that the "articulation frequencies are 2-12.5 Hz" and that the "non-articulation frequencies are greater than 12.5 Hz".

Case law holds that in cases where a specific term used in the patent document is to be given a special meaning which deviates from the meaning which is generally accepted in the art, then the patent document may exceptionally act as its own dictionary, the description giving the term in question a special, overriding meaning by explicit definition (see T 1321/04). Extending this approach to a term with no well-recognised meaning, it could perhaps be argued that such a term may be used as long as the meaning of

this term is explicitly provided in the application documents.

It would appear from page 4, lines 4 to 9 of the description and from the appellant's submissions that the term "articulation power" is intended to refer to the power associated with signals generated from the human articulatory system (which reflects signal components relevant to natural human speech), and that the term "non-articulation power" is intended to refer to the power associated with signals not generated from the human articulatory system (which reflects perceptually disturbing distortions not related to the human articulation system). In the example of page 4, lines 15 to 18, articulation power is the power associated with frequencies of 2 to 12.5 Hz. However, the description goes on to say that "*the term "articulation power  $P_A(m,i)$ " should not be limited to the frequency range of human articulation or to the aforementioned frequency range 2 ~ 12.5 Hz*" and states that the non-articulation frequency range may overlap with the articulation frequency range (page 4, lines 25-31). From this passage, it may be seen that the frequency ranges associated with articulation and non-articulation may in fact take on any value and may not even be distinct from each other. Thus, although the intended meaning of "articulation power" and "non-articulation power" is indicated in the claim itself, and even if the "own dictionary" approach may be applied to the current application, claim 1 is still unclear since the articulation and non-articulation frequencies are apparently not limited in any way whatsoever.

It is therefore not clear (Article 84 EPC 1973) in claim 1 of the main request and the second auxiliary request at which frequencies of the speech signal the powers are to be compared in order to arrive at an assessment of the speech quality. Moreover, claim 1 of the first and third auxiliary requests is not supported by the description (Article 84 EPC 1973) since the aforementioned passage on page 4 teaches that the values of "articulation frequencies" need not be limited to the range cited in the independent claim.

## 2.2 Articulation powers

The method of claim 1 requires a comparison of the "articulation power" and the "non-articulation power" of a speech signal. These parameters are defined in claim 1 of the main request and the second auxiliary request as being "associated with articulation and non-articulation frequencies of the speech signal". In the first and third auxiliary requests they are further defined as being associated with frequencies of 2 to 12.5 Hz and greater than 12.5 Hz respectively. What is however not clear, is to what extent the articulation power and non-articulation powers are "associated with" these frequencies. This becomes even more nebulous when the aforementioned statement on page 4, lines 25 to 31 is considered which indicates that the articulation and non-articulation frequencies are not at all limited. In the light of this passage it is not at all clear how the articulation powers are to be understood.

Moreover, it is not even clear what value of power should be taken to perform the comparison. The appellant has submitted that the powers are derived



from the modulation spectrum illustrated in Figure 3 of the application. According to the description, this figure illustrates the result of a Fourier transform performed on frame  $m$  of an envelope derived from a critical band signal. The frequency ranges associated with the articulation power  $P_A$  and the non-articulation power  $P_{NA}$  are depicted. However, there is no indication either on the graph or in the description as to how the power value to be used in the comparison may be derived from the graph. Should the peak value of power within the range be considered? Or the total power within the range? Or perhaps the average power over the range? Or even the power of a specific frequency within the range? In view of this lack of teaching, it is impossible to ascertain on which basis the comparison should be performed and claim 1 of all requests is unclear (Article 84 EPC 1973). In fact, as alluded to in the communication of the Board, this point is so unclear that it would even appear that the invention is not sufficiently disclosed in this respect (Article 83 EPC 1973).

### 2.3 Critical bands

In the independent claim of all of the requests, it is set out that the "modulation spectrums" from which the articulation and non-articulation powers are derived originate from a plurality of critical band signals.

Critical band filtering is based on the human auditory system. The description of the present application explains that a cochlear filterbank decomposes the speech signal into a plurality of discrete frequency bands, which are known as "critical bands". This is

achieved by providing a bank of band-pass filters. In order to mimic the corresponding properties of the human auditory system, the band-pass filters have increasing bandwidth with increasing centre frequency and an asymmetric frequency response.

Since the cochlear filterbank is designed to simulate the human ear, the range of the critical bands will be chosen to correspond to the frequencies which are perceptible to the human ear. As indicated by the examining division, the auditory spectrum lies between approximately 150 Hz and 8 kHz. The upper and lower limits of the critical bands will therefore be chosen accordingly. In view of this, it is not clear to the Board how any signals having frequencies lying in the range of 2 to 12.5 Hz may be present in the critical band filtered signal: any signals having frequencies below the lower limit of audible perception will simply not be present in the critical band filtered signal.

Consequently, it is not clear how the power associated with frequencies of 2 to 12.5 Hz can be obtained from a Fourier transform which is derived from the critical band signals, none of which will extend to frequencies this low.

As a result, claim 1 of the first and third auxiliary requests and claim 2 of the main request and of the second auxiliary request therefore lack clarity (Article 84 EPC 1973).

3. Right to be heard

The appellant was not represented at the oral proceedings. It is noted that, contrary to the Recommendation of the *epi* Council set out in *epi* Information 4/2009, pages 133-134, the appellant chose not to inform the Board that it would not attend the oral proceedings. It was left to the Board on the day of the oral proceedings to make its own enquiries as to whether the appellant had simply been delayed or whether the appellant actually had no intention of appearing.

In the communication of the Board which was sent in preparation of the oral proceedings, it was indicated that the question of clarity of the claims would be addressed. It was clear from the communication that a number of clarity issues were still outstanding, that a conflicting passage in the description made the understanding of the terminology even less clear and that the lack of clarity was of such serious nature that the sufficiency of disclosure could even be questioned.

Amendments were filed before the oral proceedings in an attempt to overcome at least some of the objections mentioned in the communication. However, as is evident from the above, in spite of the amendments, the claims still lack clarity. Indeed, objections of a very fundamental nature remain. Had the appellant been present at the oral proceedings, there would have been an opportunity to discuss these objections. By failing to appear, the appellant forfeited this opportunity.

**Order**

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

The appeal is dismissed.

The Registrar:

The Chairman:

R. Schumacher

H. Wolfrum