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Datasheet for the decision of 10 February 2025

Case Number: T 2237/22 - 3.4.01

Application Number: 15727222.0

Publication Number: 3149730

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Language of the proceedings: EN

Title of invention:
ENHANCING INTELLIGIBILITY OF SPEECH CONTENT IN AN AUDIO SIGNAL

Patent Proprietor:
Dolby Laboratories Licensing Corporation

Opponent:
K/S HIMPP

Headword:
Enhansing intelligibility / Dolby

Relevant legal provisions:
EPC 1973 Art. 83

Keyword:

Decisions cited:
T 0190/99

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Case Number: T 2237/22 - 3.4.01

D E C I S I O N
of Technical Board of Appeal 3.4.01
of 10 February 2025

Appellant: (Opponent)	K/S HIMPP Nymoellevej 6 3540 Lynge (DK)
Representative:	Betten & Resch Patent- und Rechtsanwälte PartGmbB Maximiliansplatz 14 80333 München (DE)
Respondent: (Patent Proprietor)	Dolby Laboratories Licensing Corporation 1275 Market Street San Francisco, CA 94103 (US)
Representative:	AWA Sweden AB Box 5117 200 71 Malmö (SE)
Decision under appeal:	**Decision of the Opposition Division of the European Patent Office posted on 3 August 2022 rejecting the opposition filed against European patent No. 3149730 pursuant to Article 101(2) EPC.**

Composition of the Board:

Chairman	T. Petelski
Members:	P. Fontenay
	R. Winkelhofer

Summary of Facts and Submissions

I. An opposition was filed against the patent. It relied on the grounds of Article 100(a) EPC (lack of novelty and lack of an inventive step), Article 100(b) EPC (insufficiency of disclosure), and Article 100(c) EPC (extension of subject-matter).

II. In their decision, the Opposition Division held that the patent did not contain added subject-matter, defined the invention in a manner sufficiently clear and complete for it to be carried out by a skilled person, and that the subject-matter of claims 1 and 10 was inventive. The opposition was thus rejected.

III. Regarding, in particular, the argument that had been raised by the opponent under sufficiency of disclosure, according to which the skilled person was not able to carry out, on the basis of the patent specification, the step of "obtaining a second metric which is a reference signal-to-noise ratio of the speech component to the non-speech component and the environmental noise signal as derived from a speech intelligibility standard" in claim 1, the Opposition Division held that said reference signal-to-noise ratio was not calculated but just derived from a speech intelligibility standard. The feature in question defined a clear distinction to the definition of the first metric, which was a calculated signal-to-noise-ratio. Moreover, the description disclosed two specific examples of speech intelligibility standards to be consulted as a

reference in order to derive the second metric. The Opposition Division further noted that the objection of insufficiency had "not been substantiated by verifiable facts".

IV. In their appeal, the opponent (appellant) requests that the Opposition Division's decision be set aside and amended and that the patent be revoked, as it referred to subject-matter that was not inventive and that was not sufficiently disclosed. The objection of added subject-matter under Article 100(c) EPC was not further pursued in appeal.

V. In their reply to the appeal, the proprietor (respondent) requests, as a main request, that the appeal be dismissed. As an auxiliary measure, they request maintenance of the patent on the basis of one of the first to fifth auxiliary requests, filed during the first instance proceedings.

As a further auxiliary request, it is requested that the case be remitted to the Opposition Division if the main request was found not allowable, since the first to fifth auxiliary requests had not been discussed there.

VI. Granted claim 1 reads (with feature labels added by the Board):

F1 *A method for enhancing intelligibility of speech content in an audio signal, the audio signal containing a speech component and a non-*

speech component, the speech component containing the speech content, the method comprising:

F2 *obtaining reference loudness of the audio signal, wherein the reference loudness of the audio signal is the loudness of the audio signal without an environmental noise signal;*

F3 *adjusting partial loudness of the audio signal to the reference loudness;*

F4 *calculating a first metric as a signal-to-noise ratio of the speech component to the non-speech component of the adjusted audio signal;*

F5 *obtaining a second metric which is a reference signal-to-noise ratio of the speech component to the non-speech component and the environmental noise signal as derived from a speech intelligibility standard;*

F6 *deriving a boosting gain for boosting the speech component and/or an attenuating gain for attenuating the non-speech component based on a smallest one of the first and the second metric; and*

F7 *enhancing the intelligibility of the speech content by adjusting a ratio of the speech component to the non-speech component and the environmental noise signal, wherein the ratio is adjusted by applying the boosting gain to the speech component and/or applying the attenuating gain to the non-speech component.*

VII. Claim 1 of auxiliary request 1 contains the additional limitation at the end of the claim:

..., wherein the first metric is calculated for a frequency band of the audio signal, and wherein the second metric is obtained at least partially based on the frequency band.

This reflects the content of granted claim 3.

VIII. Claim 1 of auxiliary request 2 was amended, with respect to granted claim 1, by specifying the intelligibility standards:

..., wherein the speech intelligibility standard is the Speech Intelligibility Index (SII) or the Articulation Index (AI); ...

IX. Auxiliary request 3 combines the amendments introduced in auxiliary requests 1 and 2.

X. Claim 1 of auxiliary request 4 was amended, with regard to granted claim 1, to specify at the end of the claim:

,... wherein the first metric is calculated for a frequency band of the audio signal, wherein the second metric is obtained at least partially based on the frequency band, wherein the boosting gain is derived from

$$g_{boost}(b) = f(refSNR, SAR) \cdot \frac{S_{ns}(b)+N_{ext}(b)}{S_s(b)},$$

wherein the attenuating gain is derived from

$$g_{att}(b) = \frac{S_s(b) - N_{ext}(b) \cdot f(refSNR, SAR)}{S_{ns}(b) \cdot f(refSNR, SAR)}$$

and wherein refSNR represents the second metric, SAR represents the first metric, f(refSNR,SAR) represents the smallest one of the first metric and the second metric, $g_{boost}(b)$ represents the boosting gain, $g_{att}(b)$ represents the attenuating gain, $S_s(b)$ represents the speech component of the audio signal, $S_{ns}(b)$ represents the non-speech component of the audio signal and $N_{ext}(b)$represents the environmental noise signal, each one for the frequency band, b.

XI. Auxiliary request 5 combines the amendments made in auxiliary requests 2 and 4.

XII. In a communication pursuant to Article 15(1) RPBA, the Board shared their preliminary opinion that the invention was insufficiently disclosed and did not allow the skilled person to carry out steps F4 to F6 in combination so as to enhance the intelligibility of the speech content, as essentially resulting from feature F5 (regarding the definition of a second metric) being unclear.

XIII. There were no written submissions in response to the Board's communication.

XIV. Oral proceedings with the parties were held before the Board.

Reasons for the Decision

Main request - sufficiency of disclosure (Article 100(b) EPC)

1. In the opponent's view, the claimed invention was insufficiently disclosed, because the patent provided no insight for performing feature F5 in claim 1, that was, for

> ... *obtaining a second metric which is a reference signal-to-noise ratio of the speech component to the non-speech component and the environmental noise signal as derived from a speech intelligibility standard.*

2. In their view, the absence of indications concerning the exact content of the second metric rendered impossible a comparison with the first metric to define the resulting boosting and/or attenuating gains required to increase the intelligibility of the speech content (features F6 and F7). Such a comparison required that the second metric was clearly defined. This requirement was neither met by the claim language nor by the description, where the information did not derive from the cited standards. This applied in particular to the SII standard referred to in paragraph [0055], which was defined as the product of the importance function and a band audibility function, summed over frequency bands, and did not involve the recited ratio.

3. According to a first interpretation made by the opponent, the second metric was the ratio, in terms of energies, of the speech component to the non-speech

component and the environmental noise signal. The second metric was thus always lower than, or equal to, the first metric, which was the ratio of the speech component to the non-speech component of the adjusted audio signal. This implied that the determination of a boosting gain for the speech component, and/or an attenuating gain for the non-speech component, based on the smallest one of the two metrics, always led to the selection of the second metric. As a consequence, the comparison of the metrics, as defined in feature F6, was devoid of meaning in the context of the invention.

4. In their decision, the Opposition Division held that the invention was sufficiently disclosed. This finding relied on a second interpretation of the second metric (decision, page 12, item iv). The Opposition Division held that the speech and non-speech components recited in feature F5 had an antecedent in feature F1 and were therefore referring to the speech and non-speech components contained in the audio signal. It was further underlined, in contrast to the literal understanding of this feature relied upon by the opponent, that the further indication in the claim, that the second metric derived from a speech intelligibility standard, had a technical meaning that could not be ignored. This reference limited the scope of feature F5, with the consequence that the second metric was something different from the recited ratio. This was different to feature F4, which defined that the first metric was directly calculated from the speech and non-speech components of the adjusted audio signal. It was also noted, in this respect, that the patent disclosure contained two specific examples of speech intelligibility standards (cf. paragraph [0055]) "which are sufficiently clear and complete for the skilled person as a reference", in order to derive the

second metric (see page 12, 2nd paragraph of the decision).

5. In essence, the Opposition Division's interpretation relied on its finding that the wording of feature F5 simply required that the speech and non-speech components from the audio signal, together with the environmental noise signal, were taken into account when deriving this second metric (page 11, line 5, section iii of the decision).

6. Also this second interpretation was challenged by the opponent, who reiterated the view that neither the opposed patent nor the cited speech intelligibility standards provided any teaching of how the speech and non-speech components from the audio signal, together with the environmental noise signal, were taken into account when deriving the reference signal-to-noise ratio (i.e. the second metric) from a speech intelligibility standard.

7. In the proprietor's view, though, the definition of the second metric was even broader than acknowledged by the Opposition Division. The reference signal-to-noise ratio of feature F5 merely was a reference value that was good in most situations. It contributed in defining how much a signal content needed to be boosted and/or attenuated, and it could be independent from any of the actual speech component, the non-speech component, or the environmental noise signal. Its exact content did not matter and did not need to be specified in the claims. It was only essential that such standards, which reflected results of psychoacoustic studies, existed and could be used.

8. It was also stated, in this respect, that the existing standards were based on the human auditory sensory system and took into account the perception of sounds by the human brain, as was well known to the skilled person. The evidence that had been asked for in the form of copies of the cited standards was, thus, superfluous, as the second metric could simply be equated with a reference derivable from a psychoacoustic model of the human hearing and brain.

9. Still according to the proprietor, this approach reflected the example discussed in paragraphs [0083] and [0084] in relation with Figure 8 of the patent, which derived the reference signal-to-noise values for each frequency from such a speech intelligibility standard. This example met, in itself, the condition set by the case law, that the application had to disclose at least one way of carrying out the invention.

10. It was moreover stated that the opponent never provided any evidence to the effect that the skilled person was hindered to carry out the invention. It was not sufficient, in this respect, to underline some ambiguities in the claim language, if these ambiguities did not affect the patent as a whole.

11. In the Board's analysis, none of the interpretations of the second metric mentioned above makes sense.

12. This is because the first interpretation of feature F5 (the second metric is the calculated signal to noise ratio) would have the consequence that the second metric was always lower than the first. This, however, does not make technical sense in view of the selection criterion of feature F6, because the step of selecting

the lowest of two parameters is meaningless, when, by definition, one (the second metric) is always lower than the other (the first metric). Hence, the first interpretation must be excluded. This follows from the general principle of interpretation applied by the boards of appeal that the skilled person would rule out interpretations that are illogical or do not make technical sense (see T 190/99, catchword).

13. The definition of the second metric, followed by the indication "as derived from a speech intelligibility standard" in claim 1, creates confusion. While this statement may be construed as merely referring to the origin of the second metric, as in essence argued by the opponent, the recited wording might also suggest, contrary to the preceding definition regarding the first metric, that the second metric is something else than the recited ratio, which may simply be derived in some unknown manner from an intelligibility standard, that is not even defined. That reflects the view of the proprietor who referred to these standards as mere references of psychoacoustic models that could be used as reference by the skilled person who is an audio engineer, in the present situation.

14. Contrary to the proprietor's arguments, the derivation of the second metric in form of the signal-to-noise ratio as defined in claim 1 from any intelligibility standard is not trivial.

15. In the absence of evidence regarding the exact derivation of the second metric from a standard in the description, and in view of the unclear and ambiguous wording resulting from the term "as derived" in feature F5, step F7 of claim 1 cannot be carried out by the skilled person. Concretely, the skilled person is not

able to derive, from the claim's wording, which interpretation applies to the definition of the second metric according to F5, such that the final step and purpose of the recited method of increasing the intelligibility can be achieved.

16. The ambiguity resulting from the wording of feature F5 is not only illustrative of an ambiguity in the definition of the second metric, as acknowledged by the proprietor, it also substantially affects the claimed process, making it *de facto* impossible to make sense of the selection criterion of feature F6 required for defining the gain that enhances intelligibility.

17. This is all the more true in light of the effect of increasing intelligibility, which, in the context of the claim, is not limited to mere excitation domain processing to adjust partial loudness, but requires that a degree of intelligibility be achieved (paragraphs [0035] - [0039]). Even if, trying to make sense of feature F5, it is assumed that the second metric can be obtained or derived from the intelligibility standard, in the sense of the second interpretation, the absence of an identification of said standard in the claim, and the absence of any indication in the specification as to how the second metric is derived from the standards, makes it *de facto* impossible for the skilled person to reproduce the claimed subject-matter.

18. It is the very purpose of the claimed invention to enhance intelligibility of speech content in an audio signal. It is not correct, in this respect, to assume that the exact references for deriving the second metric from known standards are not essential for the definition of the claimed method. Paragraph [0004] of

the patent application specifies that the term "intelligibility of speech content", used throughout the application, refers to an indication of the degree of comprehensibility of the speech content. The invention thus requires more than just boosting the speech content and/or attenuating the non-speech content to increase the "contrast" between both components. It needs a clearly identified reference that contributes to the comprehensibility of the speech.

19. The sole existence of known standards is not sufficient to obtain a reliable value of the second metric, in order to derive a parameter used as a reference for the determination of the second metric. The choice, by the inventors, to derive boosting and attenuating parameters not only from a calculated signal-to-noise ratio (first metric), but also from a reference value in the form of the second metric that was derived from known intelligibility standards, requires that the relationship between this reference value and the standards needs to be defined in such a way that comprehensibility of the speech component, after selection of the smallest of the two metrics, was achieved.

20. The proprietor's argument that the specific embodiment discussed in paragraphs [0083] and [0084], and Figure 8, of the patent specification, was, at the very least, sufficient to compare, for each frequency band, the values of the first metric with those of Figure 8, is not persuasive.

21. The choice of reference values for the second metric is essential. It directly affects the results of the comparison and, accordingly, the values of the boosting

and/or attenuating gains. Even in the example of Figure 8, there is no teaching of how the reference values are derived from the respective standard. Rather, the reader is simply confronted with the results of the derivation without learning about any criteria considered in it. Hence, in the absence of any references to particular standards and to a way of deriving the reference value from such standards in claim 1, the sole example in paragraphs [0083], [0084] and Figure 8 is not sufficient to carry out the invention over the whole ambit of the claim, except for using the very particular numbers of Figure 8.

22. Moreover, claim 1 covers embodiments in which the gains are determined only based on the smallest of the two metrics. In the absence, however, of any indication in the specification as to the actual derivation of the second metric, the boosting and/or attenuating gains for the speech and non-speech components that are derived from the selected metric are meaningless. The skilled person is at a loss when attempting to define the adequate values for the second metric such that the gain that results from the selected metric effectively contributes to increase the intelligibility of the speech content, in such a way that it improves its comprehensibility. In particular, the first metric is independent of the environmental noise, and the second metric is a reference value independent of the actual signal. The application does not teach how it would be possible, in these cases, to determine the gains based solely on one of these metrics, such that the intelligibility of the speech content was enhanced.

23. In conclusion, the patent specification does not allow the skilled person to carry out steps F4 to F6 in combination so as to enhance the intelligibility of the

speech content. This results from the insufficient definition of the second metric and the resulting impossibility to identify the boosting and/or attenuating gain of feature F6 "based on the smallest one of the first and the second metric".

24. The requirements set out under Article 100(b) EPC are thus not met. Hence, the main request is not allowable.

Auxiliary requests 1 to 3 - sufficiency of disclosure (Article 83 EPC)

25. Claim 1 of auxiliary request 1 is amended to contain the additional limitation that the first metric is calculated for a frequency band of the audio signal, and the second metric is obtained at least partially based on the frequency band.

26. Claim 1 of auxiliary request 2, on the other hand, is amended to contain the additional limitation that the speech intelligibility standard is the Speech Intelligibility Index (SII) or the Articulation Index (AI).

27. None of the introduced features in auxiliary requests 1 and 2 affects the fact that the disclosure of the embodiment of paragraphs [0083], [0084], and Figure 8 is not sufficient to allow the skilled person to carry out the claimed invention over its entire ambit. The amendments are also without any bearing on the finding of the Board regarding the cases in which the boosting gain in claim 1 of the main request is based solely on the smaller metric.

28. Claim 1 of auxiliary request 3 combines the amendments introduced into claim 1 of auxiliary requests 1 and 2. Therefore, its subject-matter is also not sufficiently disclosed (Article 83 EPC), for the reasons as developed above.

29. Hence, regardless of the question of admission into the proceedings, which can thus be left open, auxiliary requests 1 to 3 are not allowable.

Auxiliary requests 4 and 5 - sufficiency of disclosure (Article 83 EPC)

30. In the proprietor's view, the indications that were added in claim 1 regarding the definition of the boosting and/or attenuating gains addressed specifically the problems of insufficiency in claim 1 of the main request. In combination with the gains as defined in claim 1, the teaching of paragraphs [0083], [0084], and Figure 8 of the specification provided a sufficient teaching for the skilled person to select the frequency bands that were of higher importance for the intelligibility of the speech content. It was reiterated, in this respect, that Figure 8 was derived from intelligibility standards. It illustrated the importance of the frequency bands and disclosed that higher signal-to-noise ratios were required for important frequency bands. This was the teaching needed by the skilled person to carry out the invention. The exact relationship to a standard and its associated psychoacoustic model was not essential.

31. The proprietor's arguments are not persuasive, to be outlined in the following.

32. In their view, the amendments to claim 1 contributed to more precisely define the claimed subject-matter and address the issue of the impossibility for a skilled person to derive boosting and/or attenuating gains.

33. However, the amendments in claim 1 of auxiliary request 4 do not affect the Board's finding that the patent specification does not teach the skilled person how to determine the second metric. It is the second metric on which the boosting and attenuating gain is based. As explained further above, the skilled person is not able to obtain the second metric from a standard, and to determine the gains in any other way than using the particular values of Figure 8.

34. The same conclusion applies *mutatis mutandis* to claim 1 of auxiliary request 5. Therefore, the subject-matter of claim 1 according to auxiliary requests 4 and 5 is also not sufficiently disclosed, contrary to the requirement of Article 83 EPC.

35. Hence, regardless of the question of admission into the proceedings, which is left open, auxiliary requests 4 and 5 are not allowable.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.

2. The patent is revoked.

The Registrar: The Chair:

D. Meyfarth T. Petelski

Decision electronically authenticated