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Datasheet for the decision of 21 June 2017

Case Number: T 2484/11 - 3.4.01

Application Number: 09152357.1

Publication Number: 2088586

IPC: G10L19/14

Language of the proceedings: EN

Title of invention:
Adaptive codebook gain control for speech coding

Applicant:
Samsung Electronics Co., Ltd.

Headword:

Relevant legal provisions:
RPBA Art. 13(1), 15(3)
EPC Art. 84, 123(2), 76(1)

Keyword:
Late-filed request - request clearly allowable (no) - admitted (no)

Decisions cited:

Catchword:

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Case Number: T 2484/11 - 3.4.01

D E C I S I O N
of Technical Board of Appeal 3.4.01
of 21 June 2017

Appellant: (Applicant)	Samsung Electronics Co., Ltd. 129, Samsung-ro Yeongtong-gu Suwon-si, Gyeonggi-do, 443-742 (KR)
Representative:	Appleyard Lees IP LLP 15 Clare Road Halifax HX1 2HY (GB)
Decision under appeal:	**Decision of the Examining Division of the European Patent Office posted on 16 June 2011 refusing European patent application No. 09152357.1 pursuant to Article 97(2) EPC.**

Composition of the Board:

Chairman	G. Assi
Members:	T. Zinke
	J. Geschwind

Summary of Facts and Submissions

I. The examining division refused European patent application No. 09 152 357.

In its decision the examining division held that the application according to a main request and an auxiliary request then pending did not meet the requirements of Art. 84, Art. 123(2) (as compared to the originally filed application), 76(1) (as compared to the earlier European patent application No. 99 946 655) and Rule 42(1)(e) EPC.

II. The appellant (applicant) filed an appeal against the decision.

With the statement setting out the grounds of appeal, the appellant requested that the decision be set aside and that a patent be granted on the basis of enclosed sets of claims according to a main request, an auxiliary request I or an auxiliary request II, respectively. Furthermore, together with the main request an amendment of original description page 49 was requested.

III. At the appellant's request, a summons to attend oral proceedings was issued.

IV. In a communication pursuant to Art. 15(1) RPBA, objections under Art. 123(2) and 76(1) EPC were raised.

V. With a letter of reply dated 22 May 2017, the appellant withdrew all previous requests and filed a revised claim set and an amended description page 49 according to a new sole main request. The appellant also submitted arguments with regard to the admissibility of

the new request and with regard to the basis of the amendments made. Further, the appellant informed the Board that the representative would not attend the oral proceedings. A final decision based on the new main request and the submitted argumentation was requested.

VI. The oral proceedings took place as scheduled in the absence of the appellant.

VII. Claim 1 of the pending main request reads as follows:

"1. A method of enhancing a quality of a fixed codebook (261) search for a multi-rate CELP encoder having an encoding rate selected from 4.45kbps, 5.8kbps, 6.65kbps, 8.0kbps or 11.0 kbps for encoding an input speech signal (211), wherein the fixed codebook search is carried out by a speech classifier, the method comprising:
applying a high-pass filter (215) to the input speech signal (211) to generate a high-pass filtered speech signal;
generating a first target signal (229) from the high-pass filtered speech signal by applying a perceptual weighting filter (219);
performing a closed-loop pitch lag search to determine a fractional pitch lag k by maximising a normalized correlation term R(k) between $T_{gs}(n)$ the first target signal (229), and $y_k(n)$ a past filtered excitation at fractional pitch lag k, using

$$R(k) = \frac{\sum_{n=0}^{39} T_{gs}(n) y_k(n)}{\sqrt{\sum_{n=0}^{39} y_k(n) y_k(n)}};$$

where $y_k(n)$ is calculated for a first fractional pitch lag t_{min} in the search range and is updated for the other fractional pitch lags in the search range $k=t_{min},...t_{max}$ using the recursive relation:

$$y_k(n) = y_{k-1}(n-1) + u(-)h(n)$$

where u(n), n=-(143+11) to 39 is the excitation buffer and
h(n) is an impulse response calculated by filtering a vector of coefficients of a filter $A(z/y_1)$ extended by zeros through two filters $1/\bar{A}(z)$ and $1/A(z/y_2)$, where $A(z/y_1)$ is defined as a numerator of a perceptual weighting filter, $1/A(z/y_2)$ is the denominator of the perceptual weighting filter and $\bar{A}(z)$ is an inverse filter with quantized coefficients;
computing an adaptive codebook vector v(n) by interpolating the past excitation u(n);
filtering (249,251) the adaptive codebook vector v(n) to generate a filtered adaptive codebook vector y(n) using:

$$y(n) = v(n) * h(n)$$

calculating an adaptive codebook gain g_p using the first target signal (229) T_{gs} and the filtered adaptive codebook vector y(n) using

$$g_p = \frac{\sum_{n=0}^{39} T_{gs}(n)y(n)}{\sum_{n=0}^{39} y(n)y(n)},$$

bounded by $0<g_p<1.2$;
generating a second target signal (253) based at least on the first target signal, the filtered adaptive codebook vector, and the reduced adaptive codebook gain using:

$$T_g(n) = T_{gs}(n) - G_r * g_p * Y_s(n), \quad n=0,1,...,39$$

where the gain factor is determined based on the normalized LTP gain R_p and the encoding rate as follows:
if the encoding rate is 4.45kbps or 5.8kbps, $G_r=0.7R_p+0.3$;
if the encoding rate is 6.65kpbs, $G_r=0.6R_p+0.4$;
if the encoding rate is 8.0kbps, $G_r=0.3R_p+0.7$;
if the encoding rate is 11.0kbps, $G_r=0.95$; or
if the encoding rate is any one of 4.45 kbps, 5.8 kbps, 6.65 kbps or 8.0kbps and $g_p>0.5$ and a pitch lag T_{op} found using an open loop search is greater than a subframe size L_SF, $G_r<=G_r(0.3R_p)+0.7$
where the normalised LTP gain R_p is defined by

$$R_p = \frac{\sum_{n=0}^{39} T_{gs}(n)\, Y_a(n)}{\sqrt{\sum_{n=0}^{39} T_{gs}(n)\, T_{gs}(n)}\sqrt{\sum_{n=0}^{39} Y_a(n)\, Y_a(n)}}$$

; *and*
selecting a fixed codebook vector from the fixed codebook (261) using the second target signal (253)."

Claim 2 is a correspondingly formulated independent claim on a multi-rate CELP speech encoding device.

Reasons for the Decision

1. The appeal is admissible.

2. Admissibility of the pending main request

2.1 The claims of the pending main request were amended and filed in response to the Board's communication under Art. 15(1) RPBA.

2.2 According to Art. 13(1) RPBA, "*Any amendment to a party's case after it has filed its grounds of appeal ... may be admitted and considered at the Board's discretion*".

In accordance with established jurisprudence of the boards of appeal (cf. Case Law of the Boards of Appeal of the EPO, 8th edition, July 2016, section IV.E.4.4, "*Criteria for consideration of amended claims*", pages 1151-1160), "*As a rule, the boards' decisions should be based on the issues in dispute at first instance, which does not rule out the admission of new submissions, but does subject it to the fulfillment of certain criteria, given that no entirely "fresh case" should be created on appeal ... . Thus, in addition to the factors referred to in Art. 13(1) RPBA, the following criteria may ... likewise be decisive: there must be sound reasons for filing a request at a late stage in the proceedings, as may be the case where amendments are occasioned by developments during the proceedings or where the request addresses still outstanding objections. The amendments must be prima facie clearly allowable, ...", i.e. it must be immediately apparent to the board that the amendments made successfully address the issues raised, without giving rise to new ones*".

2.3 In the present case, the appellant amended the claims by adding detailed features taken from the originally filed description concerning the particular algorithm for determining specific gain factors for specific encoding rates (cf. pages 38, 43, 49 and 50 of the original specification). The Board having raised an objection in the communication under Art. 15(1) RPBA that the adaptive codebook gain reduction as claimed in the claims then pending was too general as compared to

the disclosure of the originally filed application and to the disclosure of the earlier application, the added features could be considered as a sound reason for filing amended claims.

2.4 However, the amendments made give rise to new objections under Art. 84 EPC. For instance:

The summation in the claimed equations is from *"n=0 to 39"*. It is is unclear why exactly these values are summed up. Moreover, a *"subframe size L_SF"* is mentioned, although neither a *"frame"* nor a *"subframe"* is specified.

In the second claimed equation, a value *"u(-)"* is mentioned, although a different value *"u(n)"* is further specified thereafter. It is not clear what *"u(-)"* might mean.

A value *"$Y_a(n)$"* is mentioned in the last claimed equation. This value, however, is not specified.

Since these features are directly derived from pages 38, 41, 49 and 50 of the originally filed earlier application, it is also not apparent, how they could be clarified.

2.5 Moreover, the amendments made give rise to new objections under Art. 123(2) and 76(1) EPC.

In particular, the amended term *"$G_r<=G_r(0.3R_p)+0.7$"* is different from the term *"$G_r<=G_r(0.3R_p+0.7)$"* mentioned on page 50, line 6 of the original specification. Hence, this amendment adds undisclosed subject-matter.

2.6 Furthermore, the amendments made do not overcome the objections under Art. 123(2) and 76(1) EPC raised in the communication under Art. 15(1) RPBA.

2.6.1 The original description of the earlier application describes on pages 9 to 73 and Figures 1 to 7 in a very detailed way a particular speech encoder and a corresponding decoder, each comprising a plurality of interconnected blocks for, inter alia, sampling the input speech signal in 20 ms frames with 160 samples each, filtering the sampled signal, determining linear prediction coefficients (LPC), determining line spectral frequencies (LSF), estimating a pitch lag, determining adaptive codebook indices, determining adaptive codebook gains, determining fixed codebook indices, determining fixed codebook gains, quantizing the LSF coefficients, the respective indices and respective gains, arranging the quantized bits etc. for five particular encoding rates. It is also disclosed in detail how the blocks should be adapted in order to take care of the different restrictions imposed by the different encoding rates.

2.6.2 Throughout the examination proceedings and also during the appeal proceedings, the appellant, however, filed independent claims according to the various requests submitted, said claims only relating to a part of the complete speech encoder disclosed (a method of adaptive codebook gain reduction and a multi-rate speech encoding device comprising processing circuitry configured to reduce the adaptive codebook gain) by using a more generic wording than originally disclosed and not claiming in detail all the other blocks of the speech encoder.

The appellant argued that a person skilled in the art would understand that not only the complete speech encoder was disclosed but also each block on its own.

As objections had been made by the examining division as well as the Board in the communication under Art. 15(1) RPBA against this generic wording relied upon, the appellant, with the present main request, tried to overcome these objections by claiming the exact algorithm with the equations as disclosed on original pages 38, 43, 49 and 50.

However, the detailed description of said algorithm reveals the presence of features that also refer to other blocks, for instance a subframe size L_SF (cf. above). This subframe size indeed refers to a frame size of 20 ms with 160 samples which is used in the complete speech encoder embodiment.

2.6.3 Hence, said block described on pages 38, 43, 49 and 50 cannot be understood as an independent component of the complete speech encoder described on pages 9 to 76. Therefore, by not claiming the other blocks of the speech encoder the requirements of Art. 123(2) and 76(1) EPC are not met.

2.7 Since the amendments made to the revised claim set give rise to new objections under Art. 84, 123(2) and 76(1) EPC and do not successfully meet the previous objections raised under Art. 123(2) and 76(1) EPC in the communication under Art. 15(1) RPBA, the present main request is not prima facie clearly allowable.

2.8 For these reasons, the Board did not admit the present main request into the appeal proceedings in accordance with Art. 13(1) RPBA.

3. Appellant absent from oral proceedings

According to established case law (cf. Case Law of the Boards of Appeal of the EPO, 8th edition, July 2016, section IV.E.4.2.6 d), "*Applicant (proprietor) absent from oral proceedings*", pages 1137-1138), an appellant filing amended claims in response to a Board's communication under Art. 15(1) RPBA has to expect that the admissibility of the newly filed claims will be considered during the oral proceedings.

For this reason, in the present case, the appellant refraining from participating at the oral proceedings de facto renounced to submit its comments orally, if any. In accordance with the provisions of Art. 15(3) RPBA, the appellant was then treated as relying only on its written submissions.

Since the pending main request was not admitted into the proceedings and all previous requests had been withdrawn, there were no further requests on file, so that the appeal had to be dismissed.

Order

For these reasons it is decided that:

1. The appeal is dismissed.

The Registrar: The Chairman:

R. Schumacher G. Assi

Decision electronically authenticated