FILE HISTORY

US 6,807,524

PATENT:	6,807,524
INVENTORS:	Bessette, Bruno
	Salami, Redwan
	Lefebvre, Roch
TITLE:	Perceptual weighting device and method for efficient coding of wideband signals
APPLICATION NO:	US2001830276A
FILED:	20 JUN 2001
ISSUED:	19 OCT 2004
COMPILED:	05 FEB 2016

BEST COPY

Class	Subclass	ISSUE CLASSIFICATION
704	200.1	

FILED UNDER 35 U.S.C. 371

PATENT NUMBER

[redacted]

U.S. UTILITY Patent Application

O.I.P.E.	PATENT DATE
mB	OCT 19 2004

APPLICATION NO.	CONT/PRIOR	CLASS	SUBCLASS	ART UNIT	EXAMINER
09/830276	D F	704	200.1	~~2641~~ 2655	Wozniak ~~Smits~~

APPLICANTS [illegible]

TITLE [illegible]

PTO-2040
12/99

ISSUING CLASSIFICATION

ORIGINAL		CROSS REFERENCE(S)					
CLASS	SUBCLASS	CLASS	SUBCLASS (ONE SUBCLASS PER BLOCK)				
704	200.1	704	217	262	224		
INTERNATIONAL CLASSIFICATION							
G10L 19/04							

☐ Continued on Issue Slip Inside File Jacket

9-14-04 Formal Drawings (4 shts) set 1 6/2001

☐ TERMINAL DISCLAIMER	DRAWINGS			CLAIMS ALLOWED	
	Sheets Drwg.	Figs. Drwg.	Print Fig.	Total Claims	Print Claim for O.G.
	4	4	1	49	1

☐ The term of this patent subsequent to ____________ (date) has been disclaimed.

4/8/04
(Assistant Examiner) (Date)

NOTICE OF ALLOWANCE MAILED

4/14/04

☐ The term of this patent shall not extend beyond the expiration date of U.S Patent. No. ____________

TALIVALDIS IVARS SMITS
PRIMARY EXAMINER
4/8/04
(Primary Examiner) (Date)

ISSUE FEE MA

Amount Due	Date Paid
$1330	7/13/04

☐ The terminal ____ months of this patent have been disclaimed.

4/04
(Legal Instruments Examiner) (Date)

ISSUE BATCH NUMBER

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Form PTO-436A
(Rev. 6/99)

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ISSUE FEE IN FILE

(FACE)

6,807,524

PERCEPTUAL WEIGHTING DEVICE AND METHOD FOR EFFICIENT CODING OF WIDEBAND SIGNALS

Transaction History

Date	Transaction Description
04-25-2001	Receipt of 371 Request
05-15-2001	371 Application Preexamination Docketing
05-15-2001	Correspondence Address Change
05-21-2001	371 Application Preexamination Docketing
05-22-2001	Notice of DO/EO Missing Requirements Mailed
06-20-2001	Preliminary Amendment
06-20-2001	Preliminary Amendment
06-20-2001	Applicant 371 Filing Paper Received
06-20-2001	Initial Exam Team nn
06-28-2001	Released to OIPE
06-28-2001	Notice of DO/EO Acceptance Mailed
07-25-2001	Application Dispatched from OIPE
07-25-2001	IFW Scan & PACR Auto Security Review
09-18-2001	Information Disclosure Statement (IDS) Filed
09-18-2001	Information Disclosure Statement (IDS) Filed
10-04-2001	Case Docketed to Examiner in GAU
01-24-2002	Case Docketed to Examiner in GAU
01-24-2002	Case Docketed to Examiner in GAU
06-10-2003	Miscellaneous Incoming Letter
07-15-2003	Case Docketed to Examiner in GAU
09-12-2003	Case Docketed to Examiner in GAU
10-20-2003	Non-Final Rejection
10-24-2003	Mail Non-Final Rejection
01-23-2004	Response after Non-Final Action
01-30-2004	Date Forwarded to Examiner
04-01-2004	Information Disclosure Statement (IDS) Filed
04-01-2004	Information Disclosure Statement (IDS) Filed
04-13-2004	Oath or Declaration Required
04-13-2004	Notice of Allowance Data Verification Completed
04-14-2004	Correction - Oath or Declaration NOT Required
04-14-2004	Mail Notice of Allowance
04-14-2004	Mail Oath of Declaration Required
04-21-2004	Dispatch to Publications
04-22-2004	Workflow - File Sent to Contractor
04-22-2004	Receipt into Pubs
04-23-2004	Receipt into Pubs
06-10-2004	Receipt into Pubs
06-21-2004	Workflow - Customer Service Request - Finish
06-21-2004	Workflow - Customer Service Request - Begin
06-30-2004	Receipt into Pubs
07-13-2004	Issue Fee Payment Verified
07-13-2004	Issue Fee Payment Received
08-09-2004	Receipt into Pubs
09-10-2004	Receipt into Pubs
09-17-2004	Dispatch to FDC
09-17-2004	Application Is Considered Ready for Issue
09-20-2004	Receipt into Pubs
09-30-2004	Issue Notification Mailed
10-19-2004	Petition Entered
10-19-2004	Workflow incoming petition IFW
10-19-2004	Recordation of Patent Grant Mailed

10-19-2004	Patent Issue Date Used in PTA Calculation
12-13-2004	Mail-Petition Decision - Granted
03-12-2008	Correspondence Address Change

09/830276

PATENT APPLICATION

09830276

CA99/01010

INITIALS [illegible]

CONTENTS

	Date Received (Incl. C. of M.) or Date Mailed		Date Received (Incl. C. of M.) or Date Mailed
1. Application 2 papers.		42.	
2. 905	22 MAY 2001	43.	
3. Declaration	20 June 2001	44.	
4. 903	28 JUN 2001	45.	
5. Amdt A	6/20/01	46.	
6. IDS	9/18/01	47.	
7. Misc Ltr	6-10-03	48.	
8. 1020 Req 3mo	10/24/03	49.	
9. Amdt B	12304	50.	
10. IDS	4104	51.	
11. Notice of Allowance	4/14/04	52.	
12. QUERY/ 8/9/04	8/31/04	53.	
13. Pet 1.28	10/19/04	54.	
14. Petition Granted	12/13/04	55.	
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ISSUE SLIP STAPLE AREA (for additional cross references)

POSITION	INITIALS	ID NO.	DATE
FEE DETERMINATION			
O.I.P.E. CLASSIFIER	[illegible]	[illegible]	5/14
FORMALITY REVIEW			
RESPONSE FORMALITY REVIEW			

INDEX OF CLAIMS

✔	.... Rejected	N	.... Non-elected
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—	(Through numeral)... Canceled	A	.... Appeal
÷	.... Restricted	O	.... Objected

Claim Final	Claim Original	Date 10/20/03	Date 4/8/04	Date
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If more than 150 claims or 10 actions
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SEARCHED

Class	Sub.	Date	Exmr.
704	222	10/6/03	JW
704	201	10/6/03	
704	219	10/7/03	
704	262	10/8/03	
704	224	4/8/04	JW
704	update	4/8/04	

SEARCH NOTES
(INCLUDING SEARCH STRATEGY)

	Date	Exmr.
EAST Search (References Included)	10/6/03 10/7/03 10/8/03	JW
Spoke w/ Primary: Talivaldis Smits Regarding allowable subject matter	4/8/04	JW
Spoke w/ Primary: David Knepper regarding Search strategy	3/1/04	JW

INTERFERENCE SEARCHED

Class	Sub.	Date	Exmr.
704	222 201 219 262 224	4/8/04 | 4/8/04	JW

(RIGHT OUTSIDE)

L Number	Hits	Search Text	DB	Time stamp
-	14	"perceptual weighing"	USPAT	2003/10/06 10:24
-	113	"weighing filter"	USPAT	2003/10/06 10:24
-	3	"weighing filter" and preemphasis	USPAT	2003/10/06 10:27
-	1003625	W(z)	USPAT	2003/10/06 10:27
-	504	"W(z)"	USPAT	2003/10/06 10:27
-	0	"W(z)" and weighing and preemphasis	USPAT	2003/10/06 10:28
-	25	"W(z)" and weighing	USPAT	2003/10/06 10:31
-	0	"weighing factor" and preemphasis	USPAT	2003/10/06 10:31
-	386	"emphasis filter"	USPAT	2003/10/06 10:32
-	0	"weighing filter" and "emphasis filter"	USPAT	2003/10/06 10:32
-	0	"weighing filter" and "emphasis filter"	USPAT	2003/10/06 10:32
-	15	"emphasis filter" and "weighing"	USPAT	2003/10/06 10:48
-	233	((pitch or perceptual) near (filter or filtering)) and (coding encoding encoder coder)	USPAT	2003/10/06 13:00
-	18	(((pitch or perceptual) near (filter or filtering)) and (coding encoding encoder coder)) and (preprocessor or prefilter)	USPAT	2003/10/06 13:00
-	1084	CELP	USPAT	2003/10/06 11:26
-	712	CELP and 704/$	USPAT	2003/10/06 11:49
-	14	(CELP and 704/$) and "perceptual filter"	USPAT	2003/10/06 15:02
-	1086	CELP "perceptual filter"	USPAT	2003/10/06 11:50
-	14	CELP and "perceptual filter"	USPAT	2003/10/06 12:02
-	47	CELP and (perceptual near (filter or filtering))	USPAT	2003/10/06 12:02
-	50	((pitch or perceptual) near (filter or filtering)) and (coding encoding encoder coder) and kroon	USPAT	2003/10/06 13:41
-	0	"H.sub.z (a)=1-.beta.z-[(n+L)/L]L)" and kroon	USPAT	2003/10/06 13:41
-	0	"H.sub.z (a)=1-.beta.z-[(n+L)/L]L)"	USPAT	2003/10/06 14:46
-	0	"(a)=1-.beta.z-[(n+L)/L]L)"	USPAT	2003/10/06 13:42
-	2020	"H.sub.z"	USPAT	2003/10/06 13:42
-	1	"H.sub.z" and kroon	USPAT	2003/10/06 13:46
-	0	"b(z)" and CELP	USPAT	2003/10/06 14:46
-	18	CELP and preemphasis	USPAT	2003/10/06 15:19
-	81	"preemphasis filter"	USPAT	2003/10/06 15:19
-	21	"preemphasis filter" and 704/$	USPAT	2003/10/06 15:19
-	3	"preemphasis filter" and "0.7"	USPAT	2003/10/07 10:26
-	4279	filter same "0.7"	USPAT	2003/10/07 10:26
-	14	filter same "0.7" and celp	USPAT	2003/10/07 14:01

-	3	544481.pn. 5699482.pn. 5701392.pn. 5754974.pn.	USPAT	2003/10/07 14:03
-	4	5444816.pn. 5699482.pn. 5701392.pn. 5754974.pn.	USPAT	2003/10/07 14:04
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-	0	64-13200	JPO	2003/10/08 15:34
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-	0	"1-mu" and celp	JPO	2003/10/08 15:37
-	0	mu and celp	JPO	2003/10/08 15:38
-	3	"1-mu" and celp	USPAT	2003/10/08 15:47
-	29	mu and 0.7 and celp	USPAT	2003/10/08 15:49
-	6	mu and 0.7 and celp and "emphasis filter"	USPAT	2003/10/08 15:50

US006807524B1

(12) **United States Patent**
Bessette et al.

(10) **Patent No.:** **US 6,807,524 B1**
(45) **Date of Patent:** **Oct. 19, 2004**

(54) **PERCEPTUAL WEIGHTING DEVICE AND METHOD FOR EFFICIENT CODING OF WIDEBAND SIGNALS**

(75) Inventors: **Bruno Bessette**, Rock Forest (CA); **Redwan Salami**, Sherbrooke (CA); **Roch Lefebvre**, Canton de Magog (CA)

(73) Assignee: **Voiceage Corporation**, Quebec (CA)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **09/830,276**

(22) PCT Filed: **Oct. 27, 1999**

(86) PCT No.: **PCT/CA99/01010**

§ 371 (c)(1), (2), (4) Date: **Jun. 20, 2001**

(87) PCT Pub. No.: **WO00/25304**

PCT Pub. Date: **May 4, 2000**

(30) **Foreign Application Priority Data**

Oct. 27, 1998 (CA) 2252170

(51) **Int. Cl.**^{7} **G10L 19/04**

(52) **U.S. Cl.** **704/200.1**; 704/219; 704/262; 704/224

(58) **Field of Search** 704/222, 201, 704/219, 262, 224

(56) **References Cited**

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EP	0 732 686 A2	9/1996
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JP	10-282997 A	10/1998
WO	WO 96/21220	7/1996

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"Predictive Coding of Speech Signals and Subjective Error Criteria" by Bishnus S. Atal et al., IEEE Transaction ASSP, vol. 27, No. 3, pp. 247–254 Jun. 1979.

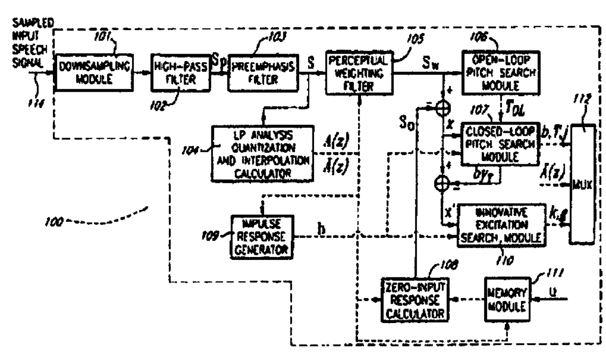
* cited by examiner

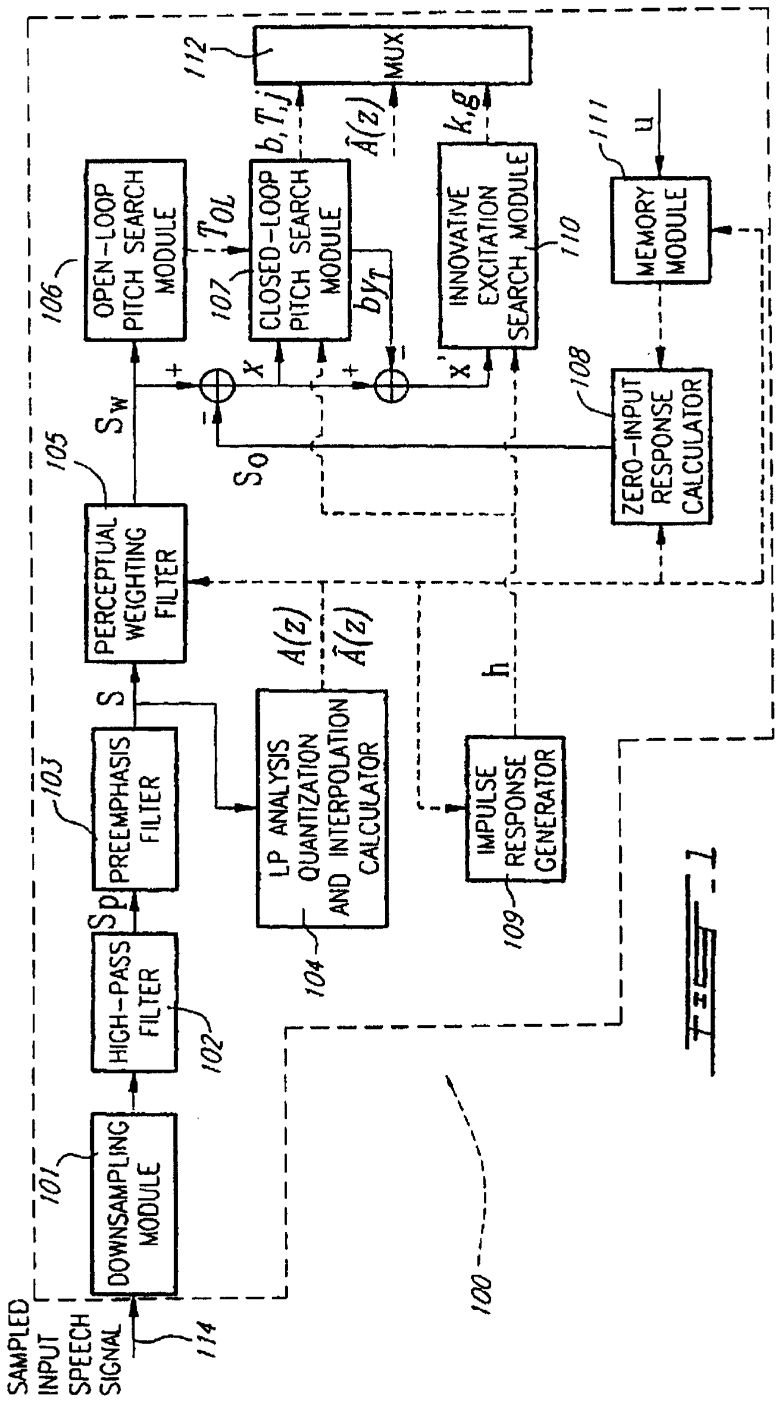
Primary Examiner—Tālivaldis Ivars Šmits
Assistant Examiner—James S. Wozniak
(74) *Attorney, Agent, or Firm*—Birch, Stewart, Kolasch & Birch, LLP

(57) **ABSTRACT**

A perceptual weighting device for producing a perceptually weighted signal in response to a wideband signal comprises a signal pre-emphasis filter, a synthesis filter calculator, and a perceptual weighting filter. The signal pre-emphasis filter enhances the high frequency content of the wideband signal to thereby produce a pre-emphasized signal. The signal pre-emphasis filter has a transfer function of the form: $P(z)=1-\mu z^{-1}$, wherein μ is a pre-emphasis factor having a value located between 0 and 1. The synthesis filter calculator is responsive to the pre-emphasized signal for producing synthesis filter coefficients. Finally, the perceptual weighting filter processes the pre-emphasized signal in relation to the synthesis filter coefficients to produce the perceptually weighted signal. The perceptual weighting filter has a transfer function, with fixed denominator, of the form: $W(z)=A(z/\gamma_1)/(1-\gamma_2 z^{-1})$ where $0<\gamma_2<\gamma_1\leq 1$.

49 Claims, 4 Drawing Sheets




SAMPLED INPUT SPEECH SIGNAL
114
DOWNSAMPLING MODULE
101
HIGH-PASS FILTER
102
Sp
PREEMPHASIS FILTER
103
S
PERCEPTUAL WEIGHTING FILTER
105
Sw
LP ANALYSIS QUANTIZATION AND INTERPOLATION CALCULATOR
104
A(z)
Â(z)
IMPULSE RESPONSE GENERATOR
109
h
OPEN-LOOP PITCH SEARCH MODULE
106
T_OL
CLOSED-LOOP PITCH SEARCH MODULE
107
x
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x'
So
b,T,j
Â(z)
INNOVATIVE EXCITATION SEARCH MODULE
110
k,g
MUX
112
ZERO-INPUT RESPONSE CALCULATOR
108
MEMORY MODULE
111
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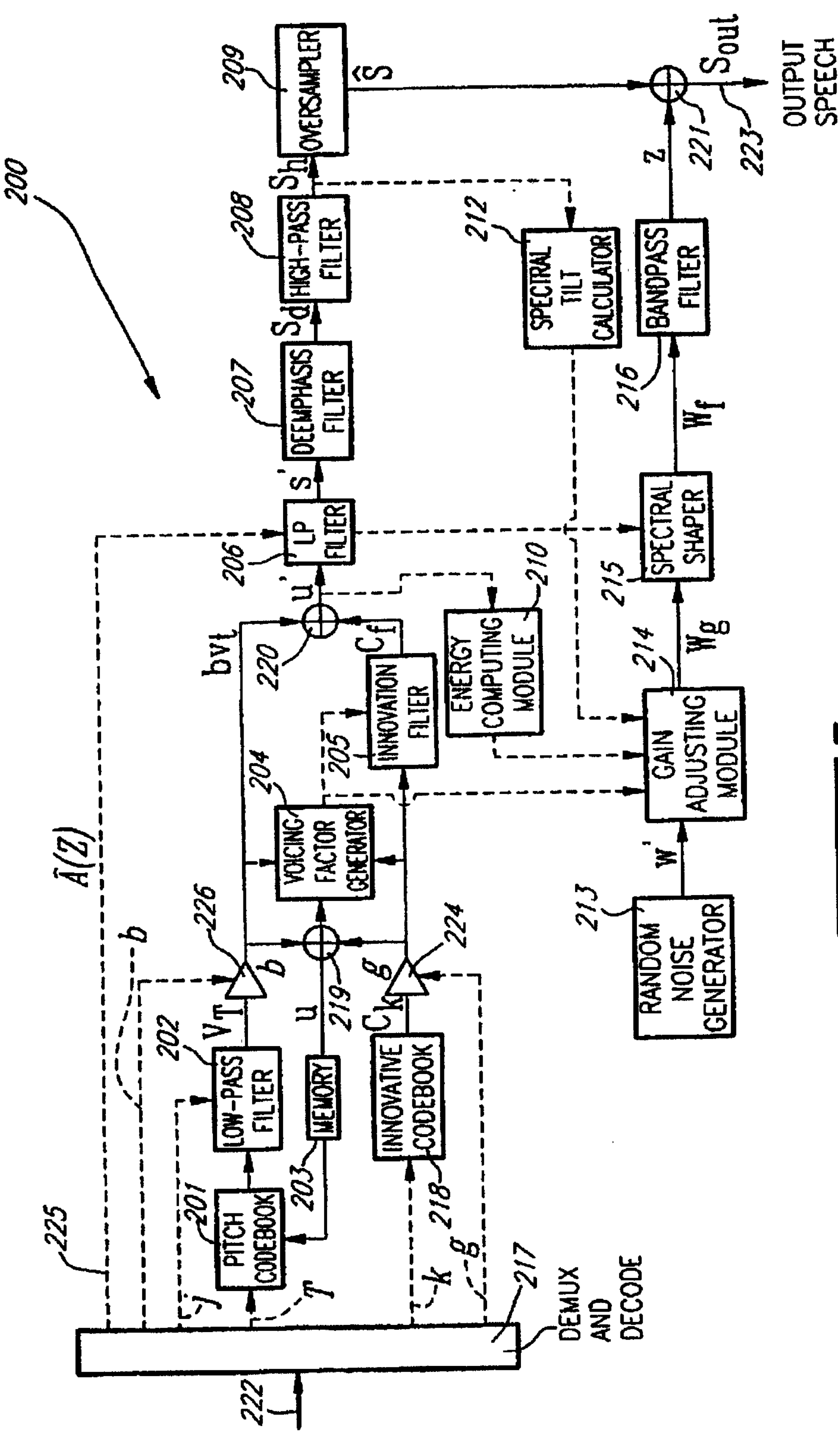
100

FIG. 1


200
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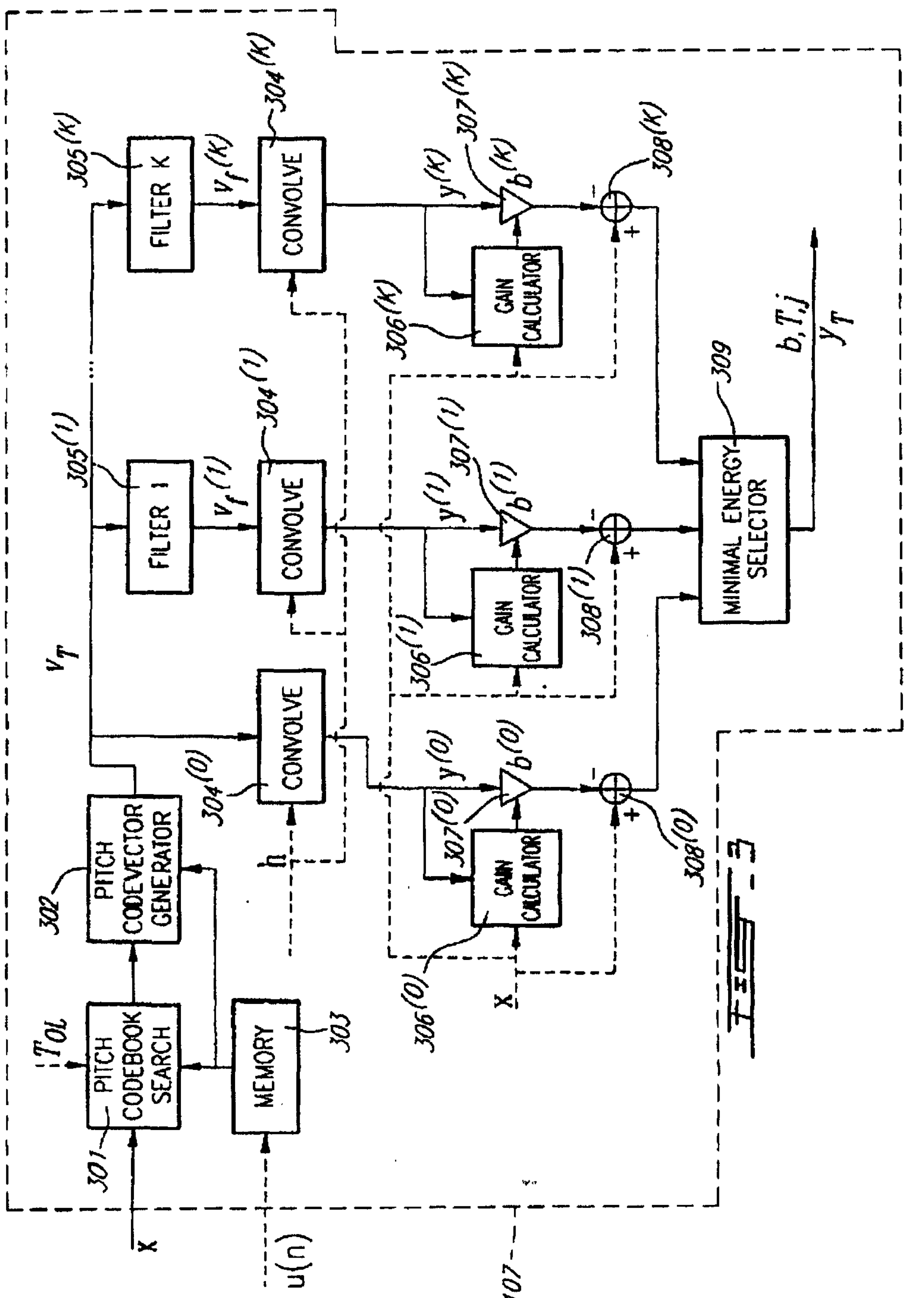
LOW-PASS FILTER
MEMORY
INNOVATIVE CODEBOOK
VOICING FACTOR GENERATOR
INNOVATION FILTER
ENERGY COMPUTING MODULE
LP FILTER
DEEMPHASIS FILTER
HIGH-PASS FILTER
OVERSAMPLER
SPECTRAL TILT CALCULATOR
RANDOM NOISE GENERATOR
GAIN ADJUSTING MODULE
SPECTRAL SHAPER
BANDPASS FILTER
DEMUX AND DECODE
OUTPUT SPEECH

FIG. 2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PITCH CODEVECTOR GENERATOR
MEMORY
CONVOLVE
FILTER 1
FILTER K
GAIN CALCULATOR
MINIMAL ENERGY SELECTOR
301
302
303
304(0)
304(1)
304(K)
305(1)
305(K)
306(0)
306(1)
306(K)
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307(1)
307(K)
308(0)
308(1)
308(K)
309
107
x
u(n)
h
T_{OL}
v_T
$v_f^{(1)}$
$v_f^{(K)}$
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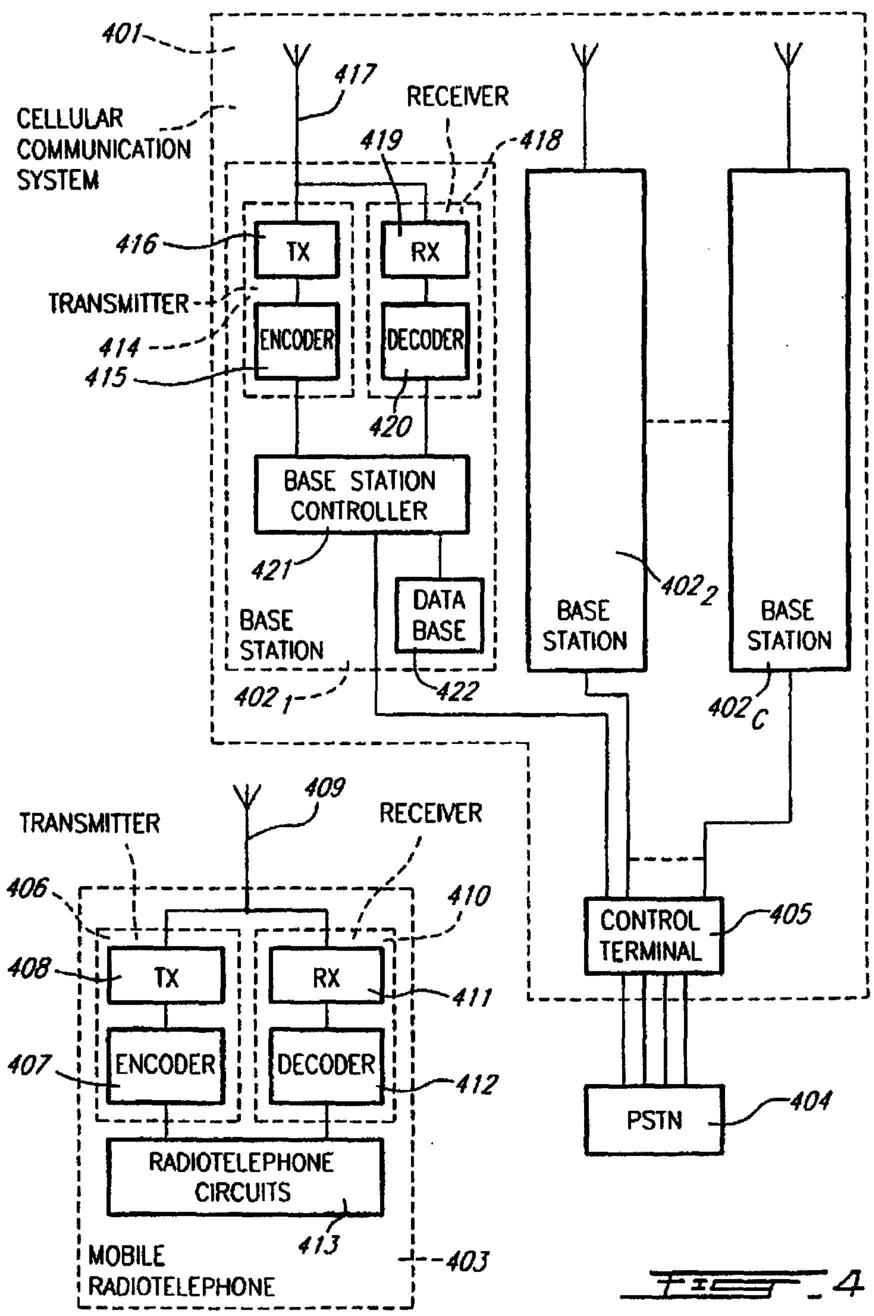
y(1)
y(K)
b(0)
b(1)
b(K)
b,T,j
y_T

FIG. 3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CELLULAR COMMUNICATION SYSTEM
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RECEIVER
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TX
RX
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ENCODER
DECODER
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BASE STATION CONTROLLER
421
DATA BASE
BASE STATION
402₁
422
BASE STATION
402₂
BASE STATION
402c
409
TRANSMITTER
RECEIVER
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410
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TX
RX
411
405
CONTROL TERMINAL
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ENCODER
DECODER
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PSTN
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RADIOTELEPHONE CIRCUITS
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MOBILE RADIOTELEPHONE
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FIG. 4

PERCEPTUAL WEIGHTING DEVICE AND METHOD FOR EFFICIENT CODING OF WIDEBAND SIGNALS

This application is the national phase under 35 U.S.C. §371 of PCT International Application No. PCT/CA99/01010 which has an International filing date of Oct. 27, 1999, which designated the United States of America and was published in English.

BACKGROUND OF THE INVENTION

1. Field of the invention

The present invention relates to a perceptual weighting device and method for producing a perceptually weighted signal in response to a wideband signal (0–7000 Hz) in order to reduce a difference between a weighted wideband signal and a subsequently synthesized weighted wideband signal.

2. Brief description of the prior art

The demand for efficient digital wideband speech/audio encoding techniques with a good subjective quality/bit rate trade-off is increasing for numerous applications such as audio/video teleconferencing, multimedia, and wireless applications, as well as Internet and packet network applications. Until recently, telephone bandwidths filtered in the range 200–3400 Hz were mainly used in speech coding applications. However, there is an increasing demand for wideband speech applications in order to increase the intelligibility and naturalness of the speech signals. A bandwidth in the range 50–7000 Hz was found sufficient for delivering a face-to-face speech quality. For audio signals, this range gives an acceptable audio quality, but is still lower than the CD quality which operates on the range 20–20000 Hz.

A speech encoder converts a speech signal into a digital bitstream which is transmitted over a communication channel (or stored in a storage medium). The speech signal is digitized (sampled and quantized with usually 16-bits per sample) and the speech encoder has the role of representing these digital samples with a smaller number of bits while maintaining a good subjective speech quality. The speech decoder or synthesizer operates on the transmitted or stored bit stream and converts it back to a sound signal.

One of the best prior art techniques capable of achieving a good quality/bit rate trade-off is the so-called Code Excited Linear Prediction (CELP) technique. According to this technique, the sampled speech signal is processed in successive blocks of L samples usually called frames where L is some predetermined number (corresponding to 10–30 ms of speech). In CELP, a linear prediction (LP) synthesis filter is computed and transmitted every frame. The L-sample frame is then divided into smaller blocks called subframes of size N samples, where L=kN and k is the number of subframes in a frame (N usually corresponds to 4–10 ms of speech). An excitation signal is determined in each subframe, which usually consists of two components: one from the past excitation (also called pitch contribution or adaptive codebook) and the other from an innovative codebook (also called fixed codebook). This excitation signal is transmitted and used at the decoder as the input of the LP synthesis filter in order to obtain the synthesized speech.

An innovative codebook in the CELP context, is an indexed set of N-sample-long sequences which will be referred to as N-dimensional codevectors. Each codebook sequence is indexed by an integer k ranging from 1 to M where M represents the size of the codebook often expressed as a number of bits b, where $M=2^b$.

To synthesize speech according to the CELP technique, each block of N samples is synthesized by filtering an appropriate codevector from a codebook through time varying filters modelling the spectral characteristics of the speech signal. At the encoder end, the synthesis output is computed for all, or a subset, of the codevectors from the codebook (codebook search). The retained codevector is the one producing the synthesis output closest to the original speech signal according to a perceptually weighted distortion measure. This perceptual weighting is performed using a so-called perceptual weighting filter, which is usually derived from the LP synthesis filter.

The CELP model has been very successful in encoding telephone band sound signals, and several CELP-based standards exist in a wide range of applications, especially in digital cellular applications. In the telephone band, the sound signal is band-limited to 200–3400 Hz and sampled at 8000 samples/sec. In wideband speech/audio applications, the sound signal is band-limited to 50–7000 Hz and sampled at 16000 samples/sec.

Some difficulties arise when applying the telephone-band optimized CELP model to wideband signals, and additional features need to be added to the model in order to obtain high quality wideband signals. Wideband signals exhibit a much wider dynamic range compared to telephone-band signals, which results in precision problems when a fixed-point implementation of the algorithm is required (which is essential in wireless applications). Furthermore, the CELP model will often spend most of its encoding bits on the low-frequency region, which usually has higher energy contents, resulting in a low-pass output signal. To overcome this problem, the perceptual weighting filter has to be modified in order to suit wideband signals, and pre-emphasis techniques which boost the high frequency regions become important to reduce the dynamic range, yielding a simpler fixed-point implementation, and to ensure a better encoding of the higher frequency contents of the signal.

In CELP-type encoders, the optimum pitch and innovative parameters are searched by minimizing the mean squared error between the input speech and synthesized speech in a perceptually weighted domain. This is equivalent to minimizing the error between the weighted input speech and weighted synthesis speech, where the weighting is performed using a filter having a transfer function W(z) of the form:

$$W(z)=A(z/g_1)/A(z/g_2) \text{ where } 0<\Gamma_2<\Gamma_1\leq 1.$$

In analysis-by-synthesis (AbS) coders, analysis show that the quantization error is weighted by the inverse of the weighting filter, $W^{-1}(z)$, which exhibits some of the formant structure in the input signal. Thus, the masking property of the human ear is exploited by shaping the error, so that it has more energy in the formant regions, where it will be masked by the strong signal energy present in those regions. The amount of weighting is controlled by the factors Γ_1 and Γ_2.

This filter works well with telephone band signals. However, it was found that this filter is not suitable for efficient perceptual weighting when it was applied to wideband signals. It was found that this filter has inherent limitations in modelling the formant structure and the required spectral tilt concurrently. The spectral tilt is more pronounced in wideband signals due to the wide dynamic range between low and high frequencies. It was suggested to add a tilt filter into filter W(z) in order to control the tilt and formant weighting separately.

OBJECT OF THE INVENTION

An object of the present invention is therefore to provide a perceptual weighting device and method adapted to wideband signals, using a modified perceptual weighting filter to obtain a high quality reconstructed signal, these device and method enabling fixed point algorithmic implementation.

SUMMARY OF THE INVENTION

More specifically, in accordance with the present invention, there is provided a perceptual weighting device for producing a perceptually weighted signal in response to a wideband signal in order to reduce a difference between a weighted wideband signal and a subsequently synthesized weighted wideband signal. This perceptual weighting device comprises:

a) a signal preemphasis filter responsive to the wideband signal for enhancing the high frequency content of the wideband signal to thereby produce a preemphasised signal;

b) a synthesis filter calculator responsive to the preemphasised signal for producing synthesis filter coefficients; and

c) a perceptual weighting filter, responsive to the preemphasised signal and the synthesis filter coefficients, for filtering the preemphasised signal in relation to the synthesis filter coefficients to thereby produce the perceptually weighted signal. The perceptual weighting filter has a transfer function with fixed denominator whereby weighting of the wideband signal in a formant region is substantially decoupled from a spectral tilt of that wideband signal.

The present invention also relates to a method for producing a perceptually weighted signal in response to a wideband signal in order to reduce a difference between a weighted wideband signal and a subsequently synthesized weighted wideband signal. This method comprises: filtering the wideband signal to produce a preemphasised signal with enhanced high frequency content; calculating, from the preemphasised signal, synthesis filter coefficients; and filtering the preemphasised signal in relation to the synthesis filter coefficients to thereby produce a perceptually weighted speech signal. The filtering comprises processing the preemphasis signal through a perceptual weighting filter having a transfer function with fixed denominator whereby weighting of the wideband signal in a formant region is substantially decoupled from a spectral tilt of the wideband signal.

In accordance with preferred embodiments of the subject invention:

reduction of the dynamic range comprises filtering the wideband signal through a transfer function of the form:

$$P(z)=1-\mu z^{-1}$$

wherein μ is a preemphasis factor having a value located between 0 and 1;

the preemphasis factor μ is 0.7;

the perceptual weighting filter has a transfer function of the form:

$$W(z)=A(z/\gamma_1)/(1-\gamma_2 z^{-1})$$

where $0<\gamma_2<\gamma_1\leqq 1$ and γ_2 and γ_1 are weighting control values; and

the variable γ_2 is set equal to μ.

Therefore, the overall perceptual weighting of the quantization error is obtained by a combination of a preemphasis filter and a modified weighting filter to enable high subjective quality of the decoded wideband sound signal into filter W(z) in order to control the tilt and formant weighting separately.

The solution to the problem exposed in the brief description of the prior art is accordingly to introduce a preemphasis filter at the input, compute the synthesis filter coefficients based on the preemphasized signal, and use a modified perceptual weighting filter by fixing its denominator. By reducing the dynamic range of the wideband signal, the preemphasis filter renders the wideband signal more suitable for fixed-point implementation, and improves the encoding of the high frequency contents of the spectrum.

The present invention further relates to an encoder for encoding a wideband signal, comprising: a) a perceptual weighting device as described herein above; b) an pitch codebook search device responsive to the perceptually weighted signal for producing pitch codebook parameters and an innovative search target vector; c) an innovative codebook search device, responsive to the synthesis filter coefficients and to the innovative search target vector, for producing innovative codebook parameters; and d) a signal forming device for producing an encoded wideband signal comprising the pitch codebook parameters, the innovative codebook parameters, and the synthesis filter coefficients.

Still further in accordance with the present invention, there is provided:

a cellular communication system for servicing a large geographical area divided into a plurality of cells, comprising: a) mobile transmitter/receiver units; b) cellular base stations respectively situated in the cells; c) a control terminal for controlling communication between the cellular base stations; d) a bidirectional wireless communication sub-system between each mobile unit situated in one cell and the cellular base station of this cell, this bidirectional wireless communication sub-system comprising, in both the mobile unit and the cellular base station:

i) a transmitter including an encoder as described hereinabove for encoding a wideband signal and a transmission circuit for transmitting the encoded wideband signal; and

ii) a receiver including a receiving circuit for receiving a transmitted encoded wideband signal and a decoder for decoding the received encoded wideband signal.

a cellular mobile transmitter/receiver unit comprising:

a) a transmitter including an encoder as described hereinabove for encoding a wideband signal and a transmission circuit for transmitting the encoded wideband signal; and

b) a receiver including a receiving circuit for receiving a transmitted encoded wideband signal and a decoder for decoding the received encoded wideband signal;

a cellular network element comprising:

a) a transmitter including an encoder as described hereinabove for encoding a wideband signal and a transmission circuit for transmitting the encoded wideband signal; and

b) a receiver including a receiving circuit for receiving a transmitted encoded wideband signal and a decoder for decoding the received encoded wideband signal; and

a bidirectional wireless communication sub-system between each mobile unit situated in one cell and the cellular base station of this cell, this bidirectional wireless communication sub-system comprising, in both the mobile unit and the cellular base station:

a) a transmitter including an encoder as described hereinabove for encoding a wideband signal and a transmission circuit for transmitting the encoded wideband signal; and

b) a receiver including a receiving circuit for receiving a transmitted encoded wideband signal and a decoder for decoding the received encoded wideband signal.

The objects, advantages and other features of the present invention will become more apparent upon reading of the following non restrictive description of preferred embodiments thereof, given by way of example only with reference to the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

In the appended drawings:

FIG. 1 is a schematic block diagram of a preferred embodiment of wideband encoding device;

FIG. 2 is a schematic block diagram of a preferred embodiment of wideband decoding device;

FIG. 3 is a schematic block diagram of a preferred embodiment of pitch analysis device; and

FIG. 4 is a simplified, schematic block diagram of a cellular communication system in which the wideband encoding device of FIG. 1 and the wideband decoding device of FIG. 2 can be used.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

As well known to those of ordinary skill in the art, a cellular communication system such as **401** (see FIG. 4) provides a telecommunication service over a large geographic area by dividing that large geographic area into a number C of smaller cells. The C smaller cells are serviced by respective cellular base stations $402_1, 402_2 \ldots 402_C$ to provide each cell with radio signalling, audio and data channels.

Radio signalling channels are used to page mobile radiotelephones (mobile transmitter/receiver units) such as **403** within the limits of the coverage area (cell) of the cellular base station **402**, and to place calls to other radiotelephones **403** located either inside or outside the base station's cell or to another network such as the Public Switched Telephone Network (PSTN) **404**.

Once a radiotelephone **403** has successfully placed or received a call, an audio or data channel is established between this radiotelephone **403** and the cellular base station **402** corresponding to the cell in which the radiotelephone **403** is situated, and communication between the base station **402** and radiotelephone **403** is conducted over that audio or data channel. The radiotelephone **403** may also receive control or timing information over a signalling channel while a call is in progress.

If a radiotelephone **403** leaves a cell and enters another adjacent cell while a call is in progress, the radiotelephone **403** hands over the call to an available audio or data channel of the new cell base station **402**. If a radiotelephone **403** leaves a cell and enters another adjacent cell while no call is in progress, the radiotelephone **403** sends a control message over the signalling channel to log into the base station **402** of the new cell. In this manner mobile communication over a wide geographical area is possible.

The cellular communication system **401** further comprises a control terminal **405** to control communication between the cellular base stations **402** and the PSTN **404**, for example during a communication between a radiotelephone **403** and the PSTN **404**, or between a radiotelephone **403** located in a first cell and a radiotelephone **403** situated in a second cell.

Of course, a bidirectional wireless radio communication subsystem is required to establish an audio or data channel between a base station **402** of one cell and a radiotelephone **403** located in that cell. As illustrated in very simplified form in FIG. 4, such a bidirectional wireless radio communication subsystem typically comprises in the radiotelephone **403**:

- a transmitter **406** including:
  - an encoder **407** for encoding the voice signal; and
  - a transmission circuit **408** for transmitting the encoded voice signal from the encoder **407** through an antenna such as **409**; and
- a receiver **410** including:
  - a receiving circuit **411** for receiving a transmitted encoded voice signal usually through the same antenna **409**; and
  - a decoder **412** for decoding the received encoded voice signal from the receiving circuit **411**.

The radiotelephone further comprises other conventional radiotelephone circuits **413** to which the encoder **407** and decoder **412** are connected and for processing signals therefrom, which circuits **413** are well known to those of ordinary skill in the art and, accordingly, will not be further described in the present specification.

Also, such a bidirectional wireless radio communication subsystem typically comprises in the base station **402**:

- a transmitter **414** including:
  - an encoder **415** for encoding the voice signal; and
  - a transmission circuit **416** for transmitting the encoded voice signal from the encoder **415** through an antenna such as **417**; and
- a receiver **418** including:
  - a receiving circuit **419** for receiving a transmitted encoded voice signal through the same antenna **417** or through another antenna (not shown); and
  - a decoder **420** for decoding the received encoded voice signal from the receiving circuit **419**.

The base station **402** further comprises, typically, a base station controller **421**, along with its associated database **422**, for controlling communication between the control terminal **405** and the transmitter **414** and receiver **418**.

As well known to those of ordinary skill in the art, voice encoding is required in order to reduce the bandwidth necessary to transmit sound signal, for example voice signal such as speech, across the bidirectional wireless radio communication subsystem, i.e., between a radiotelephone **403** and a base station **402**.

LP voice encoders (such as **415** and **407**) typically operating at 13 kbits/second and below such as Code-Excited Linear Prediction (CELP) encoders typically use a LP synthesis filter to model the short-term spectral envelope of the voice signal. The LP information is transmitted, typically, every 10 or 20 ms to the decoder (such **420** and **412**) and is extracted at the decoder end.

The novel techniques disclosed in the present specification may apply to different LP-based coding systems. However, a CELP-type coding system is used in the preferred embodiment for the purpose of presenting a non-limitative illustration of these techniques. In the same manner, such techniques can be used with sound signals other than voice and speech as well with other types of wideband signals.

FIG. 1 shows a general block diagram of a CELP-type speech encoding device **100** modified to better accommodate wideband signals.

The sampled input speech signal **114** is divided into successive L-sample blocks called "frames". In each frame, different parameters representing the speech signal in the frame are computed, encoded, and transmitted. LP parameters representing the LP synthesis filter are usually computed once every frame. The frame is further divided into smaller blocks of N samples (blocks of length N), in which excitation parameters (pitch and innovation) are determined. In the CELP literature, these blocks of length N are called "subframes" and the N-sample signals in the subframes are referred to as N-dimensional vectors. In this preferred embodiment, the length N corresponds to 5 ms while the length L corresponds to 20 ms, which means that a frame contains four subframes (N=80 at the sampling rate of 16 kHz and 64 after down-sampling to 12.8 kHz). Various N-dimensional vectors occur in the encoding procedure. A list of the vectors which appear in FIGS. 1 and 2 as well as a list of transmitted parameters are given herein below:

List of the Main N-dimensional Vectors

- s Wideband signal input speech vector (after down-sampling, pre-processing, and preemphasis);
- s_w Weighted speech vector;
- s_o Zero-input response of weighted synthesis filter;
- s_p Down-sampled pre-processed signal; Oversampled synthesized speech signal;
- s' Synthesis signal before deemphasis;
- s_d Deemphasized synthesis signal;
- s_h Synthesis signal after deemphasis and postprocessing;
- x Target vector for pitch search;
- x' Target vector for innovation search;
- h Weighted synthesis filter impulse response;
- v_T Adaptive (pitch) codebook vector at delay T;
- y_T Filtered pitch codebook vector (v_T convolved with h);
- c_k Innovative codevector at index k (k-th entry from the innovation codebook);
- c_f Enhanced scaled innovation codevector;
- u Excitation signal (scaled innovation and pitch codevectors);
- u' Enhanced excitation;
- z Band-pass noise sequence;
- w' White noise sequence; and
- w Scaled noise sequence.

List of Transmitted Parameters

STP Short term prediction parameters (defining A(z));

T Pitch lag (or pitch codebook index);

b Pitch gain (or pitch codebook gain);

j Index of the low-pass filter used on the pitch codevector;

k Codevector index (innovation codebook entry); and

g Innovation codebook gain.

In this preferred embodiment, the STP parameters are transmitted once per frame and the rest of the parameters are transmitted four times per frame (every subframe).

Encoder Side

The sampled speech signal is encoded on a block by block basis by the encoding device 100 of FIG. 1 which is broken down into eleven modules numbered from 101 to 111.

The input speech is processed into the above mentioned L-sample blocks called frames.

Referring to FIG. 1, the sampled input speech signal 114 is down-sampled in a down-sampling module 101. For example, the signal is down-sampled from 16 kHz down to 12.8 kHz, using techniques well known to those of ordinary skill in the art. Down-sampling down to another frequency can of course be envisaged. Down-sampling increases the coding efficiency, since a smaller frequency bandwidth is encoded. This also reduces the algorithmic complexity since the number of samples in a frame is decreased. The use of down-sampling becomes significant when the bit rate is reduced below 16 kbit/s, although down-sampling is not essential above 16 kbit/s.

After down-sampling, the 320-sample frame of 20 ms is reduced to 256-sample frame (down-sampling ratio of 4/5).

The input frame is then supplied to the optional pre-processing block 102. Pre-processing block 102 may consist of a high-pass filter with a 50 Hz cut-off frequency. High-pass filter 102 removes the unwanted sound components below 50 Hz.

The down-sampled pre-processed signal is denoted by $s_p(n)$, n=0, 1, 2, . . . , L−1, where L is the length of the frame (256 at a sampling frequency of 12.8 kHz). In a preferred embodiment of the preemphasis filter 103, the signal $s_p(n)$ is preemphasized using a filter having the following transfer function:

$$P(z)=1-\mu z^{-1}$$

where μ is a preemphasis factor with a value located between 0 and 1 (a typical value is μ=0.7). A higher-order filter could also be used. It should be pointed out that high-pass filter 102 and preemphasis filter 103 can be interchanged to obtain more efficient fixed-point implementations.

The function of the preemphasis filter 103 is to enhance the high frequency contents of the input signal. It also reduces the dynamic range of the input speech signal, which renders it more suitable for fixed-point implementation. Without preemphasis, LP analysis in fixed-point using single-precision arithmetic is difficult to implement.

Preemphasis also plays an important role in achieving a proper overall perceptual weighting of the quantization error, which contributes to improved sound quality. This will be explained in more detail herein below.

The output of the preemphasis filter 103 is denoted s(n). This signal is used for performing LP analysis in calculator module 104. LP analysis is a technique well known to those of ordinary skill in the art. In this preferred embodiment, the autocorrelation approach is used. In the autocorrelation approach, the signal s(n) is first windowed using a Hamming window (having usually a length of the order of 30–40 ms). The autocorrelations are computed from the windowed signal, and Levinson-Durbin recursion is used to compute LP filter coefficients, a_i, where i=1, . . . , p, and where p is the LP order, which is typically 16 in wideband coding. The parameters a_i are the coefficients of the transfer function of the LP filter, which is given by the following relation:

$$A(z)=1+\sum_{i=1}^{p} a_i z^{-i}$$

LP analysis is performed in calculator module 104, which also performs the quantization and interpolation of the LP filter coefficients. The LP filter coefficients are first transformed into another equivalent domain more suitable for quantization and interpolation purposes. The line spectral pair (LSP) and immitance spectral pair (ISP) domains are two domains in which quantization and interpolation can be efficiently performed. The 16 LP filter coefficients, a_i, can be quantized in the order of 30 to 50 bits using split or multi-stage quantization, or a combination thereof. The purpose of the interpolation is to enable updating the LP filter coefficients every subframe while transmitting them once every frame, which improves the encoder performance without increasing the bit rate. Quantization and interpolation of the LP filter coefficients is believed to be otherwise well known to those of ordinary skill in the art and, accordingly, will not be further described in the present specification.

The following paragraphs will describe the rest of the coding operations performed on a subframe basis. In the following description, the filter A(z) denotes the unquantized interpolated LP filter of the subframe, and the filter $\hat{A}(z)$ denotes the quantized interpolated LP filter of the subframe.

Perceptual Weighting:

In analysis-by-synthesis encoders, the optimum pitch and innovation parameters are searched by minimizing the mean squared error between the input speech and synthesized speech in a perceptually weighted domain. This is equivalent to minimizing the error between the weighted input speech and weighted synthesis speech.

The weighted signal $s_w(n)$ is computed in a perceptual weighting filter 105. Traditionally, the weighted signal $s_w(n)$

is computed by a weighting filter having a transfer function W(z) in the form:

$$W(z)=A(z/\gamma_1)/A(z/\gamma_2) \text{ where } 0<\gamma_2<\gamma_1\leq 1$$

As well known to those of ordinary skill in the art, in prior art analysis-by-synthesis (AbS) encoders, analysis shows that the quantization error is weighted by a transfer function $W^{-1}(z)$, which is the inverse of the transfer function of the perceptual weighting filter **105**. This result is well described by B. S. Atal and M. R. Schroeder in "Predictive coding of speech and subjective error criteria", IEEE Transaction ASSP, vol. 27, no. 3, pp. 247–254, June 1979. Transfer function $W^{-1}(z)$ exhibits some of the formant structure of the input speech signal. Thus, the masking property of the human ear is exploited by shaping the quantization error so that it has more energy in the formant regions where it will be masked by the strong signal energy present in these regions. The amount of weighting is controlled by the factors γ_1 and γ_2.

The above traditional perceptual weighting filter **105** works well with telephone band signals. However, it was found that this traditional perceptual weighting filter **105** is not suitable for efficient perceptual weighting of wideband signals. It was also found that the traditional perceptual weighting filter **105** has inherent limitations in modelling the formant structure and the required spectral tilt concurrently. The spectral tilt is more pronounced in wideband signals due to the wide dynamic range between low and high frequencies. The prior art has suggested to add a tilt filter into W(z) in order to control the tilt and formant weighting of the wideband input signal separately.

A novel solution to this problem is, in accordance with the present invention, to introduce the preemphasis filter **103** at the input, compute the LP filter A(z) based on the preemphasized speech s(n), and use a modified filter W(z) by fixing its denominator.

LP analysis is performed in module **104** on the preemphasized signal s(n) to obtain the LP filter A(z). Also, a new perceptual weighting filter **105** with fixed denominator is used. An example of transfer function for the perceptual weighting filter **104** is given by the following relation:

$$W(z)=A(z/\gamma_1)/(1-\gamma_2 z^{-1}) \text{ where } 0<\gamma_2<\gamma_1\leq 1$$

A higher order can be used at the denominator. This structure substantially decouples the formant weighting from the tilt.

Note that because A(z) is computed based on the preemphasized speech signal s(n), the tilt of the filter $1/A(z/\gamma_1)$ is less pronounced compared to the case when A(z) is computed based on the original speech. Since deemphasis is performed at the decoder end using a filter having the transfer function:

$$P^{-1}(z)=1/(1-\mu z^{-1}),$$

the quantization error spectrum is shaped by a filter having a transfer function $W^{-1}(z)P^{-1}(z)$. When γ_2 is set equal to μ, which is typically the case, the spectrum of the quantization error is shaped by a filter whose transfer function is $1/A(z/\gamma_1)$, with A(z) computed based on the preemphasized speech signal. Subjective listening showed that this structure for achieving the error shaping by a combination of preemphasis and modified weighting filtering is very efficient for encoding wideband signals, in addition to the advantages of ease of fixed-point algorithmic implementation.

Pitch Analysis:

In order to simplify the pitch analysis, an open-loop pitch lag T_{OL} is first estimated in the open-loop pitch search module **106** using the weighted speech signal $s_w(n)$. Then the closed-loop pitch analysis, which is performed in closed-loop pitch search module **107** on a subframe basis, is restricted around the open-loop pitch lag T_{OL} which significantly reduces the search complexity of the LTP parameters T and b (pitch lag and pitch gain). Open-loop pitch analysis is usually performed in module **106** once every 10 ms (two subframes) using techniques well known to those of ordinary skill in the art.

The target vector x for LTP (Long Term Prediction) analysis is first computed. This is usually done by subtracting the zero-input response S_0 of weighted synthesis filter $W(z)/\hat{A}(z)$ from the weighted speech signal s_w (n). This zero-input response s_0 is calculated by a zero-input response calculator **108**. More specifically, the target vector x is calculated using the following relation:

$$x=s_w-s_o$$

where x is the N-dimensional target vector, S_w is the weighted speech vector in the subframe, and s_o is the zero-input response of filter $W(z)/\hat{A}(z)$ which is the output of the combined filter $W(z)/\hat{A}(z)$ due to its initial states. The zero-input response calculator **108** is responsive to the quantized interpolated LP filter $\hat{A}(z)$ from the LP analysis, quantization and interpolation calculator **104** and to the initial states of the weighted synthesis filter $W(z)/\hat{A}(z)$ stored in memory module **111** to calculate the zero-input response s_o (that part of the response due to the initial states as determined by setting the inputs equal to zero) of filter $W(z)/\hat{A}(z)$. This operation is well known to those of ordinary skill in the art and, accordingly, will not be further described.

Of course, alternative but mathematically equivalent approaches can be used to compute the target vector x.

A N-dimensional impulse response vector h of the weighted synthesis filter $W(z)/\hat{A}(z)$ is computed in the impulse response generator **109** using the LP filter coefficients A(z) and $\hat{A}(z)$ from module **104**. Again, this operation is well known to those of ordinary skill in the art and, accordingly, will not be further described in the present specification.

The closed-loop pitch (or pitch codebook) parameters b, T and j are computed in the closed-loop pitch search module **107**, which uses the target vector x, the impulse response vector h and the open-loop pitch lag T_{OL} as inputs. Traditionally, the pitch prediction has been represented by a pitch filter having the following transfer function:

$$1/(1-bz^{-T})$$

where b is the pitch gain and T is the pitch delay or lag. In this case, the pitch contribution to the excitation signal u(n) is given by bu(n−t), where the total excitation is given by

$$u(n)=bu(n-T)+gc_k(n)$$

with g being the innovative codebook gain and $c_k(n)$ the innovative codevector at index k.

This representation has limitations if the pitch lag Tis shorter than the subframe length N. In another representation, the pitch contribution can be seen as an pitch codebook containing the past excitation signal. Generally, each vector in the pitch codebook is a shift-by-one version of the previous vector (discarding one sample and adding a new sample). For pitch lags T>N, the pitch codebook is equivalent to the filter structure $(1/(1-bz^{-T})$, and an pitch codebook vector van) at pitch lag T is given by

$$v_T(n)=u(n-T),\ n=0, \ldots, N-1.$$

For pitch lags T shorter than N, a vector $v_T(n)$ is built by repeating the available samples from the past excitation until the vector is completed (this is not equivalent to the filter structure).

In recent encoders, a higher pitch resolution is used which significantly improves the quality of voiced sound segments. This is achieved by oversampling the past excitation signal using polyphase interpolation filters. In this case, the vector $v_T(n)$ usually corresponds to an interpolated version of the past excitation, with pitch lag T being a non-integer delay (e.g. 50.25).

The pitch search consists of finding the best pitch lag T and gain b that minimize the mean squared weighted error E between the target vector x and the scaled filtered past excitation. Error E being expressed as:

$$E=\|x-by_T\|^2$$

where y_T is the filtered pitch codebook vector at pitch lag T:

$$y_T(n)=v_T(n)*h(n)=\sum_{i=0}^{n}v_T(i)h(n-i),\ n=0,\ \dots\ ,N-1.$$

It can be shown that the error E is minimized by maximizing the search criterion

$$C=\frac{x^t y_T}{\sqrt{y_T^t y_T}}$$

where t denotes vector transpose.

In the preferred embodiment of the present invention, a 1/3 subsample pitch resolution is used, and the pitch (pitch codebook) search is composed of three stages.

In the first stage, an open-loop pitch lag T_{OL} is estimated in open-loop pitch search module **106** in response to the weighted speech signal $s_w(n)$. As indicated in the foregoing description, this open-loop pitch analysis is usually performed once every 10 ms (two subframes) using techniques well known to those of ordinary skill in the art.

In the second stage, the search criterion C is searched in the closed-loop pitch search module **107** for integer pitch lags around the estimated open-loop pitch lag T_{OL} (usually ±5), which significantly simplifies the search procedure. A simple procedure is used for updating the filtered codevector y_T without the need to compute the convolution for every pitch lag.

Once an optimum integer pitch lag is found in the second stage, a third stage of the search (module **107**) tests the fractions around that optimum integer pitch lag.

When the pitch predictor is represented by a filter of the form $1/(1-bz^{-T})$, which is a valid assumption for pitch lags T>N, the spectrum of the pitch filter exhibits a harmonic structure over the entire frequency range, with a harmonic frequency related to 1/T. In case of wideband signals, this structure is not very efficient since the harmonic structure in wideband signals does not cover the entire extended spectrum. The harmonic structure exists only up to a certain frequency, depending on the speech segment. Thus, in order to achieve efficient representation of the pitch contribution in voiced segments of wideband speech, the pitch prediction filter needs to have the flexibility of varying the amount of periodicity over the wideband spectrum.

A new method which achieves efficient modeling of the harmonic structure of the speech spectrum of wideband signals is disclosed in the present specification, whereby several forms of low pass filters are applied to the past excitation and the low pass filter with higher prediction gain is selected.

When subsample pitch resolution is used, the low pass filters can be incorporated into the interpolation filters used to obtain the higher pitch resolution. In this case, the third stage of the pitch search, in which the fractions around the chosen integer pitch lag are tested, is repeated for the several interpolation filters having different low-pass characteristics and the fraction and filter index which maximize the search criterion C are selected.

A simpler approach is to complete the search in the three stages described above to determine the optimum fractional pitch lag using only one interpolation filter with a certain frequency response, and select the optimum low-pass filter shape at the end by applying the different predetermined low-pass filters to the chosen pitch codebook vector v_T and select the low-pass filter which minimizes the pitch prediction error. This approach is discussed in detail below.

FIG. 3 illustrates a schematic block diagram of a preferred embodiment of the proposed approach.

In memory module **303**, the past excitation signal u(n), n<0, is stored. The pitch codebook search module **301** is responsive to the target vector x, to the open-loop pitch lag T_{OL} and to the past excitation signal u(n), n<0, from memory module **303** to conduct a pitch codebook (pitch codebook) search minimizing the above-defined search criterion C. From the result of the search conducted in module **301**, module **302** generates the optimum pitch codebook vector v_T. Note that since a sub-sample pitch resolution is used (fractional pitch), the past excitation signal u(n), n<0, is interpolated and the pitch codebook vector v_T corresponds to the interpolated past excitation signal. In this preferred embodiment, the interpolation filter (in module **301**, but not shown) has a low-pass filter characteristic removing the frequency contents above 7000 Hz.

In a preferred embodiment, K filter characteristics are used; these filter characteristics could be low-pass or band-pass filter characteristics. Once the optimum codevector v_T is determined and supplied by the pitch codevector generator **302**, K filtered versions of v_T are computed respectively using K different frequency shaping filters such as **305**$^{(j)}$, where j=1, 2, . . . , K. These filtered versions are denoted $v_f^{(j)}$, where j=1, 2, . . . , K. The different vectors $V_f^{(j)}$ are convolved in respective modules **304**$^{(j)}$, where j=0, 1, 2, . . . , K, with the impulse response h to obtain the vectors $y^{(j)}$, where j=0, 1, 2, . . . , K. To calculate the mean squared pitch prediction error for each vector $y^{(j)}$, the value $y^{(j)}$ is multiplied by the gain b by means of a corresponding amplifier **307**$^{(j)}$ and the value $by^{(j)}$ is subtracted from the target vector x by means of a corresponding subtractor **308**$^{(j)}$. Selector **309** selects the frequency shaping filter **305**$^{(j)}$ which minimizes the mean squared pitch prediction error

$$e^{(j)}=\|x-b^{(j)}y^{(j)}\|^2,\ j=1,\ 2,\ \dots,\ K$$

To calculate the mean squared pitch prediction error $e^{(j)}$ for each value of $y^{(j)}$, the value $y^{(j)}$ is multiplied by the gain b by means of a corresponding amplifier **307**$^{(j)}$ and the value $b^{(j)}y^{(j)}$ is subtracted from the target vector x by means of subtractors **308**$^{(j)}$. Each gain $b^{(j)}$ is calculated in a corresponding gain calculator **306**$^{(j)}$ in association with the frequency shaping filter at index j, using the following relationship:

$$b^{(j)}=x^t y^{(j)}/\|y^{(j)}\|^2$$

In selector **309**, the parameters b, T, and are j chosen based on v_T or $v_f^{(j)}$ which minimizes the mean squared pitch prediction error e.

Referring back to FIG. 1, the pitch codebook index T is encoded and transmitted to multiplexer **112**. The pitch gain b is quantized and transmitted to multiplexer **112**. With this new approach, extra information is needed to encode the index j of the selected frequency shaping filter in multiplexer **112**. For example, if three filters are used (j=0, 1, 2, 3), then two bits are needed to represent this information. The filter index information j can also be encoded jointly with the pitch gain b.

Innovative codebook search:

Once the pitch, or LTP (Long Term Prediction) parameters b, T, and j are determined, the next step is to search for the optimum innovative excitation by means of search module **110** of FIG. 1. First, the target vector x is updated by subtracting the LTP contribution:

$$x' = x - by_T$$

where b is the pitch gain and y_T is the filtered pitch codebook vector (the past excitation at delay T filtered with the selected low pass filter and convolved with the inpulse response h as described with reference to FIG. 3).

The search procedure in CELP is performed by finding the optimum excitation codevector c_k and gain g which minimize the mean-squared error between the target vector and the scaled filtered codevector

$$E = \|x' - gHc_k\|^2$$

where H is a lower triangular convolution matrix derived from the impulse response vector h.

In the preferred embodiment of the present invention, the innovative codebook search is performed in module **110** by means of an algebraic codebook as described in U.S. Pat. No. 5,444,816 (Adoul et al.) issued on Aug. 22, 1995; U.S. Pat. No. 5,699,482 granted to Adoul et al., on Dec. 17, 1997; U.S. Pat. No. 5,754,976 granted to Adoul et al., on May 19, 1998; and U.S. Pat. No. 5,701,392 (Adoul et al.) dated Dec. 23, 1997.

Once the optimum excitation codevector c_k and its gain g are chosen by module **110**, the codebook index k and gain g are encoded and transmitted to multiplexer **112**.

Referring to FIG. **1**, the parameters b, T, j, $\hat{A}(z)$, k and g are multiplexed through the multiplexer **112** before being transmitted through a communication channel.

Memory Update:

In memory module **111** (FIG. 1), the states of the weighted synthesis filter $W(z)/\hat{A}(z)$ are updated by filtering the excitation signal $u = gc_k + bv_T$ through the weighted synthesis filter. After this filtering, the states of the filter are memorized and used in the next subframe as initial states for computing the zero-input response in calculator module **108**.

As in the case of the target vector x, other alternative but mathematically equivalent approaches well known to those of ordinary skill in the art can be used to update the filter states.

Decoder Side

The speech decoding device **200** of FIG. **2** illustrates the various steps carried out between the digital input **222** (input stream to the demultiplexer 217) and the output sampled speech **223** (output of the adder **221**).

Demultiplexer **217** extracts the synthesis model parameters from the binary information received from a digital input channel. From each received binary frame, the extracted parameters are:

- the short-term prediction parameters (STP) $\hat{A}(z)$ (once per frame);
- the long-term prediction (LTP) parameters T, b, and j (for each subframe); and
- the innovation codebook index k and gain g (for each subframe).

The current speech signal is synthesized based on these parameters as will be explained hereinbelow.

The innovative codebook **218** is responsive to the index k to produce the innovation codevector c_k, which is scaled by the decoded gain factor g through an amplifier **224**. In the preferred embodiment, an innovative codebook **218** as described in the above mentioned U.S. Pat Nos. 5,444,816; 5,699,482; 5,754,976; and 5,701,392 is used to represent the innovative codevector c_k.

The generated scaled codevector gc_k at the output of the amplifier **224** is processed through a innovation filter **205**.

Periodicity Enhancement:

The generated scaled codevector at the output of the amplifier **224** is processed through a frequency-dependent pitch enhancer **205**.

Enhancing the periodicity of the excitation signal u improves the quality in case of voiced segments. This was done in the past by filtering the innovation vector from the innovative codebook (fixed codebook) **218** through a filter in the form $1/(1-\epsilon bz^{-T})$ where ϵ is a factor below 0.5 which controls the amount of introduced periodicity. This approach is less efficient in case of wideband signals since it introduces periodicity over the entire spectrum. A new alternative approach, which is part of the present invention, is disclosed whereby periodicity enhancement is achieved by filtering the innovative codevector c_k from the innovative (fixed) codebook through an innovation filter **205** (F(z)) whose frequency response emphasizes the higher frequencies more than lower frequencies. The coefficients of F(z) are related to the amount of periodicity in the excitation signal u.

Many methods known to those skilled in the art are available for obtaining valid periodicity coefficients. For example, the value of gain b provides an indication of periodicity. That is, if gain b is close to 1, the periodicity of the excitation signal u is high, and if gain b is less than 0.5, then periodicity is low.

Another efficient way to derive the filter F(z) coefficients used in a preferred embodiment, is to relate them to the amount of pitch contribution in the total excitation signal u. This results in a frequency response depending on the subframe periodicity, where higher frequencies are more strongly emphasized (stronger overall slope) for higher pitch gains. Innovation filter **205** has the effect of lowering the energy of the innovative codevector c_k at low frequencies when the excitation signal u is more periodic, which enhances the periodicity of the excitation signal u at lower frequencies more than higher frequencies. Suggested forms for innovation filter **205** are

$$F(z) = 1 - \sigma z^{-1}, \tag{1}$$

or

$$F(z) = -\alpha z + 1 - \alpha z^{-1} \tag{2}$$

where σ or α are periodicity factors derived from the level of periodicity of the excitation signal u.

The second three-term form of F(z) is used in a preferred embodiment. The periodicity factor α is computed in the voicing factor generator **204**. Several methods can be used to derive the periodicity factor a based on the periodicity of the excitation signal u. Two methods are presented below.

Method 1:

The ratio of pitch contribution to the total excitation signal u is first computed in voicing factor generator **204** by

$$R_p = \frac{b^2 v_T^t v_T}{u^t u} = \frac{b^2 \sum_{n=0}^{N-1} v_T^2(n)}{\sum_{n=0}^{N-1} u^2(n)}$$

where v_T is the pitch codebook vector, b is the pitch gain, and u is the excitation signal u given at the output of the adder **219** by

$$u = gc_k + bv_T$$

Note that the term bv_T has its source in the pitch codebook (pitch codebook) **201** in response to the pitch lag T and the past value of u stored in memory **203**. The pitch codevector v_T from the pitch codebook **201** is then processed through a low-pass filter **202** whose cut-off frequency is adjusted by means of the index j from the demultiplexer **217**. The resulting codevector v_T is then multiplied by the gain b from the demultiplexer **217** through an amplifier **226** to obtain the signal bv_T.

The factor α is calculated in voicing factor generator **204** by

$$\alpha=qR_p \text{ bounded by } \alpha<q$$

where q is a factor which controls the amount of enhancement (q is set to 0.25 in this preferred embodiment).

Method 2:

Another method used in a preferred embodiment of the invention for calculating periodicity factor α is discussed below.

First, a voicing factor r_v is computed in voicing factor generator **204** by

$$r_v=(E_v-E_c)/(E_v+E_c)$$

where E_v is the energy of the scaled pitch codevector bv_T and E_c is the energy of the scaled innovative codevector gc_k. That is

$$E_v=b^2v_T^tv_T=b^2\sum_{n=0}^{N-1}v_T^2(n)$$

and

$$E_c=g^2c_k^tc_k=g^2\sum_{n=0}^{N-1}c_k^2(n).$$

Note that the value of r_v lies between −1 and 1 (1 corresponds to purely voiced signals and −1 corresponds to purely unvoiced signals).

In this preferred embodiment, the factor α is then computed in voicing factor generator **204** by

$$\alpha=0.125\ (1+r_v)$$

which corresponds to a value of 0 for purely unvoiced signals and 0.25 for purely voiced signals.

In the first, two-term form of F(z), the periodicity factor a can be approximated by using σ=2α in methods 1 and 2 above. In such a case, the periodicity factor σ is calculated as follows in method 1 above:

$$\sigma=2qR_p \text{ bounded by } \sigma<2q.$$

In method 2, the periodicity factor σ is calculated as follows:

$$\sigma=0.25\ (1+r_v).$$

The enhanced signal c_f is therefore computed by filtering the scaled innovative codevector gc_k through the innovation filter **205** (F(z)).

The enhanced excitation signal u' is computed by the adder **220** as:

$$u'=c_f+bv_T$$

Note that this process is not performed at the encoder **100**. Thus, it is essential to update the content of the pitch codebook **201** using the excitation signal u without enhancement to keep synchronism between the encoder **100** and decoder **200**. Therefore, the excitation signal u is used to update the memory **203** of the pitch codebook **201** and the enhanced excitation signal u' is used at the input of the LP synthesis filter **206**.

Synthesis and Deemphasis

The synthesized signal s' is computed by filtering the enhanced excitation signal u' through the LP synthesis filter **206** which has the form $1/\hat{A}(z)$, where $\hat{A}(z)$ is the interpolated LP filter in the current subframe. As can be seen in FIG. 2, the quantized LP coefficients $\hat{A}(z)$ on line **225** from demultiplexer **217** are supplied to the LP synthesis filter **206** to adjust the parameters of the LP synthesis filter **206** accordingly. The deemphasis filter **207** is the inverse of the preemphasis filter **103** of FIG. 1. The transfer function of the deemphasis filter **207** is given by

$$D(z)=1/(1-\mu z^{-1})$$

where μ is a preemphasis factor with a value located between 0 and 1 (a typical value is μ=0.7). A higher-order filter could also be used.

The vector s' is filtered through the deemphasis filter D(z) (module **207**) to obtain the vector s_d, which is passed through the high-pass filter **208** to remove the unwanted frequencies below 50 Hz and further obtain s_h.

Oversampling and High-frequency Regeneration

The over-sampling module **209** conducts the inverse process of the down-sampling module **101** of FIG. 1. In this preferred embodiment, oversampling converts from the 12.8 kHz sampling rate to the original 16 kHz sampling rate, using techniques well known to those of ordinary skill in the art. The oversampled synthesis signal is denoted $\hat{s}$. Signal $\hat{s}$ is also referred to as the synthesized wideband intermediate signal.

The oversampled synthesis $\hat{s}$ signal does not contain the higher frequency components which were lost by the down-sampling process (module **101** of FIG. 1) at the encoder **100**. This gives a low-pass perception to the synthesized speech signal. To restore the full band of the original signal, a high frequency generation procedure is disclosed. This procedure is performed in modules **210** to **216**, and adder **221**, and requires input from voicing factor generator **204** (FIG. 2).

In this new approach, the high frequency contents are generated by filling the upper part of the spectrum with a white noise property scaled in the excitation domain, then converted to the speech domain, preferably by shaping it with the same LP synthesis filter used for synthesizing the down-sampled signal $\hat{s}$.

The high frequency generation procedure in accordance with the present invention is described hereinbelow.

The random noise generator **213** generates a white noise sequence w' with a flat spectrum over the entire frequency bandwidth, using techniques well known to those of ordinary skill in the art. The generated sequence is of length N' which is the subframe length in the original domain. Note that N is the subframe length in the down-sampled domain. In this preferred embodiment, N=64 and N'=80 which correspond to 5 ms.

The white noise sequence is properly scaled in the gain adjusting module **214**. Gain adjustment comprises the following steps. First, the energy of the generated noise sequence w' is set equal to the energy of the enhanced excitation signal u' computed by an energy computing module **210**, and the resulting scaled noise sequence is given by

$$w(n) = w'(n)\sqrt{\frac{\sum_{n=0}^{N-1} u'^2(n)}{\sum_{n=0}^{N-1} w'^2(n)}},\ n = 0, \ldots, N'-1.$$

The second step in the gain scaling is to take into account the high frequency contents of the synthesized signal at the output of the voicing factor generator **204** so as to reduce the energy of the generated noise in case of voiced segments (where less energy is present at high frequencies compared to unvoiced segments). In this preferred embodiment, measuring the high frequency contents is implemented by measuring the tilt of the synthesis signal through a spectral tilt calculator **212** and reducing the energy accordingly. Other measurements such as zero crossing measurements can equally be used. When the tilt is very strong, which corresponds to voiced segments, the noise energy is further reduced. The till factor is computed in module **212** as the first correlation coefficient of the synthesis signal s_h and it is given by:

$$\text{tilt} = \frac{\sum_{n=1}^{N-1} s_h(n)s_h(n-1)}{\sum_{n=0}^{N-1} s_h^2(n)},\ \text{conditioned by tilt} \geq 0 \text{ and tilt} \geq r_v\text{-}$$

where voicing factor r_v is given by

$$r_v = (E_v - E_c)/(E_v + E_c)$$

where E_v is the energy of the scaled pitch codevector bv_T and E_c is the energy of the scaled innovative codevector gc_k, as described earlier. Voicing factor r_v is most often less than tilt but this condition was introduced as a precaution against high frequency tones where the tilt value is negative and the value of r_v is high. Therefore, this condition reduces the noise energy for such tonal signals.

The tilt value is 0 in case of flat spectrum and 1 in case of strongly voiced signals, and it is negative in case of unvoiced signals where more energy is present at high frequencies.

Different methods can be used to derive the scaling factor g_t from the amount of high frequency contents. In this invention, two methods are given based on the tilt of signal described above.

Method 1:

The scaling factor g_t is derived from the tilt by

$$g_t = 1 - \text{tilt} \text{ bounded by } 0.2 \leq g_t \leq 1.0$$

For strongly voiced signal where the tilt approaches 1, g_t is 0.2 and for strongly unvoiced signals g_t becomes 1.0.

Method 2:

The tilt factor g_t is first restricted to be larger or equal to zero, then the scaling factor is derived from the tilt by

$$g_t = 10^{-0.6\ \text{tilt}}$$

The scaled noise sequence w_g produced in gain adjusting module **214** is therefore given by:

$$w_g = g_t w.$$

When the tilt is close to zero, the scaling factor g_t is close to 1, which does not result in energy reduction. When the tilt value is 1, the scaling factor g_t results in a reduction of 12 dB in the energy of the generated noise.

Once the noise is properly scaled (w_g), it is brought into the speech domain using the spectral shaper **215**. In the preferred embodiment, this is achieved by filtering the noise w_g through a bandwidth expanded version of the same LP synthesis filter used in the down-sampled domain ($1/\hat{A}(z/0.8)$). The corresponding bandwidth expanded LP filter coefficients are calculated in spectral shaper **215**.

The filtered scaled noise sequence w_f is then band-pass filtered to the required frequency range to be restored using the band-pass filter **216**. In the preferred embodiment, the band-pass filter **216** restricts the noise sequence to the frequency range 5.6–7.2 kHz. The resulting band-pass filtered noise sequence z is added in adder **221** to the over-sampled synthesized speech signal $\hat{s}$ to obtain the final reconstructed sound signal s_{out} on the output **223**.

Although the present invention has been described hereinabove by way of a preferred embodiment thereof, this embodiment can be modified at will, within the scope of the appended claims, without departing from the spirit and nature of the subject invention. Even though the preferred embodiment discusses the use of wideband speech signals, it will be obvious to those skilled in the art that the subject invention is also directed to other embodiments using wideband signals in general and that it is not necessarily limited to speech applications.

What is claimed is:

1. A perceptual weighting device for producing a perceptually weighted signal in response to a wideband speech signal in order to reduce a difference between the wideband speech signal and a subsequently synthesized wideband speech signal, said perceptual weighting device comprising:

a) a signal preemphasis filter responsive to the wideband speech signal for enhancing a high frequency content of the wideband speech signal to thereby produce a preemphasised signal;

b) a synthesis filter calculator responsive to said preemphasised signal for producing synthesis filter coefficients; and

c) a perceptual weighting filter, responsive to said preemphasised signal and said synthesis filter coefficients, for filtering said preemphasised signal in relation to said synthesis filter coefficients to thereby produce said perceptually weighted signal, said perceptual weighting filter having a transfer function with fixed denominator whereby weighting of said wideband speech signal in a formant region is substantially decoupled from a spectral tilt of said wideband speech signal.

2. A perceptual weighting device as defined in claim 1, wherein said signal preemphasis filter has a transfer function of the form:

$$P(z) = 1 - \mu z^{-1}$$

wherein μ is a preemphasis factor having a value located between 0 and 1.

3. A perceptual weighting device as defined in claim 2, wherein said preemphasis factor μ is 0.7.

4. A perceptual weighting device as defined in claim 2, wherein said perceptual weighting filter has a transfer function of the form:

$$W(z) = A(z/\gamma_1)/(1 - \gamma_2 z^{-1})$$

where $0 < \gamma_2 < \gamma_1 \leqq 1$ and γ_2 and γ_1 are weighting control values.

5. A perceptual weighting device as defined in claim 4, wherein γ_2 is set equal to μ.

6. A perceptual weighting device as defined in claim 1, wherein said perceptual weighting filter has a transfer function of the form:

$$W(z) = A(z/\gamma_1)/(1 - \gamma_2 z^{-1})$$

where $0<\gamma_2<\gamma_1\leq 1$ and γ_2 and γ_1 are weighting control values.

7. A perceptual weighting device as defined in claim 6, wherein γ_2 is set equal to μ.

8. A method for producing a perceptually weighted signal in response to a wideband speech signal in order to reduce a difference between the weighted wideband speech signal and a subsequently synthesized weighted wideband speech signal, said method comprising:

a) filtering the wideband speech signal to produce a preemphasised signal with enhanced high frequency content;

b) calculating, from said preemphasised signal, synthesis filter coefficients; and

c) filtering said preemphasised signal in relation to said synthesis filter coefficients to thereby produce a perceptually weighted speech signal, wherein said filtering comprises processing the preemphasis signal through a perceptual weighting filter having a transfer function with fixed denominator whereby weighting of said wideband speech signal in a formant region is substantially decoupled from a spectral tilt of said wideband speech signal.

9. A method for producing a perceptually weighted signal as defined in claim 8, wherein filtering the wideband speech signal comprises filtering through a transfer function of the form:

$$P(z)=1-\mu z^{-1}$$

wherein μ is a preemphasis factor having a value located between 0 and 1.

10. A method for producing a perceptually weighted signal as defined in claim 9, wherein said preemphasis factor μ is 0.7.

11. A method for producing a perceptually weighted signal as defined in claim 9, wherein said perceptual weighting filter has a transfer function of the form:

$$W(z)=A(z/\gamma_1)/(1-\gamma_2 z^{-1})$$

where $0<\gamma_2<\gamma_1\leq 1$ and γ_2 and γ_1 are weighting control values.

12. A method for producing a perceptually weighted signal as defined in claim 11, wherein γ_2 is set equal to μ.

13. A method for producing a perceptually weighted signal as defined in claim 8, wherein said perceptual weighting filter has a transfer function of the form:

$$W(z)=A(z/\gamma_1)/(1-\gamma_2 z^{-1})$$

where $0<\gamma_2<\gamma_1\leq 1$ and γ_2 and γ_1 are weighting control values.

14. A method for producing a perceptually weighted signal as defined in claim 13, wherein γ_2 is set equal to μ.

15. An encoder for encoding a wideband speech signal, comprising:

a) a perceptual weighting device as recited in claim 1;

b) a pitch codebook search device responsive to said perceptually weighted signal for producing pitch codebook parameters and an innovative search target vector;

c) an innovative codebook search device, responsive to said synthesis filter coefficients and to said innovative search target vector, for producing innovative codebook parameters; and

d) a signal forming device for producing an encoded wideband speech signal comprising said pitch codebook parameters, said innovative codebook parameters, and said synthesis filter coefficients.

16. An encoder as defined in claim 15, wherein said signal preemphasis filter has a transfer function of the form:

$$P(z)=1-\mu z^{-1}$$

wherein μ is a preemphasis factor having a value located between 0 and 1.

17. An encoder as defined in claim 16, wherein said preemphasis factor μ is 0.7.

18. An encoder as defined in claim 16, wherein said perceptual weighting filter has a transfer function of the form:

$$W(z)=A(z/\gamma_1)/(1-\gamma_2 z^{-1})$$

where $0<\gamma_2<\gamma_1\leq 1$ and γ_2 and γ_1 are weighting control values.

19. An encoder as defined in claim 18, wherein γ_2 is set equal to μ.

20. An encoder as defined in claim 15, wherein said perceptual weighting filter has a transfer function of the form:

$$W(z)=A(z/\gamma_1)/(1-\gamma_2 z^{-1})$$

where $0<\gamma_2<\gamma_1\leq 1$ and γ_2 and γ_1 are weighting control values.

21. An encoder as defined in claim 20, wherein μ is set equal to γ_2.

22. A cellular communication system for servicing a large geographical area divided into a plurality of cells, comprising:

a) mobile transmitter/receiver units;

b) cellular base stations respectively situated in said cells;

c) a control terminal for controlling communication between the cellular base stations;

d) a bidirectional wireless communication sub-system between each mobile unit situated in one cell and the cellular base station of said one cell, said bidirectional wireless communication sub-system comprising, in both the mobile unit and the cellular base station:

i) a transmitter including an encoder for encoding a wideband speech signal as recited in claim 15 and a transmission circuit for transmitting the encoded wideband speech signal; and

ii) a receiver including a receiving circuit for receiving a transmitted encoded wideband speech signal and a decoder for decoding the received encoded wideband speech signal.

23. A cellular communication system as defined in claim 22, wherein said signal preemphasis filter has a transfer function of the form:

$$P(z)=1-\mu z^{-1}$$

wherein μ is a preemphasis factor having a value located between 0 and 1.

24. A cellular communication system as defined in claim 23, wherein said preemphasis factor μ is 0.7.

25. A cellular communication system as defined in claim 23, wherein said perceptual weighting filter has a transfer function of the form:

$$W(z)=A(z/\gamma_1)/(1-\gamma_2 z^{-1})$$

where $0<\gamma_2<\gamma_1\leq 1$ and γ_2 and γ_1 are weighting control values.

26. A cellular communication system as defined in claim 25, wherein μ is set equal to γ_2.

27. A cellular communication system as defined in claim 22, wherein said perceptual weighting filter has a transfer function of the form:

$$W(z)=A(z/\gamma_1)/(1-\gamma_2 z^{-1})$$

where $0<\gamma_2<\gamma_1\leqq 1$ and γ_2 and γ_1 are weighting control values.

28. A cellular communication system as defined in claim 27, wherein γ_2 is set equal to μ.

29. A cellular mobile transmitter/receiver unit comprising:

a) a transmitter including an encoder for encoding a wideband speech signal as recited in claim 15 and a transmission circuit for transmitting the encoded wideband speech signal; and

b) a receiver including a receiving circuit for receiving a transmitted encoded wideband speech signal and a decoder for decoding the received encoded wideband speech signal.

30. A cellular mobile transmitter/receiver unit as defined in claim 29, wherein said signal preemphasis filter has a transfer function of the form:

$$P(z)=1-\mu z^{-1}$$

wherein μ is a preemphasis factor having a value located between 0 and 1.

31. A cellular mobile transmitter/receiver unit as defined in claim 30, wherein said preemphasis factor μ is 0.7.

32. A cellular mobile transmitter/receiver unit as defined in claim 30, wherein said perceptual weighting filter has a transfer function of the form:

$$W(z)=A(z/\gamma_1)/(1-\gamma_2 z^{-1})$$

where $0<\gamma_2<\gamma_1\leqq 1$ and γ_2 and γ_1 are weighting control values.

33. A cellular mobile transmitter/receiver unit as defined in claim 32, wherein γ_2 is set equal to μ.

34. A cellular mobile transmitter/receiver unit as defined in claim 29, wherein said perceptual weighting filter has a transfer function of the form:

$$W(z)=A(z/\gamma_1)/(1-\gamma_2 z^{-1})$$

where $0<\gamma_2<\gamma_1\leqq 1$ and γ_2 and γ_1 are weighting control values.

35. A cellular mobile transmitter/receiver unit as defined in claim 34, wherein γ_2 is set equal to μ.

36. A cellular network element comprising:

a) a transmitter including an encoder for encoding a wideband speech signal as defined in claim 15 and a transmission circuit for transmitting the encoded wideband speech signal; and

b) a receiver including a receiving circuit for receiving a transmitted encoded wideband speech signal and a decoder for decoding the received encoded wideband speech signal.

37. A cellular network element as defined in claim 36, wherein said signal preemphasis filter has a transfer function of the form:

$$P(z)=1-\mu z^{-1}$$

wherein μ is a preemphasis factor having a value located between 0 and 1.

38. A cellular network element as defined in claim 37, wherein said preemphasis factor μ is 0.7.

39. A cellular network element as defined in claim 37, wherein said perceptual weighting filter has a transfer function of the form:

$$W(z)=A(z/\gamma_1)/(1-\gamma_2 z^{-1})$$

where $0<\gamma_2<\gamma_1\leqq 1$ and γ_2 and γ_1 are weighting control values.

40. A cellular network element as defined in claim 39, wherein γ_2 is set equal to μ.

41. A cellular network element as defined in claim 36, wherein said perceptual weighting filter has a transfer function of the form:

$$W(z)=A(z/\gamma_1)/(1-\gamma_2 z^{-1})$$

where $0<\gamma_2<\gamma_1\leqq 1$ and γ_2 and γ_1 are weighting control values.

42. A cellular network element as defined in claim 41, wherein μ is set equal to γ_2.

43. In a cellular communication system for servicing a large geographical area divided into a plurality of cells, comprising: mobile transmitter/receiver units; cellular base stations, respectively situated in said cells; and control terminal for controlling communication between the cellular base stations:

a bidirectional wireless communication sub-system between each mobile unit situated in one cell and the cellular base station of said one cell, said bidirectional wireless communication sub-system comprising, in both the mobile unit and the cellular base station:

a) a transmitter including an encoder for encoding a wideband speech signal as recited in claim 15 and a transmission circuit for transmitting the encoded wideband speech signal; and

b) a receiver including a receiving circuit for receiving a transmitted encoded wideband speech signal and a decoder for decoding the received encoded wideband speech signal.

44. A bidirectional wireless communication sub-system as defined in claim 43, wherein said signal preemphasis filter has a transfer function of the form:

$$P(z)=1-\mu z^{-1}$$

wherein μ is a preemphasis factor having a value located between 0 and 1.

45. A bidirectional wireless communication sub-system as defined in claim 44, wherein said preemphasis factor μ is 0.7.

46. A bidirectional wireless communication sub-system as defined in claim 44, wherein said perceptual weighting filter has a transfer function of the form:

$$W(z)=A(z/\gamma_1)/(1-\gamma_2 z^{-1})$$

where $0<\gamma_2<\gamma_1$ and γ_2 and γ_1 are weighting control values.

47. A bidirectional wireless communication sub-system as defined in claim 46, wherein μ is set equal to γ_2.

48. A bidirectional wireless communication sub-system as defined in claim 43, wherein said perceptual weighting filter has a transfer function of the form:

$$W(z)=A(z/\gamma_1)/(1-\gamma_2 z^{-1})$$

where $0<\gamma_2<\gamma_1\leqq 1$ and γ_2 and γ_1 are weighting control values.

49. A bidirectional wireless communication subsystem as defined in claim 48, wherein γ_2 is set equal to μ.

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APPLICANTS

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** CONTINUING DATA *************************

THIS APPLICATION IS A 371 OF PCT/CA99/01010 10/27/1999

** FOREIGN APPLICATIONS ********************

CANADA 2,252,170 10/27/1998

** SMALL ENTITY **

	STATE OR COUNTRY	SHEETS DRAWING	TOTAL CLAIMS	INDEPENDENT CLAIMS
Foreign Priority claimed ☑ yes ☐ no 35 USC 119 (a-d) conditions met ☑ yes ☐ no ☐ Met after Allowance Verified and Acknowledged Examiner's Signature Initials	CANADA	4	49	2

ADDRESS

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TITLE

Perceptual weighting device and method for efficient coding of wideband signals

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FORM PTO-1390 (REV. 11-2000) U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE

TRANSMITTAL LETTER TO THE UNITED STATES DESIGNATED/ELECTED OFFICE (DO/EO/US) CONCERNING A FILING UNDER 35 U.S.C. 371

ATTORNEY'S DOCKET NUMBER	U.S. APPLICATION NO. (If known, see 37 CFR 1.5)
4082-0130P	09/830276

INTERNATIONAL APPLICATION NO.	INTERNATIONAL FILING DATE	PRIORITY DATE CLAIMED
PCT/CA99/01010	October 27, 1999	October 27, 1998

TITLE OF INVENTION
PERCEPTUAL WEIGHTING DEVICE AND METHOD FOR EFFICIENT CODING OF WIDEBAND SIGNALS

APPLICANT(S) FOR DO/EO/US
Bruno BESSETTE, Redwan SALAMI, Roch LEFEBVRE

Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information:

1. ☒ This is a **FIRST** submission of items concerning a filing under 35 U.S.C. 371.
2. ☐ This is a **SECOND** or **SUBSEQUENT** submission of items concerning a filing under 35 U.S.C. 371.
3. ☒ This express request to begin national examination procedures (35 U.S.C. 371(f)) at any time rather than delay examination until the expiration of the applicable time limit set in 35 U.S.C. 371(b) and PCT Articles 22 and 39 (1).
4. ☐ The US has been elected by the expiration of 19 months from the priority date (Article 31).
5. ☒ A copy of the International Application as filed (35 U.S.C. 371(c)(2))
   a. ☒ is transmitted herewith (required only if not transmitted by the International Bureau).
   b. ☒ has been transmitted by the International Bureau.
   c. ☐ is not required, as the application was filed in the United States Receiving Office (RO/US).
6. ☐ An English language translation of the International Application as filed (35 U.S.C. 371(c)(2)).
   a. ☐ is transmitted herewith.
   b. ☐ has been previously submitted under 35 U.S.C. 154(d)(4)
7. ☐ Amendments to the claims of the International Application under PCT Article 19 (35 U.S.C. 371(c)(3)).
   a. ☐ are transmitted herewith (required only if not transmitted by the International Bureau).
   b. ☐ have been transmitted by the International Bureau.
   c. ☐ have not been made; however, the time limit for making such amendments has NOT expired.
   d. ☐ have not been made and will not be made.
8. ☐ An English language translation of the amendments to the claims under PCT Article 19 (35 U.S.C. 371(c)(3)).
9. ☐ An oath or declaration of the inventor(s) (35 U.S.C. 371(c)(4)).
10. ☐ An English language translation of the annexes of the International Preliminary Examination Report under PCT Article 36 (35 U.S.C. 371(c)(5)).

Items 11. to 20. below concern document(s) or information included:

11. ☒ An Information Disclosure Statement under 37 CFR 1.97 and 1.98./International Search Report with cited references
12. ☐ An assignment document for recording. A separate cover sheet in compliance with 37 CFR 3.28 and 3.31 is included.
13. ☒ A FIRST preliminary amendment.
14. ☐ A SECOND or SUBSEQUENT preliminary amendment.
15. ☐ A substitute specification.
16. ☐ A change of power of attorney and/or address letter.
17. ☐ A computer-readable form of the sequence listing in accordance with PCT Rule 13ter.2 and 35 U.S.C. 1.821-1.825.
18. ☐ A second copy of the published international application under 35 U.S.C. 154(d)(4).
19. ☐ A second copy of the English language translation of the international application under 35 U.S.C. 154(d)(4).
20. ☐ Other items or information:

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US APPLICATION NO (if known, see 37 CFR 1.5)	INTERNATIONAL APPLICATION NO	ATTORNEY'S DOCKET NUMBER
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21. ☒ The following fees are submitted:

	CALCULATIONS	PTO USE ONLY
BASIC NATIONAL FEE (37 CFR 1.492(a)(1)-(5):		
Neither international preliminary examination fee (37 CFR 1.482) nor international search fee (37 CFR 1.445(a)(2)) paid to USPTO and International Search Report not prepared by the EPO or JPO............ **$1,000.00**		
International preliminary examination fee (37 CFR 1.482) not paid to USPTO but International Search Report prepared by the EPO or JPO........ **$860.00**		
International preliminary examination fee (37 CFR 1.482) not paid to USPTO but international search fee (37 CFR 1.445(a)(2)) paid to USPTO............ **$710.00**		
International preliminary examination fee (37 CFR 1.482) paid to USPTO but all claims did not satisfy provisions of PCT Article 33(1)-(4)............ **$690.00**		
International preliminary examination fee (37 CFR 1.482) paid to USPTO and all claims satisfied provisions of PCT Article 33(1)-(4)................. **$100.00**		
ENTER APPROPRIATE BASIC FEE AMOUNT =	$ 860.00	
Surcharge of **$130.00** for furnishing the oath or declaration later than ☐ 20 ☒ 30 months from the earliest claimed priority date (37 CFR 1.492(e)).	$ 130.00	

CLAIMS	NUMBER FILED	NUMBER EXTRA	RATE		
Total Claims	49 - 20 =	29	X $18.00	$ 522.00	
Independent Claims	2 - 3 =	0	X $80.00	$ 0	
MULTIPLE DEPENDENT CLAIM(S) (if applicable)		0	+ $270.00	$ 0	
TOTAL OF ABOVE CALCULATIONS =				$ 1512.00	
☒ Applicant claims small entity status. See 37 CFR 1.27. The fees indicated above are reduced by 1/2.				$ (756.00)	
SUBTOTAL =				$ 756.00	
Processing fee of **$130.00** for furnishing the English translation later than ☐20 ☐30 months from the earliest claimed priority date (37 CFR 1.492(f)). +				$ 0	
TOTAL NATIONAL FEE =				$ 756.000	
Fee for recording the enclosed assignment (37 CFR 1.21(h)). The assignment must be accompanied by an appropriate cover sheet (37 CFR 3.28, 3.31). **$40.00** per property +				$ 0	
TOTAL FEES ENCLOSED =				$ 756.00	
				Amount to be: refunded	$
				charged	$

a. ☒ A check in the amount of $ 756.00 to cover the above fees is enclosed.

b. ☐ Please charge my Deposit Account. No. __________ in the amount of $______ to cover the above fees. A duplicate copy of this sheet is enclosed.

c. ☒ The Commissioner is hereby authorized to charge any additional fees which may be required, or credit any overpayment to Deposit Account No. 02-2448.

NOTE: Where an appropriate time limit under 37 CFR 1.494 or 1.495 has not been met, a petition to revive (37 CFR 1.137(a) or (b)) must be filed and granted to restore the application to pending status.

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Date: April 25, 2001

By ______________________
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Form PTO-1390 (REV 11-2000) page 2 of 2

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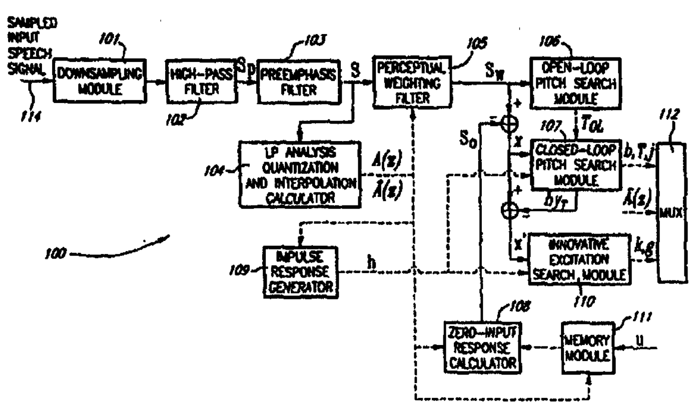

(57) Abstract

A perceptual weighting device for producing a perceptually weighted signal in response to a wideband signal comprises a signal preemphasis filter, a synthesis filter claculator, and a perceptual weighting filter. The signal preemphasis filter enhances high frequency content of the wideband signal to thereby produce a preemphasised signal. The signal preemphasis filter has a transfer function of the form: $P(z)=1-\mu z^{-1}$ wherein μ is a preemphasis factor having a value located between 0 and 1. The synthesis filter calculator is responsive to the preemphasised signal for producing synthesis filter coefficients. Finally, the perceptual weighting filter processes the preemphasised signal in relation to the synthesis filter coefficients to produce the perceptually weighted signal. The perceptual weighting filter has a transfer function, with fixed denominator, of the form: $W(z)\ A(z/\gamma_1)\ /\ (1-\gamma_2 z^{-1})$ where $0<\gamma_2<\gamma_1\leq 1$ and γ_2 and γ_1 are weighting control values, whereby weighting of the wideband signal in a formant region is substantially decoupled from a spectral tilt of this wideband signal.

PERCEPTUAL WEIGHTING DEVICE AND METHOD FOR EFFICIENT CODING OF WIDEBAND SIGNALS

BACKGROUND OF THE INVENTION

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1. Field of the invention:

The present invention relates to a perceptual weighting device and method for producing a perceptually weighted signal in response to a wideband signal (0-7000 Hz) in order to reduce a difference between a weighted wideband signal and a subsequently synthesized weighted wideband signal.

2. Brief description of the prior art:

The demand for efficient digital wideband speech/audio encoding techniques with a good subjective quality/bit rate trade-off is increasing for numerous applications such as audio/video teleconferencing, multimedia, and wireless applications, as well as Internet and packet network applications. Until recently, telephone bandwidths filtered in the range 200-3400 Hz were mainly used in speech coding applications. However, there is an increasing demand for wideband speech applications in order to increase the intelligibility and naturalness of the speech signals. A bandwidth in the range 50-7000 Hz was found sufficient for delivering a face-to-face speech quality. For audio signals, this range gives an acceptable audio quality, but is still lower than the CD quality which operates on the range 20-20000 Hz.

A speech encoder converts a speech signal into a digital bitstream which is transmitted over a communication channel (or stored in a storage medium). The speech signal is digitized (sampled and quantized with usually 16-bits per sample) and the speech encoder has the role of representing these digital samples with a smaller number of bits while maintaining a good subjective speech quality. The speech decoder or synthesizer operates on the transmitted or stored bit stream and converts it back to a sound signal.

One of the best prior art techniques capable of achieving a good quality/bit rate trade-off is the so-called Code Excited Linear Prediction (CELP) technique. According to this technique, the sampled speech signal is processed in successive blocks of L samples usually called *frames* where L is some predetermined number (corresponding to 10-30 ms of speech). In CELP, a linear prediction (LP) synthesis filter is computed and transmitted every frame. The L-sample frame is then divided into smaller blocks called *subframes* of size N samples, where $L=kN$ and k is the number of subframes in a frame (N usually corresponds to 4-10 ms of speech). An excitation signal is determined in each subframe, which usually consists of two components: one from the past excitation (also called pitch contribution or adaptive codebook) and the other from an innovative codebook (also called fixed codebook). This excitation signal is transmitted and used at the decoder as the input of the LP synthesis filter in order to obtain the synthesized speech.

An innovative codebook in the CELP context, is an indexed set of N-sample-long sequences which will be referred to as N-dimensional codevectors. Each codebook sequence is indexed by an integer k ranging from 1 to M where M represents the size of the codebook often expressed as a number of bits b, where $M=2^b$.

To synthesize speech according to the CELP technique, each block of N samples is synthesized by filtering an appropriate codevector from a codebook through time varying filters modelling the spectral characteristics of the speech signal. At the encoder end, the synthesis output is computed for all, or a subset, of the codevectors from the codebook (codebook search). The retained codevector is the one producing the synthesis output closest to the original speech signal according to a perceptually weighted distortion measure. This perceptual weighting is performed using a so-called perceptual weighting filter, which is usually derived from the LP synthesis filter.

The CELP model has been very successful in encoding telephone band sound signals, and several CELP-based standards exist in a wide range of applications, especially in digital cellular applications. In the telephone band, the sound signal is band-limited to 200-3400 Hz and sampled at 8000 samples/sec. In wideband speech/audio applications, the sound signal is band-limited to 50-7000 Hz and sampled at 16000 samples/sec.

Some difficulties arise when applying the telephone-band optimized CELP model to wideband signals, and additional features need to be added to the model in order to obtain high quality wideband signals. Wideband signals exhibit a much wider dynamic range compared to telephone-band signals, which results in precision problems when a fixed-point implementation of the algorithm is required (which is essential in wireless applications). Furthermore, the CELP model will often spend most of its encoding bits on the low-frequency region, which usually has higher energy contents, resulting in a low-pass output signal. To overcome this problem, the perceptual weighting filter has to be modified in order to suit wideband signals, and pre-emphasis techniques which boost the high frequency regions become important to reduce the dynamic range, yielding a simpler fixed-point implementation, and to ensure a better encoding of the higher frequency contents of the signal.

In CELP-type encoders, the optimum pitch and innovative parameters are searched by minimizing the mean squared error between the input speech and synthesized speech in a perceptually weighted domain. This is equivalent to minimizing the error between the weighted input speech and weighted synthesis speech, where the weighting is performed using a filter having a transfer function $W(z)$ of the form:

$$W(z) = A(z/g_1)/A(z/g_2) \quad \text{where} \quad 0<\Gamma_2<\Gamma_1\leq 1$$

In analysis-by-synthesis (AbS) coders, analysis show that the quantization error is weighted by the inverse of the weighting filter, $W^{-1}(z)$, which exhibits some of the formant structure in the input signal. Thus, the masking property of the human ear is exploited by shaping the error, so that it has more energy in the formant regions, where it will be masked by the strong signal energy present in those regions. The amount of weighting is controlled by the factors Γ_1 and Γ_2.

This filter works well with telephone band signals. However, it was found that this filter is not suitable for efficient perceptual weighting when it was applied to wideband signals. It was found that this filter has inherent limitations in modelling the formant structure and the required spectral tilt concurrently. The spectral tilt is more pronounced in wideband signals due to the wide dynamic range between low and high frequencies. It was suggested to add a tilt filter into filter $W(z)$ in order to control the tilt and formant weighting separately.

OBJECT OF THE INVENTION

An object of the present invention is therefore to provide a perceptual weighting device and method adapted to wideband signals, using a modified perceptual weighting filter to obtain a high quality reconstructed signal, these device and method enabling fixed point algorithmic implementation.

SUMMARY OF THE INVENTION

More specifically, in accordance with the present invention, there is provided a perceptual weighting device for producing a perceptually weighted signal in response to a wideband signal in order to reduce a difference between a weighted wideband signal and a subsequently synthesized weighted wideband signal. This perceptual weighting device comprises:

a) a signal preemphasis filter responsive to the wideband signal for enhancing the high frequency content of the wideband signal to thereby produce a preemphasised signal;

b) a synthesis filter calculator responsive to the preemphasised signal for producing synthesis filter coefficients; and

c) a perceptual weighting filter, responsive to the preemphasised signal and the synthesis filter coefficients, for filtering the preemphasised signal in relation to the synthesis filter coefficients to thereby produce the perceptually weighted signal. The perceptual weighting filter has a transfer function with fixed denominator whereby weighting of the wideband signal in a formant region is substantially decoupled from a spectral tilt of that wideband signal.

The present invention also relates to a method for producing a perceptually weighted signal in response to a wideband signal in order to reduce a difference between a weighted wideband signal and a subsequently synthesized weighted wideband signal. This method comprises: filtering the wideband signal to produce a preemphasised signal with enhanced high frequency content; calculating, from the preemphasised signal, synthesis filter coefficients; and filtering the preemphasised signal in relation to the synthesis filter coefficients to thereby produce a perceptually weighted speech signal. The filtering comprises processing the preemphasis signal through a perceptual weighting filter having a transfer function with fixed denominator whereby weighting of the wideband signal in a formant region is substantially decoupled from a spectral tilt of the wideband signal.

In accordance with preferred embodiments of the subject invention:

- reduction of the dynamic range comprises filtering the wideband signal through a transfer function of the form:

$$P(z) = 1 - \mu z^{-1}$$

wherein μ is a preemphasis factor having a value located between 0 and 1;

- the preemphasis factor μ is 0.7;

- the perceptual weighting filter has a transfer function of the form:

$$W(z) = A(z/\gamma_1) / (1-\gamma_2 z^{-1})$$

where $0 < \gamma_2 < \gamma_1 \leq 1$ and γ_2 and γ_1 are weighting control values; and

- the variable γ_2 is set equal to μ.

Therefore, the overall perceptual weighting of the quantization error is obtained by a combination of a preemphasis filter and a modified weighting filter to enable high subjective quality of the decoded wideband sound signal into filter $W(z)$ in order to control the tilt and formant weighting separately.

The solution to the problem exposed in the brief description of the prior art is accordingly to introduce a preemphasis filter at the input, compute the synthesis filter coefficients based on the preemphasized signal, and use a modified perceptual weighting filter by fixing its denominator. By reducing the dynamic range of the wideband signal, the preemphasis filter renders the wideband signal more suitable for fixed-point implementation, and improves the encoding of the high frequency contents of the spectrum.

The present invention further relates to an encoder for encoding a wideband signal, comprising: a) a perceptual weighting device as described herein above; b) an pitch codebook search device responsive to the perceptually weighted signal for producing pitch codebook parameters and an innovative search target vector; c) an innovative codebook search device, responsive to the synthesis filter coefficients and to the innovative search target vector, for producing innovative codebook parameters; and d) a signal forming device for producing an encoded wideband signal comprising the pitch codebook parameters, the innovative codebook parameters, and the synthesis filter coefficients.

Still further in accordance with the present invention, there is provided:

- a cellular communication system for servicing a large geographical area divided into a plurality of cells, comprising: a) mobile transmitter/receiver units; b) cellular base stations respectively situated in the cells; c) a control terminal for controlling communication between the cellular base stations; d) a bidirectional wireless communication sub-system between each mobile unit situated in one cell and the cellular base station of this cell, this bidirectional wireless communication sub-system comprising, in both the mobile unit and the cellular base station:

i) a transmitter including an encoder as described hereinabove for encoding a wideband signal and a transmission circuit for transmitting the encoded wideband signal; and

ii) a receiver including a receiving circuit for receiving a transmitted encoded wideband signal and a decoder for decoding the received encoded wideband signal.

- a cellular mobile transmitter/receiver unit comprising:

a) a transmitter including an encoder as described hereinabove for encoding a wideband signal and a transmission circuit for transmitting the encoded wideband signal; and

b) a receiver including a receiving circuit for receiving a transmitted encoded wideband signal and a decoder for decoding the received encoded wideband signal;

- a cellular network element comprising:

a) a transmitter including an encoder as described hereinabove for encoding a wideband signal and a transmission circuit for transmitting the encoded wideband signal; and

b) a receiver including a receiving circuit for receiving a transmitted encoded wideband signal and a decoder for decoding the received encoded wideband signal; and

- a bidirectional wireless communication sub-system between each mobile unit situated in one cell and the cellular base station of this cell, this bidirectional wireless communication sub-system comprising, in both the mobile unit and the cellular base station:

a) a transmitter including an encoder as described hereinabove for encoding a wideband signal and a transmission circuit for transmitting the encoded wideband signal; and

b) a receiver including a receiving circuit for receiving a transmitted encoded wideband signal and a decoder for decoding the received encoded wideband signal.

The objects, advantages and other features of the present invention will become more apparent upon reading of the following non restrictive description of preferred embodiments thereof, given by way of example only with reference to the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

In the appended drawings:

Figure 1 is a schematic block diagram of a preferred embodiment of wideband encoding device;

Figure 2 is a schematic block diagram of a preferred embodiment of wideband decoding device;

Figure 3 is a schematic block diagram of a preferred embodiment of pitch analysis device; and

Figure 4 is a simplified, schematic block diagram of a cellular communication system in which the wideband encoding device of Figure 1 and the wideband decoding device of Figure 2 can be used.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

As well known to those of ordinary skill in the art, a cellular communication system such as 401 (see Figure 4) provides a telecommunication service over a large geographic area by dividing that large geographic area into a number C of smaller cells. The C smaller cells are serviced by respective cellular base stations 402_1, 402_2 ... 402_C to provide each cell with radio signalling, audio and data channels.

Radio signalling channels are used to page mobile radiotelephones (mobile transmitter/receiver units) such as 403 within the limits of the coverage area (cell) of the cellular base station 402, and to place calls to other radiotelephones 403 located either inside or outside the base station's cell or to another network such as the Public Switched Telephone Network (PSTN) 404.

Once a radiotelephone 403 has successfully placed or received a call, an audio or data channel is established between this radiotelephone 403 and the cellular base station 402 corresponding to the cell in which the radiotelephone 403 is situated, and communication between the base station 402 and radiotelephone 403 is conducted over that audio or data channel. The radiotelephone 403 may also receive control or timing information over a signalling channel while a call is in progress.

If a radiotelephone 403 leaves a cell and enters another adjacent cell while a call is in progress, the radiotelephone 403 hands over the call to an available audio or data channel of the new cell base station 402. If a radiotelephone 403 leaves a cell and enters another adjacent cell while no call is in progress, the radiotelephone 403 sends a control message over the signalling channel to log into the base station 402 of the new cell. In this manner mobile communication over a wide geographical area is possible.

The cellular communication system 401 further comprises a control terminal 405 to control communication between the cellular base stations 402 and the PSTN 404, for example during a communication between a radiotelephone 403 and the PSTN 404, or between a radiotelephone 403 located in a first cell and a radiotelephone 403 situated in a second cell.

Of course, a bidirectional wireless radio communication subsystem is required to establish an audio or data channel between a base station 402 of one cell and a radiotelephone 403 located in that cell. As illustrated in very simplified form in Figure 4, such a bidirectional wireless radio communication subsystem typically comprises in the radiotelephone 403:

- a transmitter 406 including:
    - an encoder 407 for encoding the voice signal; and
    - a transmission circuit 408 for transmitting the encoded voice signal from the encoder 407 through an antenna such as 409; and
- a receiver 410 including:
    - a receiving circuit 411 for receiving a transmitted encoded voice signal usually through the same antenna 409; and
    - a decoder 412 for decoding the received encoded voice signal from the receiving circuit 411.

The radiotelephone further comprises other conventional radiotelephone circuits 413 to which the encoder 407 and decoder 412 are connected and for processing signals therefrom, which circuits 413 are well known to those of ordinary skill in the art and, accordingly, will not be further described in the present specification.

Also, such a bidirectional wireless radio communication subsystem typically comprises in the base station 402:

- a transmitter 414 including:
  - an encoder 415 for encoding the voice signal; and
  - a transmission circuit 416 for transmitting the encoded voice signal from the encoder 415 through an antenna such as 417; and
- a receiver 418 including:
  - a receiving circuit 419 for receiving a transmitted encoded voice signal through the same antenna 417 or through another antenna (not shown); and
  - a decoder 420 for decoding the received encoded voice signal from the receiving circuit 419.

The base station 402 further comprises, typically, a base station controller 421, along with its associated database 422, for controlling communication between the control terminal 405 and the transmitter 414 and receiver 418.

As well known to those of ordinary skill in the art, voice encoding is required in order to reduce the bandwidth necessary to transmit sound signal, for example voice signal such as speech, across the bidirectional wireless radio communication subsystem, i.e., between a radiotelephone 403 and a base station 402.

LP voice encoders (such as 415 and 407) typically operating at 13 kbits/second and below such as Code-Excited Linear Prediction (CELP) encoders typically use a LP synthesis filter to model the short-term

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spectral envelope of the voice signal. The LP information is transmitted, typically, every 10 or 20 ms to the decoder (such 420 and 412) and is extracted at the decoder end.

The novel techniques disclosed in the present specification may apply to different LP-based coding systems. However, a CELP-type coding system is used in the preferred embodiment for the purpose of presenting a non-limitative illustration of these techniques. In the same manner, such techniques can be used with sound signals other than voice and speech as well with other types of wideband signals.

Figure 1 shows a general block diagram of a CELP-type speech encoding device 100 modified to better accommodate wideband signals.

The sampled input speech signal 114 is divided into successive L-sample blocks called "frames". In each frame, different parameters representing the speech signal in the frame are computed, encoded, and transmitted. LP parameters representing the LP synthesis filter are usually computed once every frame. The frame is further divided into smaller blocks of N samples (blocks of length N), in which excitation parameters (pitch and innovation) are determined. In the CELP literature, these blocks of length N are called "subframes" and the N-sample signals in the subframes are referred to as N-dimensional vectors. In this preferred embodiment, the length N corresponds to 5 ms while the length L corresponds to 20 ms, which means that a frame contains four subframes (N=80 at the sampling rate of 16 kHz and 64 after down-sampling to 12.8 kHz). Various N-dimensional vectors occur in the encoding procedure. A list of the vectors which appear in Figures 1 and 2 as well as a list of transmitted parameters are given herein below:

<u>List of the main N-dimensional vectors</u>

$\boldsymbol{s}$ Wideband signal input speech vector (after down-sampling, pre-processing, and preemphasis);

$\boldsymbol{s}_w$ Weighted speech vector;

$\boldsymbol{s}_0$ Zero-input response of weighted synthesis filter;

$\boldsymbol{s}_p$ Down-sampled pre-processed signal;

Oversampled synthesized speech signal;

$\boldsymbol{s}'$ Synthesis signal before deemphasis;

$\boldsymbol{s}_d$ Deemphasized synthesis signal;

$\boldsymbol{s}_h$ Synthesis signal after deemphasis and postprocessing;

$\boldsymbol{x}$ Target vector for pitch search;

$\boldsymbol{x}'$ Target vector for innovation search;

$\boldsymbol{h}$ Weighted synthesis filter impulse response;

$\boldsymbol{v}_T$ Adaptive (pitch) codebook vector at delay T;

$\boldsymbol{y}_T$ Filtered pitch codebook vector ($\mathbf{v}_T$ convolved with $\mathbf{h}$);

$\boldsymbol{c}_k$ Innovative codevector at index k (k-th entry from the innovation codebook);

$\boldsymbol{c}_f$ Enhanced scaled innovation codevector;

$\boldsymbol{u}$ Excitation signal (scaled innovation and pitch codevectors);

$\boldsymbol{u}'$ Enhanced excitation;

$\boldsymbol{z}$ Band-pass noise sequence;

$\boldsymbol{w}'$ White noise sequence; and

$\boldsymbol{w}$ Scaled noise sequence.

List of transmitted parameters

STP Short term prediction parameters (defining $A(z)$);
T Pitch lag (or pitch codebook index);
b Pitch gain (or pitch codebook gain);
j Index of the low-pass filter used on the pitch codevector;
k Codevector index (innovation codebook entry); and
g Innovation codebook gain.

In this preferred embodiment, the STP parameters are transmitted once per frame and the rest of the parameters are transmitted four times per frame (every subframe).

ENCODER SIDE

The sampled speech signal is encoded on a block by block basis by the encoding device 100 of Figure 1 which is broken down into eleven modules numbered from 101 to 111.

The input speech is processed into the above mentioned L-sample blocks called frames.

Referring to Figure 1, the sampled input speech signal 114 is down-sampled in a down-sampling module 101. For example, the signal is down-sampled from 16 kHz down to 12.8 kHz, using techniques well known to those of ordinary skill in the art. Down-sampling down to another frequency can of course be envisaged. Down-sampling increases the coding efficiency, since a smaller frequency bandwidth is encoded. This also reduces the algorithmic complexity since the number of samples in a frame is decreased. The use of down-sampling becomes significant when the bit rate is reduced below 16 kbit/s, although down-sampling is not essential above 16 kbit/s.

After down-sampling, the 320-sample frame of 20 ms is reduced to 256-sample frame (down-sampling ratio of 4/5).

The input frame is then supplied to the optional pre-processing block 102. Pre-processing block 102 may consist of a high-pass filter with a 50 Hz cut-off frequency. High-pass filter 102 removes the unwanted sound components below 50 Hz.

The down-sampled pre-processed signal is denoted by $s_p(n)$, n=0, 1, 2, ...,L-1, where L is the length of the frame (256 at a sampling frequency of 12.8 kHz). In a preferred embodiment of the preemphasis filter 103, the signal $s_p(n)$ is preemphasized using a filter having the following transfer function:

$$P(z) = 1 - \mu z^{-1}$$

where μ is a preemphasis factor with a value located between 0 and 1 (a typical value is μ = 0.7). A higher-order filter could also be used. It should be pointed out that high-pass filter 102 and preemphasis filter 103 can be interchanged to obtain more efficient fixed-point implementations.

The function of the preemphasis filter 103 is to enhance the high frequency contents of the input signal. It also reduces the dynamic range of the input speech signal, which renders it more suitable for fixed-point implementation. Without preemphasis, LP analysis in fixed-point using single-precision arithmetic is difficult to implement.

Preemphasis also plays an important role in achieving a proper overall perceptual weighting of the quantization error, which contributes to improved sound quality. This will be explained in more detail herein below.

The output of the preemphasis filter 103 is denoted $s(n)$. This signal is used for performing LP analysis in calculator module 104. LP analysis is a technique well known to those of ordinary skill in the art. In this preferred embodiment, the autocorrelation approach is used. In the autocorrelation approach, the signal $s(n)$ is first windowed using a Hamming window (having usually a length of the order of 30-40 ms). The autocorrelations are computed from the windowed signal, and Levinson-Durbin recursion is used to compute LP filter coefficients, a_i, where i=1,...,p, and where p is the LP order, which is typically 16 in wideband coding. The parameters a_i are the coefficients of the transfer function of the LP filter, which is given by the following relation:

$$A(z) = 1 + \sum_{i=1}^{p} a_i z^{-i}$$

LP analysis is performed in calculator module 104, which also performs the quantization and interpolation of the LP filter coefficients. The LP filter coefficients are first transformed into another equivalent domain more suitable for quantization and interpolation purposes. The line spectral pair (LSP) and immitance spectral pair (ISP) domains are two domains in which quantization and interpolation can be efficiently performed. The 16 LP filter coefficients, a_i, can be quantized in the order of 30 to 50 bits using split or multi-stage quantization, or a combination thereof. The purpose of the interpolation is to enable updating the LP filter coefficients every subframe while transmitting them once every frame, which improves the encoder performance without increasing the bit rate. Quantization and interpolation of the LP filter coefficients is believed to be otherwise well known to those of ordinary skill in the art and, accordingly, will not be further described in the present specification.

The following paragraphs will describe the rest of the coding operations performed on a subframe basis. In the following description, the filter $A(z)$ denotes the unquantized interpolated LP filter of the subframe, and the filter $\hat{A}(z)$ denotes the quantized interpolated LP filter of the subframe.

Perceptual Weighting:

In analysis-by-synthesis encoders, the optimum pitch and innovation parameters are searched by minimizing the mean squared error between the input speech and synthesized speech in a perceptually weighted domain. This is equivalent to minimizing the error between the weighted input speech and weighted synthesis speech.

The weighted signal $s_w(n)$ is computed in a perceptual weighting filter 105. Traditionally, the weighted signal $s_w(n)$ is computed by a weighting filter having a transfer function $W(z)$ in the form:

$$W(z)=A(z/\gamma_1)\ /\ A(z/\gamma_2) \quad \text{where} \quad 0<\gamma_2<\gamma_1\leq 1$$

As well known to those of ordinary skill in the art, in prior art analysis-by-synthesis (AbS) encoders, analysis shows that the quantization error is weighted by a transfer function $W^{-1}(z)$, which is the inverse of the transfer function of the perceptual weighting filter 105. This result is well described by B.S. Atal and M.R. Schroeder in "Predictive coding of speech and subjective error criteria", IEEE Transaction ASSP, vol. 27, no. 3, pp. 247-254, June 1979. Transfer function $W^{-1}(z)$ exhibits some of the formant structure of the input speech signal. Thus, the masking property of the human ear is exploited by shaping the quantization error so that it has more energy in the formant regions where it will be masked by the strong signal energy present in these regions. The amount of weighting is controlled by the factors γ_1 and γ_2.

The above traditional perceptual weighting filter 105 works well with telephone band signals. However, it was found that this traditional perceptual weighting filter 105 is not suitable for efficient perceptual weighting of wideband signals. It was also found that the traditional perceptual weighting filter 105 has inherent limitations in modelling the formant structure and the required spectral tilt concurrently. The spectral tilt is more pronounced in wideband signals due to the wide dynamic range between low and high frequencies. The prior art has suggested to add a tilt filter into $W(z)$ in order to control the tilt and formant weighting of the wideband input signal separately.

A novel solution to this problem is, in accordance with the present invention, to introduce the preemphasis filter 103 at the input, compute the LP filter $A(z)$ based on the preemphasized speech $s(n)$, and use a modified filter $W(z)$ by fixing its denominator.

LP analysis is performed in module 104 on the preemphasized signal $s(n)$ to obtain the LP filter $A(z)$. Also, a new perceptual weighting filter 105 with fixed denominator is used. An example of transfer function for the perceptual weighting filter 104 is given by the following relation:

$$W(z) = A\ (z/\gamma_1)\ /\ (1-\gamma_2 z^{-1}) \qquad \text{where} \qquad 0<\gamma_2<\gamma_1\leq 1$$

A higher order can be used at the denominator. This structure substantially decouples the formant weighting from the tilt.

Note that because $A(z)$ is computed based on the preemphasized speech signal $s(n)$, the tilt of the filter $1/A(z/\gamma_1)$ is less pronounced compared to the case when $A(z)$ is computed based on the original speech. Since deemphasis is performed at the decoder end using a filter having the transfer function:

$$P^{-1}(z)=1/(1-\mu z^{-1}),$$

the quantization error spectrum is shaped by a filter having a transfer function $W^{-1}(z)P^{-1}(z)$. When γ_2 is set equal to μ, which is typically the case, the spectrum of the quantization error is shaped by a filter whose transfer function is $1/A(z/\gamma_1)$, with $A(z)$ computed based on the preemphasized speech signal. Subjective listening showed that this structure for achieving the error shaping by a combination of preemphasis and modified weighting filtering is very efficient for encoding wideband signals, in addition to the advantages of ease of fixed-point algorithmic implementation.

Pitch Analysis:

In order to simplify the pitch analysis, an open-loop pitch lag T_{OL} is first estimated in the open-loop pitch search module 106 using the weighted speech signal $s_w(n)$. Then the closed-loop pitch analysis, which is performed in closed-loop pitch search module 107 on a subframe basis, is restricted around the open-loop pitch lag T_{OL} which significantly reduces the search complexity of the LTP parameters T and b (pitch lag and pitch gain). Open-loop pitch analysis is usually performed in module 106 once every 10 ms (two subframes) using techniques well known to those of ordinary skill in the art.

The target vector x for LTP (Long Term Prediction) analysis is first computed. This is usually done by subtracting the zero-input response s_0 of weighted synthesis filter $W(z)/\hat{A}(z)$ from the weighted speech signal $s_w(n)$. This zero-input response s_0 is calculated by a zero-input response calculator 108. More specifically, the target vector x is calculated using the following relation:

$$x = s_w - s_0$$

where x is the N-dimensional target vector, s_w is the weighted speech vector in the subframe, and s_0 is the zero-input response of filter $W(z)/\hat{A}(z)$ which is the output of the combined filter $W(z)/\hat{A}(z)$ due to its initial states. The zero-input response calculator 108 is responsive to the quantized interpolated LP filter $\hat{A}(z)$ from the LP analysis, quantization and interpolation calculator 104 and to the initial states of the weighted synthesis filter $W(z)/\hat{A}(z)$ stored in memory module 111 to calculate the zero-input response s_0 (that part of the response due to the initial states as determined by setting the inputs equal to zero) of filter $W(z)/\hat{A}(z)$. This operation is well known to those of ordinary skill in the art and, accordingly, will not be further described.

Of course, alternative but mathematically equivalent approaches can be used to compute the target vector x.

A N-dimensional impulse response vector $\boldsymbol{h}$ of the weighted synthesis filter $W(z)/\hat{A}(z)$ is computed in the impulse response generator 109 using the LP filter coefficients $A(z)$ and $\hat{A}(z)$ from module 104. Again, this operation is well known to those of ordinary skill in the art and, accordingly, will not be further described in the present specification.

The closed-loop pitch (or pitch codebook) parameters b, T and j are computed in the closed-loop pitch search module 107, which uses the target vector $\boldsymbol{x}$, the impulse response vector $\boldsymbol{h}$ and the open-loop pitch lag T_{OL} as inputs. Traditionally, the pitch prediction has been represented by a pitch filter having the following transfer function:

$$1 / (1-bz^{-T})$$

where b is the pitch gain and T is the pitch delay or lag. In this case, the pitch contribution to the excitation signal $u(n)$ is given by $bu(n-T)$, where the total excitation is given by

$$u(n) = bu(n-T)+gc_k(n)$$

with g being the innovative codebook gain and $c_k(n)$ the innovative codevector at index k.

This representation has limitations if the pitch lag T is shorter than the subframe length N. In another representation, the pitch contribution can be seen as an pitch codebook containing the past excitation signal. Generally, each vector in the pitch codebook is a shift-by-one version of the previous vector (discarding one sample and adding a new sample). For pitch lags $T>N$, the pitch codebook is equivalent to the filter structure $(1/(1-bz^{-T})$, and an pitch codebook vector $v_T(n)$ at pitch lag T is given by

$$v_T(n) = u(n-T) \quad , \qquad n=0,\ldots,N-1.$$

For pitch lags T shorter than N, a vector $v_T(n)$ is built by repeating the available samples from the past excitation until the vector is completed (this is not equivalent to the filter structure).

In recent encoders, a higher pitch resolution is used which significantly improves the quality of voiced sound segments. This is achieved by oversampling the past excitation signal using polyphase interpolation filters. In this case, the vector $v_T(n)$ usually corresponds to an interpolated version of the past excitation, with pitch lag T being a non-integer delay (e.g. 50.25).

The pitch search consists of finding the best pitch lag T and gain b that minimize the mean squared weighted error E between the target vector x and the scaled filtered past excitation. Error E being expressed as:

$$E = \|x - b y_T\|^2$$

where y_T is the filtered pitch codebook vector at pitch lag T:

$$y_T(n) = v_T(n) * h(n) = \sum_{i=0}^{n} v_T(i) h(n-i), \qquad n=0,\ldots,N-1.$$

It can be shown that the error E is minimized by maximizing the search criterion

$$C = \frac{x^t y_T}{\sqrt{y^t{}_T\, y_T}}$$

where t denotes vector transpose.

In the preferred embodiment of the present invention, a 1/3 subsample pitch resolution is used, and the pitch (pitch codebook) search is composed of three stages.

In the first stage, an open-loop pitch lag T_{OL} is estimated in open-loop pitch search module 106 in response to the weighted speech signal $s_w(n)$.

As indicated in the foregoing description, this open-loop pitch analysis is usually performed once every 10 ms (two subframes) using techniques well known to those of ordinary skill in the art.

In the second stage, the search criterion C is searched in the closed-loop pitch search module 107 for integer pitch lags around the estimated open-loop pitch lag T_{OL} (usually ±5), which significantly simplifies the search procedure. A simple procedure is used for updating the filtered codevector y_T without the need to compute the convolution for every pitch lag.

Once an optimum integer pitch lag is found in the second stage, a third stage of the search (module 107) tests the fractions around that optimum integer pitch lag.

When the pitch predictor is represented by a filter of the form $1/(1-bz^{-T})$, which is a valid assumption for pitch lags $T>N$, the spectrum of the pitch filter exhibits a harmonic structure over the entire frequency range, with a harmonic frequency related to $1/T$. In case of wideband signals, this structure is not very efficient since the harmonic structure in wideband signals does not cover the entire extended spectrum. The harmonic structure exists only up to a certain frequency, depending on the speech segment. Thus, in order to achieve efficient representation of the pitch contribution in voiced segments of wideband speech, the pitch prediction filter needs to have the flexibility of varying the amount of periodicity over the wideband spectrum.

A new method which achieves efficient modeling of the harmonic structure of the speech spectrum of wideband signals is disclosed in the present specification, whereby several forms of low pass filters are applied to the past excitation and the low pass filter with higher prediction gain is selected.

When subsample pitch resolution is used, the low pass filters can be incorporated into the interpolation filters used to obtain the higher pitch resolution. In this case, the third stage of the pitch search, in which the fractions around the chosen integer pitch lag are tested, is repeated for the several interpolation filters having different low-pass characteristics and the fraction and filter index which maximize the search criterion C are selected.

A simpler approach is to complete the search in the three stages described above to determine the optimum fractional pitch lag using only one interpolation filter with a certain frequency response, and select the optimum low-pass filter shape at the end by applying the different predetermined low-pass filters to the chosen pitch codebook vector v_T and select the low-pass filter which minimizes the pitch prediction error. This approach is discussed in detail below.

Figure 3 illustrates a schematic block diagram of a preferred embodiment of the proposed approach.

In memory module 303, the past excitation signal $u(n)$, $n<0$, is stored. The pitch codebook search module 301 is responsive to the target vector x, to the open-loop pitch lag T_{OL} and to the past excitation signal $u(n)$, $n<0$, from memory module 303 to conduct a pitch codebook (pitch codebook) search minimizing the above-defined search criterion C. From the result of the search conducted in module 301, module 302 generates the optimum pitch codebook vector v_T. Note that since a sub-sample pitch resolution is used (fractional pitch), the past excitation signal $u(n)$, $n<0$, is interpolated and the pitch codebook vector v_T corresponds to the interpolated past excitation signal. In this preferred embodiment, the interpolation filter (in module 301, but not shown) has a low-pass filter characteristic removing the frequency contents above 7000 Hz.

In a preferred embodiment, K filter characteristics are used; these filter characteristics could be low-pass or band-pass filter characteristics. Once the optimum codevector v_T is determined and supplied by the pitch codevector generator 302, K filtered versions of v_T are computed respectively using K different frequency shaping filters such as $305^{(j)}$, where $j=1, 2, \ldots, K$. These filtered versions are denoted $v_f^{(j)}$, where $j=1, 2, \ldots, K$. The different vectors $v_f^{(j)}$ are convolved in respective modules $304^{(j)}$, where $j=0, 1, 2, \ldots, K$, with the impulse response **h** to obtain the vectors $y^{(j)}$, where $j=0, 1, 2, \ldots, K$. To calculate the mean squared pitch prediction error for each vector $y^{(j)}$, the value $y^{(j)}$ is multiplied by the gain b by means of a corresponding amplifier $307^{(j)}$ and the value $by^{(j)}$ is subtracted from the target vector x by means of a corresponding subtractor $308^{(j)}$. Selector 309 selects the frequency shaping filter $305^{(j)}$ which minimizes the mean squared pitch prediction error

$$e^{(j)} = \|x - b^{(j)} y^{(j)}\|^2 \quad , \qquad j=1, 2, \ldots, K$$

To calculate the mean squared pitch prediction error $e^{(j)}$ for each value of $y^{(j)}$, the value $y^{(j)}$ is multiplied by the gain b by means of a corresponding amplifier $307^{(j)}$ and the value $b^{(j)}y^{(j)}$ is subtracted from the target vector x by means of subtractors $308^{(j)}$. Each gain $b^{(j)}$ is calculated in a corresponging gain calculator $306^{(j)}$ in association with the frequency shaping filter at index j, using the following relationship:

$$b^{(j)}=x^{t}y^{(j)}/\|y^{(j)}\|^2 \quad .$$

In selector 309, the parameters b, T, and j are chosen based on v_T or $v_f^{(j)}$ which minimizes the mean squared pitch prediction error e.

Referring back to Figure 1, the pitch codebook index T is encoded and transmitted to multiplexer 112. The pitch gain b is quantized and transmitted to multiplexer 112. With this new approach, extra information is needed to encode the index j of the selected frequency shaping filter in multiplexer 112. For example, if three filters are used (j=0, 1, 2, 3), then two bits are needed to represent this information. The filter index information j can also be encoded jointly with the pitch gain b.

Innovative codebook search:

Once the pitch, or LTP (Long Term Prediction) parameters b, T, and j are determined, the next step is to search for the optimum innovative excitation by means of search module 110 of Figure 1. First, the target vector x is updated by subtracting the LTP contribution:

$$x' = x - by_T$$

where b is the pitch gain and y_T is the filtered pitch codebook vector (the past excitation at delay T filtered with the selected low pass filter and convolved with the inpulse response **h** as described with reference to Figure 3).

The search procedure in CELP is performed by finding the optimum excitation codevector $\mathbf{c}_k$ and gain g which minimize the mean-squared error between the target vector and the scaled filtered codevector

$$E = \| x' - gHc_k \|^2$$

where H is a lower triangular convolution matrix derived from the impulse response vector h.

In the preferred embodiment of the present invention, the innovative codebook search is performed in module 110 by means of an algebraic codebook as described in US patents Nos: 5,444,816 (Adoul et al.) issued on August 22, 1995; 5,699,482 granted to Adoul et al., on December 17, 1997; 5,754,976 granted to Adoul et al., on May 19, 1998; and 5,701,392 (Adoul et al.) dated December 23, 1997.

Once the optimum excitation codevector $\mathbf{c}_k$ and its gain g are chosen by module 110, the codebook index k and gain g are encoded and transmitted to multiplexer 112.

Referring to Figure 1, the parameters b, T, j, $\hat{A}(z)$, k and g are multiplexed through the multiplexer 112 before being transmitted through a communication channel.

Memory update:

In memory module 111 (Figure 1), the states of the weighted synthesis filter $W(z)/\hat{A}(z)$ are updated by filtering the excitation signal $\mathbf{u} = g\mathbf{c}_k + b\mathbf{v}_T$ through the weighted synthesis filter. After this filtering, the states of the filter are memorized and used in the next subframe as initial states for computing the zero-input response in calculator module 108.

As in the case of the target vector $\mathbf{x}$, other alternative but mathematically equivalent approaches well known to those of ordinary skill in the art can be used to update the filter states.

<u>DECODER SIDE</u>

The speech decoding device 200 of Figure 2 illustrates the various steps carried out between the digital input 222 (input stream to the demultiplexer 217) and the output sampled speech 223 (output of the adder 221).

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Demultiplexer 217 extracts the synthesis model parameters from the binary information received from a digital input channel. From each received binary frame, the extracted parameters are:

- the short-term prediction parameters (STP) $\hat{A}(z)$ (once per frame);

- the long-term prediction (LTP) parameters T, b, and j (for each subframe); and

- the innovation codebook index k and gain g (for each subframe).

The current speech signal is synthesized based on these parameters as will be explained hereinbelow.

The innovative codebook 218 is responsive to the index k to produce the innovation codevector $\mathbf{c}_k$, which is scaled by the decoded gain factor g through an amplifier 224. In the preferred embodiment, an innovative codebook 218 as described in the above mentioned US patent numbers 5,444,816; 5,699,482; 5,754,976; and 5,701,392 is used to represent the innovative codevector $\mathbf{c}_k$.

The generated scaled codevector $g\mathbf{c}_k$ at the output of the amplifier 224 is processed through a innovation filter 205.

Periodicity enhancement:

The generated scaled codevector at the output of the amplifier 224 is processed through a frequency-dependent pitch enhancer 205.

Enhancing the periodicity of the excitation signal ***u*** improves the quality in case of voiced segments. This was done in the past by filtering the innovation vector from the innovative codebook (fixed codebook) 218 through a filter in the form $1/(1-\varepsilon bz^{-T})$ where ε is a factor below 0.5 which controls the amount of introduced periodicity. This approach is less efficient in case of wideband signals since it introduces periodicity over the entire spectrum. A new alternative approach, which is part of the present invention, is disclosed whereby periodicity enhancement is achieved by filtering the innovative codevector $\boldsymbol{c}_k$ from the innovative (fixed) codebook through an innovation filter 205 ($F(z)$) whose frequency response emphasizes the higher frequencies more than lower frequencies. The coefficients of $F(z)$ are related to the amount of periodicity in the excitation signal ***u***.

Many methods known to those skilled in the art are available for obtaining valid periodicity coefficients. For example, the value of gain ***b*** provides an indication of periodicity. That is, if gain ***b*** is close to 1, the periodicity of the excitation signal ***u*** is high, and if gain ***b*** is less than 0.5, then periodicity is low.

Another efficient way to derive the filter $F(z)$ coefficients used in a preferred embodiment, is to relate them to the amount of pitch contribution in the total excitation signal ***u***. This results in a frequency response depending on the subframe periodicity, where higher frequencies are more strongly emphasized (stronger overall slope) for higher pitch gains. Innovation filter 205 has the effect of lowering the energy of the innovative codevector $\boldsymbol{c}_k$ at low frequencies when the excitation signal ***u*** is more periodic, which enhances the periodicity of the excitation signal u at lower frequencies more than higher frequencies. Suggested forms for innovation filter 205 are

(1) $F(z) = 1 - \sigma z^{-1}$, or (2) $F(z) = -\alpha z + 1 - \alpha z^{-1}$

where σ or α are periodicity factors derived from the level of periodicity of the excitation signal u.

The second three-term form of $F(z)$ is used in a preferred embodiment. The periodicity factor α is computed in the voicing factor generator 204. Several methods can be used to derive the periodicity factor α based on the periodicity of the excitation signal u. Two methods are presented below.

Method 1:

The ratio of pitch contribution to the total excitation signal u is first computed in voicing factor generator 204 by

$$R_p = \frac{b^2 v_T^t v_T}{u^t u} = \frac{b^2 \sum_{n=0}^{N-1} v_T^2(n)}{\sum_{n=0}^{N-1} u^2(n)}$$

where v_T is the pitch codebook vector, b is the pitch gain, and u is the excitation signal u given at the output of the adder 219 by

$$u = gc_k + bv_T$$

Note that the term bv_T has its source in the pitch codebook (pitch codebook) 201 in response to the pitch lag T and the past value of u stored in memory 203. The pitch codevector v_T from the pitch codebook 201 is then processed through a low-pass filter 202 whose cut-off frequency is adjusted by means of the index j from the demultiplexer 217. The resulting codevector v_T is then multiplied by the gain b from the demultiplexer 217 through an amplifier 226 to obtain the signal bv_T.

The factor α is calculated in voicing factor generator 204 by

$$\alpha = qR_p \qquad \text{bounded by} \quad \alpha < q$$

where q is a factor which controls the amount of enhancement (q is set to 0.25 in this preferred embodiment).

Method 2:

Another method used in a preferred embodiment of the invention for calculating periodicity factor α is discussed below.

First, a voicing factor r_v is computed in voicing factor generator 204 by

$$r_v = (E_v - E_c) / (E_v + E_c)$$

where E_v is the energy of the scaled pitch codevector bv_T and E_c is the energy of the scaled innovative codevector gc_k. That is

$$E_v = b^2 \, v_T{}^t \, v_T = b^2 \sum_{n=0}^{N-1} v_T{}^2 \, (n)$$

and

$$E_c = g^2 \, c_k{}^t \, c_k = g^2 \sum_{n=0}^{N-1} c_k^2 \, (n) \quad .$$

Note that the value of r_v lies between -1 and 1 (1 corresponds to purely voiced signals and -1 corresponds to purely unvoiced signals).

In this preferred embodiment, the factor α is then computed in voicing factor generator 204 by

$$\alpha = 0.125 \, (1 + r_v)$$

which corresponds to a value of 0 for purely unvoiced signals and 0.25 for purely voiced signals.

In the first, two-term form of $F(z)$, the periodicity factor σ can be approximated by using $\sigma = 2\alpha$ in methods 1 and 2 above. In such a case, the periodicity factor σ is calculated as follows in method 1 above:

$\sigma = 2qR_p$ bounded by $\sigma < 2q$.

In method 2, the periodicity factor σ is calculated as follows:

$\sigma = 0.25\,(1 + r_v)$.

The enhanced signal c_f is therefore computed by filtering the scaled innovative codevector gc_k through the innovation filter 205 ($F(z)$).

The enhanced excitation signal u' is computed by the adder 220 as:

$$u' = c_f + bv_T$$

Note that this process is not performed at the encoder 100. Thus, it is essential to update the content of the pitch codebook 201 using the excitation signal u without enhancement to keep synchronism between the encoder 100 and decoder 200. Therefore, the excitation signal u is used to update the memory 203 of the pitch codebook 201 and the enhanced excitation signal u' is used at the input of the LP synthesis filter 206.

Synthesis and deemphasis

The synthesized signal s' is computed by filtering the enhanced excitation signal u' through the LP synthesis filter 206 which has the form $1/\hat{A}(z)$, where $\hat{A}(z)$ is the interpolated LP filter in the current subframe. As can be seen in Figure 2, the quantized LP coefficients $\hat{A}(z)$ on line 225 from demultiplexer 217 are supplied to the LP synthesis filter 206 to adjust the parameters of the LP synthesis filter 206 accordingly. The deemphasis filter 207 is the inverse of the preemphasis filter 103 of Figure 1. The transfer function of the deemphasis filter 207 is given by

$$D(z) = 1 / (1 - \mu z^{-1})$$

where μ is a preemphasis factor with a value located between 0 and 1 (a typical value is $\mu = 0.7$). A higher-order filter could also be used.

The vector s' is filtered through the deemphasis filter $D(z)$ (module 207) to obtain the vector s_d, which is passed through the high-pass filter 208 to remove the unwanted frequencies below 50 Hz and further obtain s_h.

Oversampling and high-frequency regeneration

The over-sampling module 209 conducts the inverse process of the down-sampling module 101 of Figure 1. In this preferred embodiment, oversampling converts from the 12.8 kHz sampling rate to the original 16 kHz sampling rate, using techniques well known to those of ordinary skill in the art. The oversampled synthesis signal is denoted $\hat{s}$. Signal $\hat{s}$ is also referred to as the synthesized wideband intermediate signal.

The oversampled synthesis $\hat{s}$ signal does not contain the higher frequency components which were lost by the downsampling process (module 101 of Figure 1) at the encoder 100. This gives a low-pass perception to the synthesized speech signal. To restore the full band of the original signal, a high frequency generation procedure is disclosed. This procedure is performed in modules 210 to 216, and adder 221, and requires input from voicing factor generator 204 (Figure 2).

In this new approach, the high frequency contents are generated by filling the upper part of the spectrum with a white noise properly scaled in the excitation domain, then converted to the speech domain, preferably by shaping it with the same LP synthesis filter used for synthesizing the down-sampled signal $\hat{s}$.

The high frequency generation procedure in accordance with the present invention is described hereinbelow.

The random noise generator 213 generates a white noise sequence w' with a flat spectrum over the entire frequency bandwidth, using techniques well known to those of ordinary skill in the art. The generated sequence is of length N' which is the subframe length in the original domain. Note that N is the subframe length in the down-sampled domain. In this preferred embodiment, N=64 and N'=80 which correspond to 5 ms.

The white noise sequence is properly scaled in the gain adjusting module 214. Gain adjustment comprises the following steps. First, the energy of the generated noise sequence *w'* is set equal to the energy of the enhanced excitation signal *u'* computed by an energy computing module 210, and the resulting scaled noise sequence is given by

$$w(n) = w'(n)\sqrt{\frac{\sum_{n=0}^{N-1} u'^2(n)}{\sum_{n=0}^{N'-1} w'^2(n)}}\quad , \qquad n=0,\ldots,N'-1.$$

The second step in the gain scaling is to take into account the high frequency contents of the synthesized signal at the output of the voicing factor generator 204 so as to reduce the energy of the generated noise in case of voiced segments (where less energy is present at high frequencies compared to unvoiced segments). In this preferred embodiment, measuring the high frequency contents is implemented by measuring the tilt of the synthesis signal through a spectral tilt calculator 212 and reducing the energy accordingly. Other measurements such as zero crossing measurements can equally be used. When the tilt is very strong, which corresponds to voiced segments, the noise energy is further reduced. The tilt factor is computed in module 212 as the first correlation coefficient of the synthesis signal s_h and it is given by:

$$tilt = \frac{\sum_{n=1}^{N-1} s_h(n)\ s_h(n-1)}{\sum_{n=0}^{N-1} s_h^2(n)}$$, conditioned by $tilt \geq 0$ and $tilt \geq r_v$

where voicing factor r_v is given by

$$r_v = (E_v - E_c) / (E_v + E_c)$$

where E_v is the energy of the scaled pitch codevector bv_T and E_c is the energy of the scaled innovative codevector gc_k, as described earlier. Voicing factor r_v is most often less than *tilt* but this condition was introduced as a precaution against high frequency tones where the tilt value is negative and the value of r_v is high. Therefore, this condition reduces the noise energy for such tonal signals.

The tilt value is 0 in case of flat spectrum and 1 in case of strongly voiced signals, and it is negative in case of unvoiced signals where more energy is present at high frequencies.

Different methods can be used to derive the scaling factor g_t from the amount of high frequency contents. In this invention, two methods are given based on the tilt of signal described above.

Method 1:

The scaling factor g_t is derived from the tilt by

$g_t = 1 - tilt$ bounded by $0.2 \leq g_t \leq 1.0$

For strongly voiced signal where the tilt approaches 1, g_t is 0.2 and for strongly unvoiced signals g_t becomes 1.0.

Method 2:

The tilt factor g_t is first restricted to be larger or equal to zero, then the scaling factor is derived from the tilt by

$g_t = 10^{-0.6 tilt}$

The scaled noise sequence w_g produced in gain adjusting module 214 is therefore given by:

$w_g = g_t w.$

When the tilt is close to zero, the scaling factor g_t is close to 1, which does not result in energy reduction. When the tilt value is 1, the scaling factor g_t results in a reduction of 12 dB in the energy of the generated noise.

Once the noise is properly scaled (w_g), it is brought into the speech domain using the spectral shaper 215. In the preferred embodiment, this is achieved by filtering the noise w_g through a bandwidth expanded version of the same LP synthesis filter used in the down-sampled domain ($1/\hat{A}(z/0.8)$). The corresponding bandwidth expanded LP filter coefficients are calculated in spectral shaper 215.

The filtered scaled noise sequence w_f is then band-pass filtered to the required frequency range to be restored using the band-pass filter 216. In the preferred embodiment, the band-pass filter 216 restricts the noise sequence to the frequency range 5.6-7.2 kHz. The resulting band-pass filtered noise sequence z is added in adder 221 to the oversampled synthesized speech signal $\hat{s}$ to obtain the final reconstructed sound signal s_{out} on the output 223.

Although the present invention has been described hereinabove by way of a preferred embodiment thereof, this embodiment can be modified at will, within the scope of the appended claims, without departing from the spirit and nature of the subject invention. Even though the preferred embodiment discusses the use of wideband speech signals, it will be obvious to those skilled in the art that the subject invention is also directed to other embodiments using wideband signals in general and that it is not necessarily limited to speech applications.

WHAT IS CLAIMED IS:

1. A perceptual weighting device for producing a perceptually weighted signal in response to a wideband signal in order to reduce a difference between a weighted wideband signal and a subsequently synthesized weighted wideband signal, said perceptual weighting device comprising:

a) a signal preemphasis filter responsive to the wideband signal for enhancing a high frequency content of the wideband signal to thereby produce a preemphasised signal;

b) a synthesis filter calculator responsive to said preemphasised signal for producing synthesis filter coefficients; and

c) a perceptual weighting filter, responsive to said preemphasised signal and said synthesis filter coefficients, for filtering said preemphasised signal in relation to said synthesis filter coefficients to thereby produce said perceptually weighted signal, said perceptual weighting filter having a transfer function with fixed denominator whereby weighting of said wideband signal in a formant region is substantially decoupled from a spectral tilt of said wideband signal.

2. A perceptual weighting device as defined in claim 1, wherein said signal preemphasis filter has a transfer function of the form:

$$P(z) = 1 - \mu z^{-1}$$

wherein μ is a preemphasis factor having a value located between 0 and 1.

3. A perceptual weighting device as defined in claim 2, wherein said preemphasis factor μ is 0.7.

4. A perceptual weighting device as defined in claim 2, wherein said perceptual weighting filter has a transfer function of the form:

$$W(z) = A\ (z/\gamma_1)\ /\ (1-\gamma_2 z^{-1})$$

where $0<\gamma_2<\gamma_1\leq 1$ and γ_2 and γ_1 are weighting control values.

5. A perceptual weighting device as defined in claim 4, wherein γ_2 is set equal to μ.

6. A perceptual weighting device as defined in claim 1, wherein said perceptual weighting filter has a transfer function of the form:

$$W(z) = A\ (z/\gamma_1)\ /\ (1-\gamma_2 z^{-1})$$

where $0<\gamma_2<\gamma_1\leq 1$ and γ_2 and γ_1 are weighting control values.

7. A perceptual weighting device as defined in claim 6, wherein γ_2 is set equal to μ.

8. A method for producing a perceptually weighted signal in response to a wideband signal in order to reduce a difference between a weighted wideband signal and a subsequently synthesized weighted wideband signal, said method comprising:

a) filtering the wideband signal to produce a preemphasised signal with enhanced high frequency content;

b) calculating, from said preemphasised signal, synthesis filter coefficients; and

c) filtering said preemphasised signal in relation to said synthesis filter coefficients to thereby produce a perceptually weighted speech signal, wherein said filtering comprises processing the preemphasis signal through a perceptual weighting filter having a transfer function with fixed denominator whereby weighting of said wideband signal in a formant region is substantially decoupled from a spectral tilt of said wideband signal.

9. A method for producing a perceptually weighted signal as defined in claim 8, wherein filtering the wideband signal comprises filtering through a transfer function of the form:

$$P(z) = 1 - \mu z^{-1}$$

wherein μ is a preemphasis factor having a value located between 0 and 1.

10. A method for producing a perceptually weighted signal as defined in claim 9, wherein said preemphasis factor μ is 0.7.

11. A method for producing a perceptually weighted signal as defined in claim 9, wherein said perceptual weighting filter has a transfer function of the form:

$$W(z) = A(z/\gamma_1) / (1 - \gamma_2 z^{-1})$$

where $0 < \gamma_2 < \gamma_1 \leq 1$ and γ_2 and γ_1 are weighting control values.

12. A method for producing a perceptually weighted signal as defined in claim 11, wherein γ_2 is set equal to μ.

13. A method for producing a perceptually weighted signal as defined in claim 8, wherein said perceptual weighting filter has a transfer function of the form:

$$W(z) = A(z/\gamma_1) / (1 - \gamma_2 z^{-1})$$

where $0 < \gamma_2 < \gamma_1 \leq 1$ and γ_2 and γ_1 are weighting control values.

14. A method for producing a perceptually weighted signal as defined in claim 13, wherein γ_2 is set equal to μ.

15. An encoder for encoding a wideband signal, comprising:

a) a perceptual weighting device as recited in claim 1;

b) an pitch codebook search device responsive to said perceptually weighted signal for producing pitch codebook parameters and an innovative search target vector;

c) an innovative codebook search device, responsive to said synthesis filter coefficients and to said innovative search target vector, for producing innovative codebook parameters; and

d) a signal forming device for producing an encoded wideband signal comprising said pitch codebook parameters, said innovative codebook parameters, and said synthesis filter coefficients.

16. An encoder as defined in claim 15, wherein said signal preemphasis filter has a transfer function of the form:

$$P(z) = 1 - \mu z^{-1}$$

wherein μ is a preemphasis factor having a value located between 0 and 1.

17. An encoder as defined in claim 16, wherein said preemphasis factor μ is 0.7.

18. An encoder as defined in claim 16, wherein said perceptual weighting filter has a transfer function of the form:

$$W(z) = A\ (z/\gamma_1)\ /\ (1-\gamma_2 z^{-1})$$

where $0 < \gamma_2 < \gamma_1 \leq 1$ and γ_2 and γ_1 are weighting control values.

19. An encoder as defined in claim 18, wherein γ_2 is set equal to μ.

20. An encoder as defined in claim 15, wherein said perceptual weighting filter has a transfer function of the form:

$$W(z) = A(z/\gamma_1) / (1-\gamma_2 z^{-1})$$

where $0 < \gamma_2 < \gamma_1 \leq 1$ and γ_2 and γ_1 are weighting control values.

21. An encoder as defined in claim 20, wherein μ is set equal to γ_2.

22. A cellular communication system for servicing a large geographical area divided into a plurality of cells, comprising:

a) mobile transmitter/receiver units;

b) cellular base stations respectively situated in said cells;

c) a control terminal for controlling communication between the cellular base stations;

d) a bidirectional wireless communication sub-system between each mobile unit situated in one cell and the cellular base station of said one cell, said bidirectional wireless communication sub-system comprising, in both the mobile unit and the cellular base station:

i) a transmitter including an encoder for encoding a wideband signal as recited in claim 15 and a transmission circuit for transmitting the encoded wideband signal; and

ii) a receiver including a receiving circuit for receiving a transmitted encoded wideband signal and a decoder for decoding the received encoded wideband signal.

23. A cellular communication system as defined in claim 22, wherein said signal preemphasis filter has a transfer function of the form:

$$P(z) = 1 - \mu z^{-1}$$

wherein μ is a preemphasis factor having a value located between 0 and 1.

24. A cellular communication system as defined in claim 23, wherein said preemphasis factor μ is 0.7.

25. A cellular communication system as defined in claim 23, wherein said perceptual weighting filter has a transfer function of the form:

$$W(z) = A(z/\gamma_1) / (1 - \gamma_2 z^{-1})$$

where $0 < \gamma_2 < \gamma_1 \leq 1$ and γ_2 and γ_1 are weighting control values.

26. A cellular communication system as defined in claim 25, wherein μ is set equal to γ_2.

27. A cellular communication system as defined in claim 22, wherein said perceptual weighting filter has a transfer function of the form:

$$W(z) = A\ (z/\gamma_1)\ /\ (1-\gamma_2 z^{-1})$$

where $0< \gamma_2 < \gamma_1 \leq 1$ and γ_2 and γ_1 are weighting control values.

28. A cellular communication system as defined in claim 27, wherein γ_2 is set equal to μ.

29. A cellular mobile transmitter/receiver unit comprising:

a) a transmitter including an encoder for encoding a wideband signal as recited in claim 15 and a transmission circuit for transmitting the encoded wideband signal; and

b) a receiver including a receiving circuit for receiving a transmitted encoded wideband signal and a decoder for decoding the received encoded wideband signal.

30. A cellular mobile transmitter/receiver unit as defined in claim 29, wherein said signal preemphasis filter has a transfer function of the form:

$$P(z) = 1 - \mu z^{-1}$$

wherein μ is a preemphasis factor having a value located between 0 and 1.

31. A cellular mobile transmitter/receiver unit as defined in claim 30, wherein said preemphasis factor μ is 0.7.

32. A cellular mobile transmitter/receiver unit as defined in claim 30, wherein said perceptual weighting filter has a transfer function of the form:

$$W(z) = A(z/\gamma_1) / (1-\gamma_2 z^{-1})$$

where $0 < \gamma_2 < \gamma_1 \leq 1$ and γ_2 and γ_1 are weighting control values.

33. A cellular mobile transmitter/receiver unit as defined in claim 32, wherein γ_2 is set equal to μ.

34. A cellular mobile transmitter/receiver unit as defined in claim 29, wherein said perceptual weighting filter has a transfer function of the form:

$$W(z) = A(z/\gamma_1) / (1-\gamma_2 z^{-1})$$

where $0 < \gamma_2 < \gamma_1 \leq 1$ and γ_2 and γ_1 are weighting control values.

35. A cellular mobile transmitter/receiver unit as defined in claim 34, wherein γ_2 is set equal to μ.

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36. A cellular network element comprising:

a) a transmitter including an encoder for encoding a wideband signal as defined in claim 15 and a transmission circuit for transmitting the encoded wideband signal; and

b) a receiver including a receiving circuit for receiving a transmitted encoded wideband signal and a decoder for decoding the received encoded wideband signal.

37. A cellular network element as defined in claim 36, wherein said signal preemphasis filter has a transfer function of the form:

$$P(z) = 1 - \mu z^{-1}$$

wherein μ is a preemphasis factor having a value located between 0 and 1.

38. A cellular network element as defined in claim 37, wherein said preemphasis factor μ is 0.7.

39. A cellular network element as defined in claim 37, wherein said perceptual weighting filter has a transfer function of the form:

$$W(z) = A\ (z/\gamma_1)\ /\ (1-\gamma_2 z^{-1})$$

where $0 < \gamma_2 < \gamma_1 \leq 1$ and γ_2 and γ_1 are weighting control values.

40. A cellular network element as defined in claim 39, wherein γ_2 is set equal to μ.

41. A cellular network element as defined in claim 36, wherein said perceptual weighting filter has a transfer function of the form:

$$W(z) = A\ (z/\gamma_1)\ /\ (1-\gamma_2 z^{-1})$$

where $0 < \gamma_2 < \gamma_1 \leq 1$ and γ_2 and γ_1 are weighting control values.

42. A cellular network element as defined in claim 41, wherein μ is set equal to γ_2.

43. In a cellular communication system for servicing a large geographical area divided into a plurality of cells, comprising: mobile transmitter/receiver units; cellular base stations, respectively situated in said cells; and control terminal for controlling communication between the cellular base stations:

a bidirectional wireless communication sub-system between each mobile unit situated in one cell and the cellular base station of said one cell, said bidirectional wireless communication sub-system comprising, in both the mobile unit and the cellular base station:

a) a transmitter including an encoder for encoding a wideband signal as recited in claim 15 and a transmission circuit for transmitting the encoded wideband signal; and

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b) a receiver including a receiving circuit for receiving a transmitted encoded wideband signal and a decoder for decoding the received encoded wideband signal.

44. A bidirectional wireless communication sub-system as defined in claim 43, wherein said signal preemphasis filter has a transfer function of the form:

$$P(z) = 1 - \mu z^{-1}$$

wherein μ is a preemphasis factor having a value located between 0 and 1.

45. A bidirectional wireless communication sub-system as defined in claim 44, wherein said preemphasis factor μ is 0.7.

46. A bidirectional wireless communication sub-system as defined in claim 44, wherein said perceptual weighting filter has a transfer function of the form:

$$W(z) = A(z/\gamma_1) / (1 - \gamma_2 z^{-1})$$

where $0 < \gamma_2 < \gamma_1 \leq 1$ and γ_2 and γ_1 are weighting control values.

47. A bidirectional wireless communication sub-system as defined in claim 46, wherein μ is set equal to γ_2.

48. A bidirectional wireless communication sub-system as defined in claim 43, wherein said perceptual weighting filter has a transfer function of the form:

$$W(z) = A(z/\gamma_1) / (1-\gamma_2 z^{-1})$$

where $0 < \gamma_2 < \gamma_1 \leq 1$ and γ_2 and γ_1 are weighting control values.

49. A bidirectional wireless communication sub-system as defined in claim 48, wherein γ_2 is set equal to μ.

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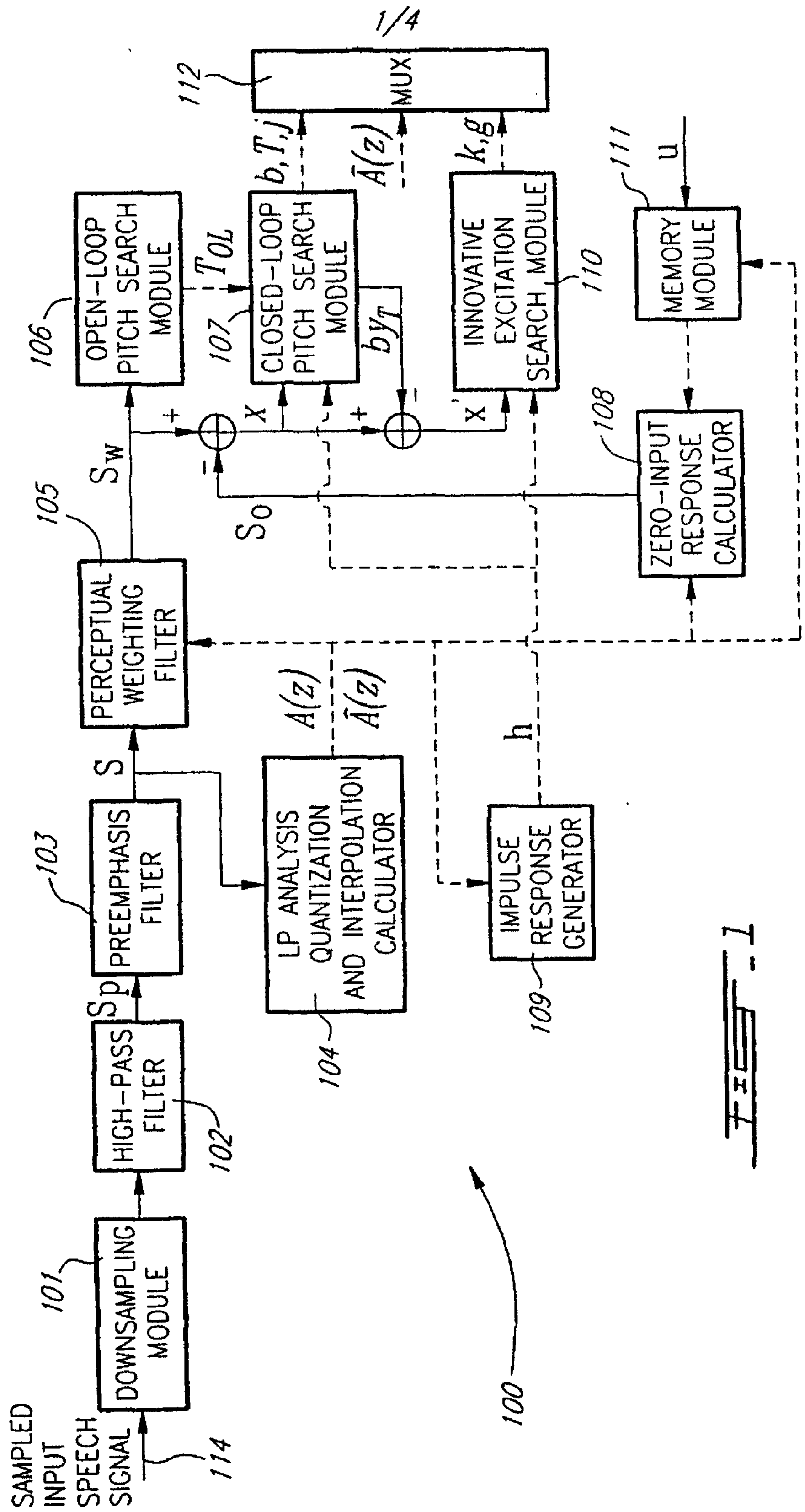

FIG. 1

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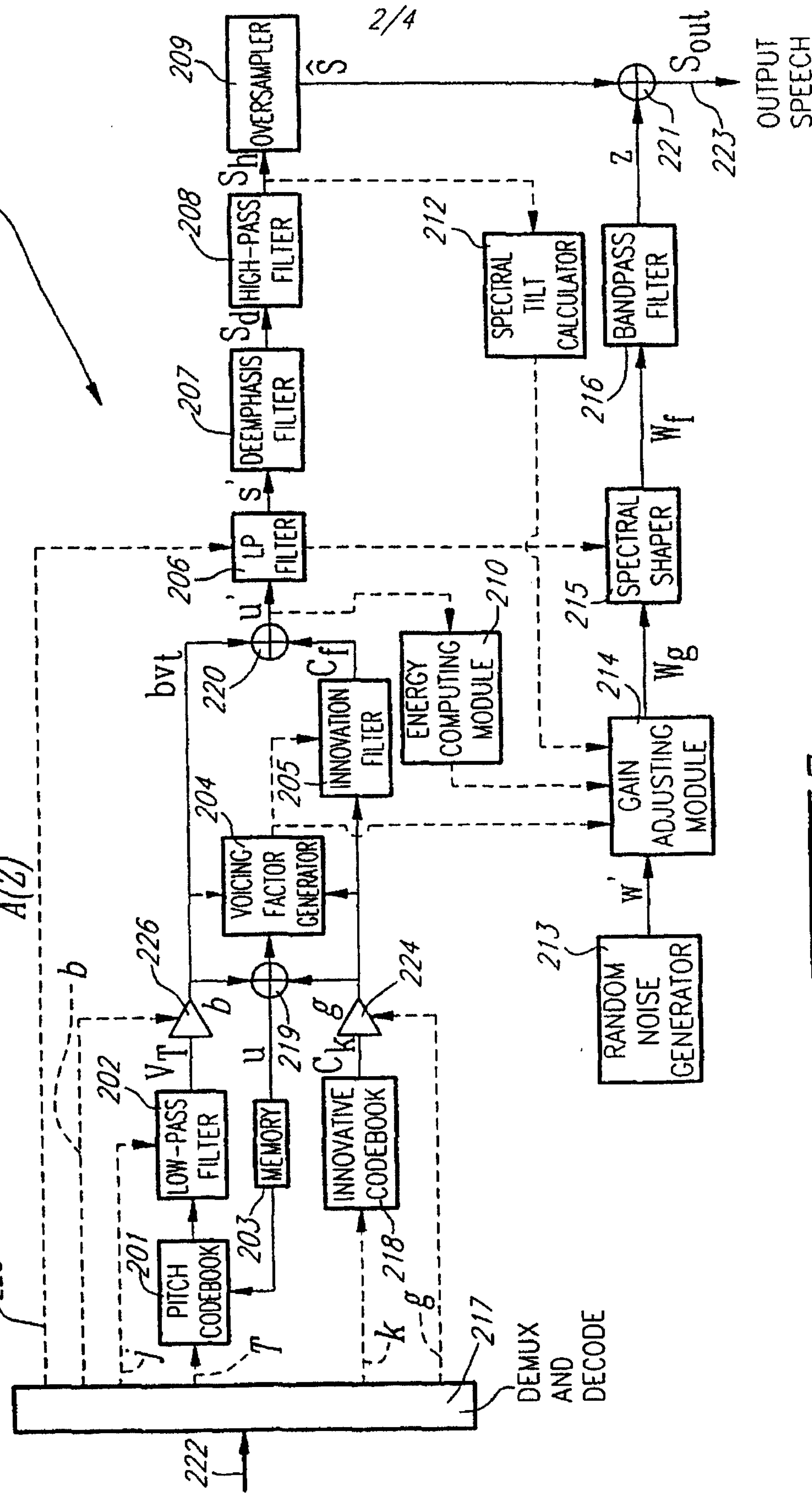
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INNOVATIVE CODEBOOK
VOICING FACTOR GENERATOR
INNOVATION FILTER
ENERGY COMPUTING MODULE
LP FILTER
DEEMPHASIS FILTER
HIGH-PASS FILTER
OVERSAMPLER
SPECTRAL TILT CALCULATOR
RANDOM NOISE GENERATOR
GAIN ADJUSTING MODULE
SPECTRAL SHAPER
BANDPASS FILTER
DEMUX AND DECODE
OUTPUT SPEECH

FIG. 2

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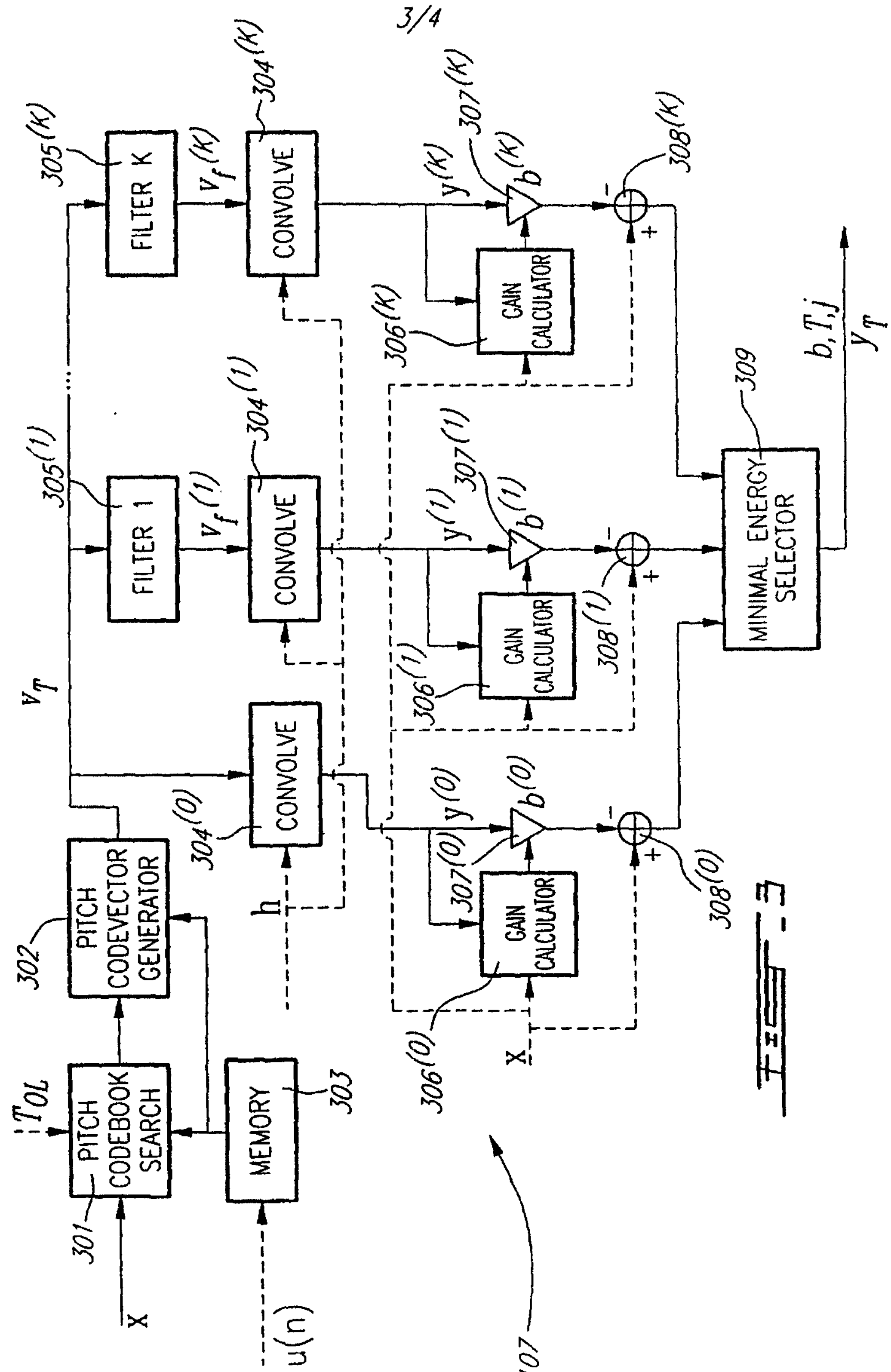
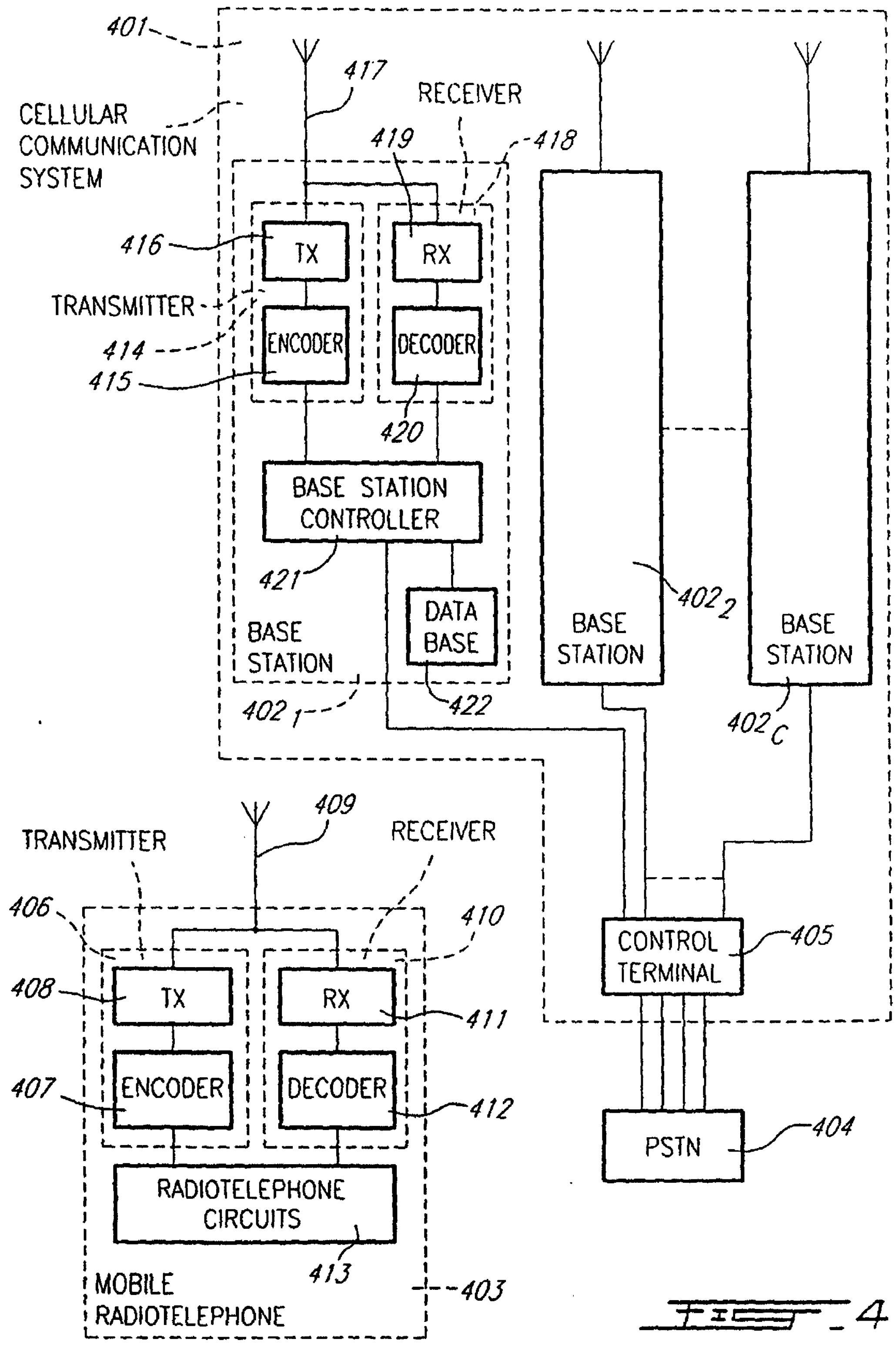


FIG. 3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BASE STATION
CONTROLLER
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BASE
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422
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402 2
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TX
RX
411
407
ENCODER
DECODER
412
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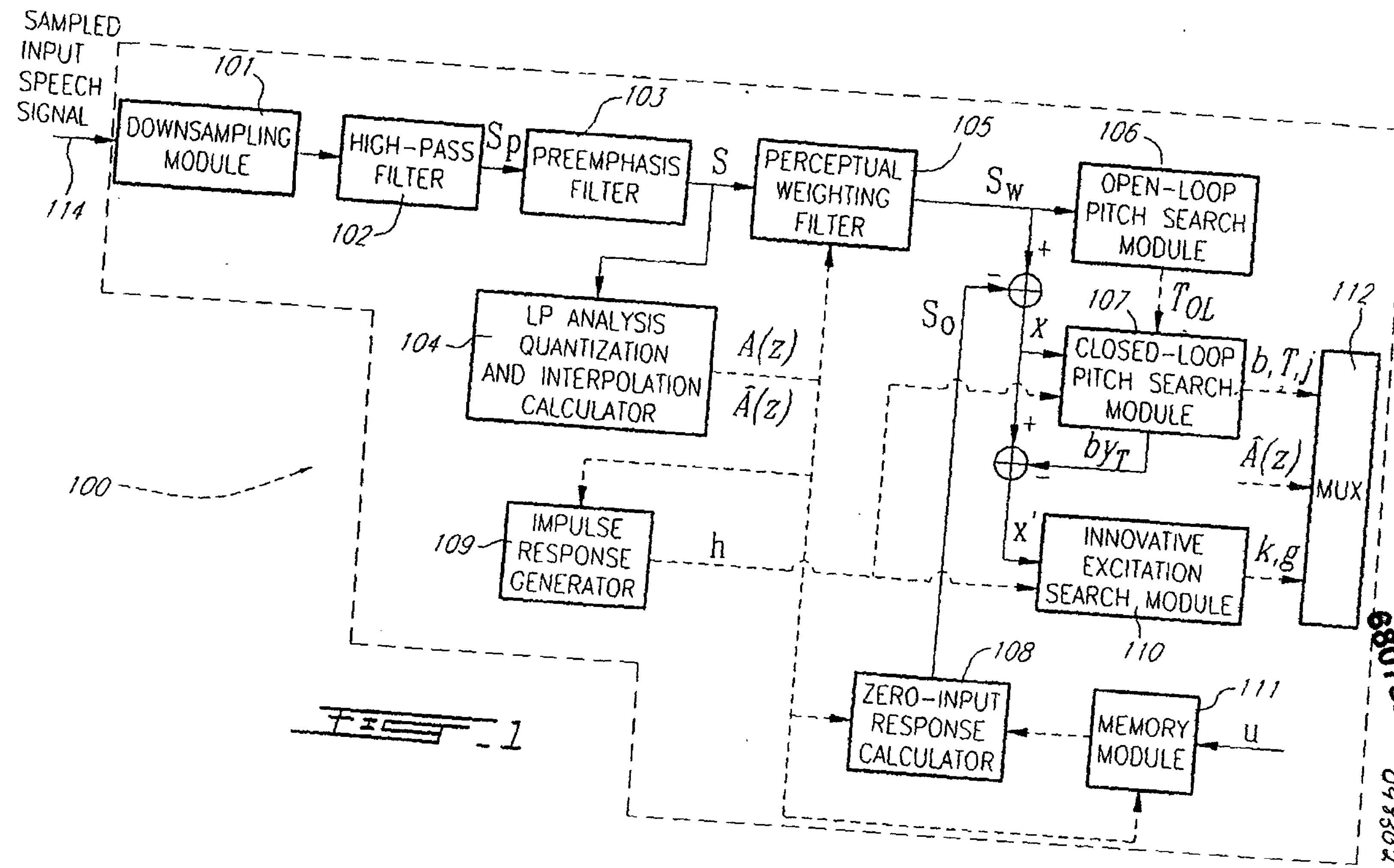
403
CONTROL
TERMINAL
405
PSTN
404

FIG. 4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114
101
DOWNSAMPLING MODULE
HIGH-PASS FILTER
102
Sp
103
PREEMPHASIS FILTER
S
105
PERCEPTUAL WEIGHTING FILTER
Sw
106
OPEN-LOOP PITCH SEARCH MODULE
T OL
107
CLOSED-LOOP PITCH SEARCH MODULE
b, T, j
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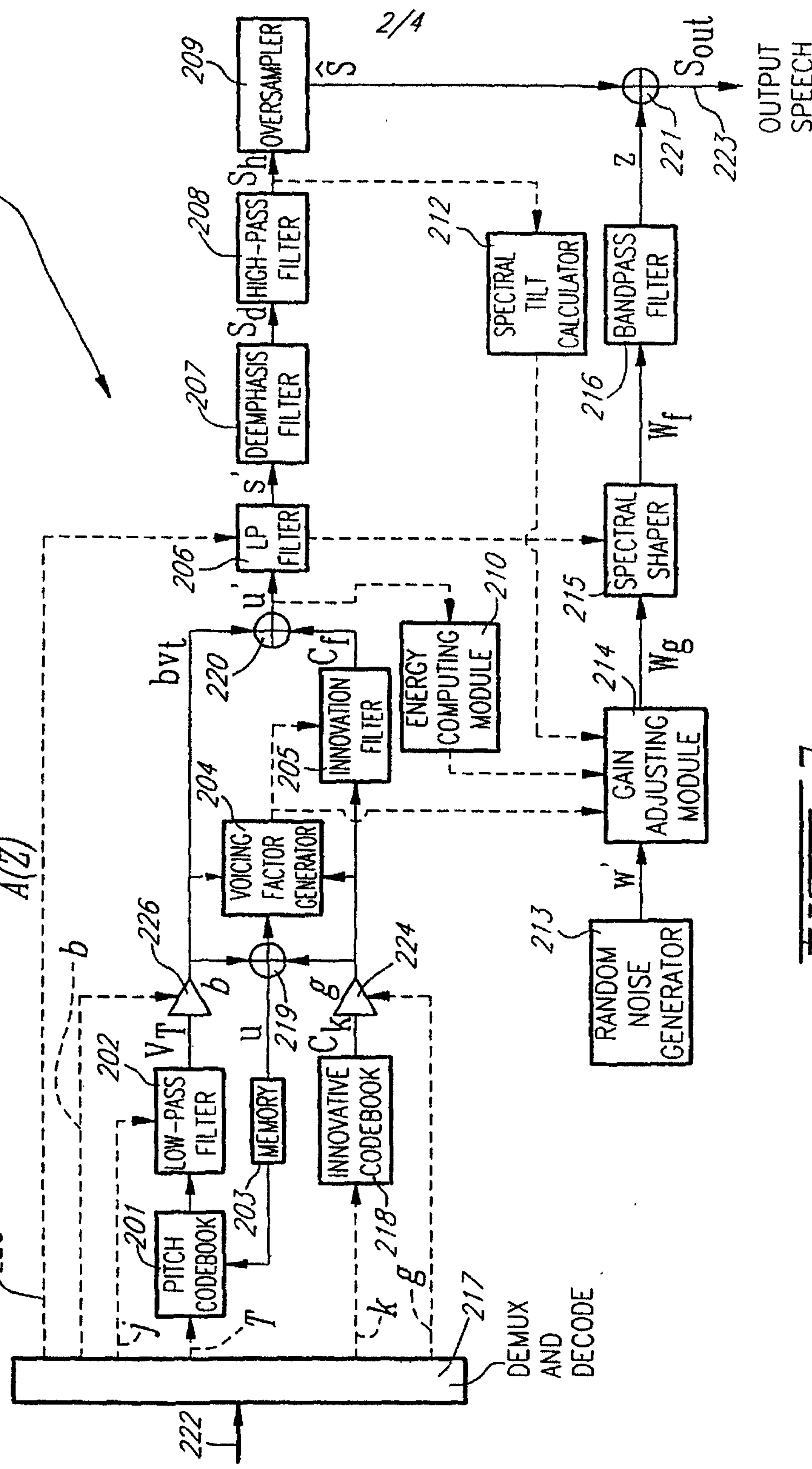
112
MUX
Â(z)
k, g
104
LP ANALYSIS QUANTIZATION AND INTERPOLATION CALCULATOR
A(z)
Â(z)
So
x
x'
100
109
IMPULSE RESPONSE GENERATOR
h
INNOVATIVE EXCITATION SEARCH MODULE
110
108
ZERO-INPUT RESPONSE CALCULATOR
111
MEMORY MODULE
u

FIG. 1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LOW-PASS FILTER
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MEMORY
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INNOVATIVE CODEBOOK
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VOICING FACTOR GENERATOR
204
INNOVATION FILTER
205
LP FILTER
206
DEEMPHASIS FILTER
207
HIGH-PASS FILTER
208
OVERSAMPLER
209
ENERGY COMPUTING MODULE
210
SPECTRAL TILT CALCULATOR
212
RANDOM NOISE GENERATOR
213
GAIN ADJUSTING MODULE
214
SPECTRAL SHAPER
215
BANDPASS FILTER
216
219
220
221
223
224
226
OUTPUT SPEECH
$\hat{A}(Z)$
v_T
u
c_k
b
g
j
k
T
bv_t
c_f
u'
s'
s_d
s_h
$\hat{s}$
w'
w_g
w_f
z
s_{out}

FIG. 2

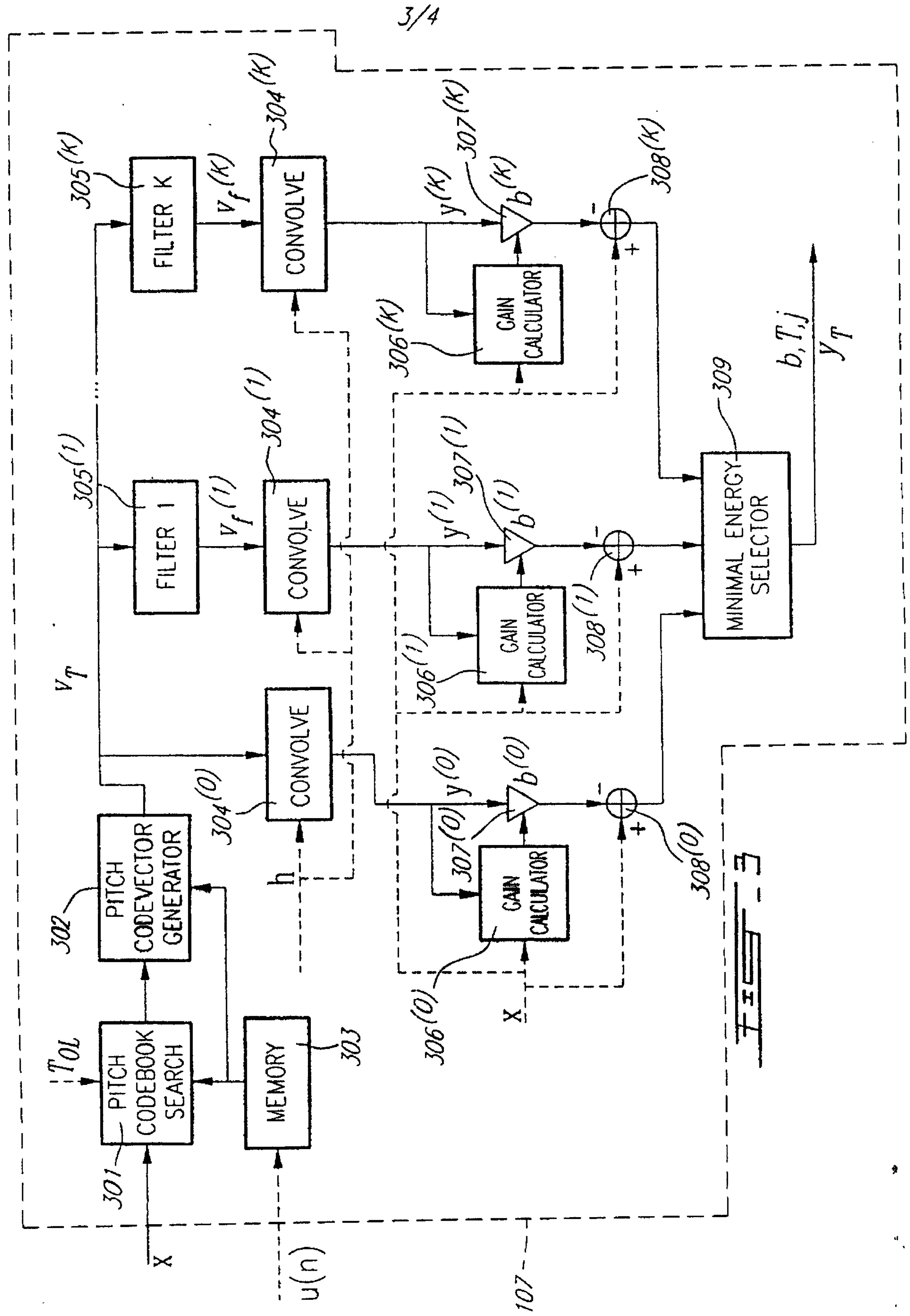
PITCH CODEBOOK SEARCH
PITCH CODEVECTOR GENERATOR
MEMORY
CONVOLVE
FILTER 1
FILTER K
GAIN CALCULATOR
MINIMAL ENERGY SELECTOR
T_{OL}
X
u(n)
h
v_T
$v_f^{(1)}$
$v_f^{(K)}$
$y^{(0)}$
$y^{(1)}$
$y^{(K)}$
$b^{(0)}$
$b^{(1)}$
$b^{(K)}$
b, T, j
y_T
301
302
303
304(0)
304(1)
304(K)
305(1)
305(K)
306(0)
306(1)
306(K)
307(0)
307(1)
307(K)
308(0)
308(1)
308(K)
309
107

FIG. 3

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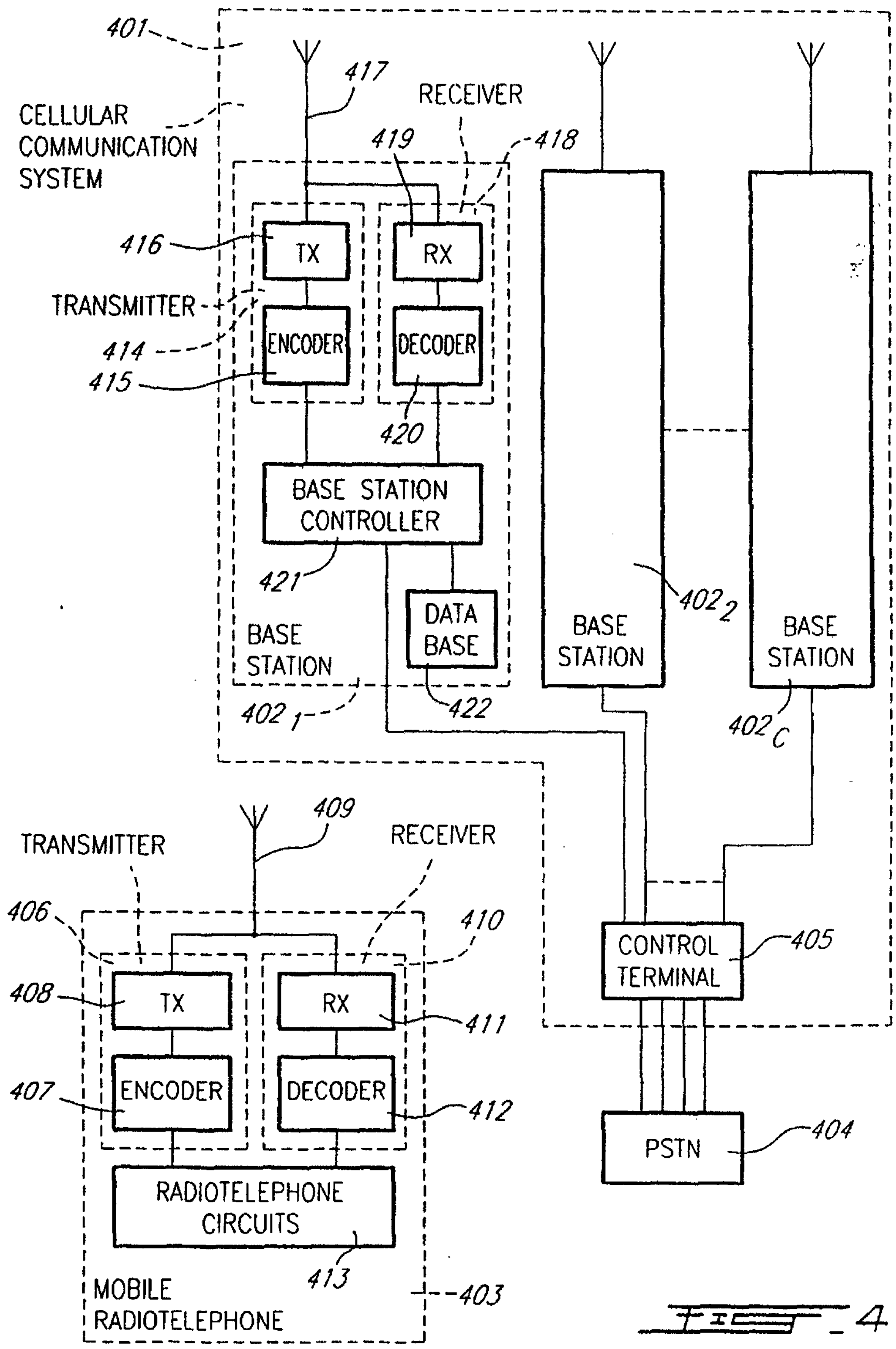

FIG. 4

Form PTO-1449

INFORMATION DISCLOSURE CITATION IN AN APPLICATION

(Use several sheets if necessary)

ATTY DOCKET NO.	APPLICATION NO.
4082-0130P	NEW
APPLICANT	
Bruno BESSETTE et al.	09/830276
FILING DATE	GROUP
April 25, 2001	

U.S. PATENT DOCUMENTS

EXAMINER INITIAL	DOCUMENT NUMBER	DATE	NAME	CLASS	SUB CLASS	FILING DATE IF APPROPRIATE

FOREIGN PATENT DOCUMENTS

	DOCUMENT NUMBER	DATE	COUNTRY	CLASS	SUB CLASS	TRANSLATION YES	TRANSLATION NO
JW	0 4 6 5 0 5 7A	1992-01-08	EUROPE				
JW	0 7 3 2 6 8 6A	1996-09-18	EUROPE				

OTHER DOCUMENTS (Include Name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.) date, page(s), volume-issue number(s), publisher, city and/or country where published.

EXAMINER [signature]

DATE CONSIDERED 4/21/04

EXAMINER: Initial if citation considered, whether or not citation is in conformance with M.P.E.P. 609; Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

09/830276

JC18 Rec'd PCT/PTO 25 APR 2001

10.4.01 #5

PATENT
4082-0130P

IN THE U.S. PATENT AND TRADEMARK OFFICE

Applicant:	Bruno BESSETTE et al.	Conf.:	
Int'l. Appl. No.:	PCT/CA99/01010		
Appl. No.:	NEW	Group:	
Filed:	April 25, 2001	Examiner:	
For:	PERCEPTUAL WEIGHTING DEVICE AND METHOD FOR EFFICIENT CODING OF WIDEBAND SIGNALS		

PRELIMINARY AMENDMENT

BOX PATENT APPLICATION
Assistant Commissioner for Patents
Washington, DC 20231

April 25, 2001

Sir:

The following Preliminary Amendments and Remarks are respectfully submitted in connection with the above-identified application.

AMENDMENTS

IN THE SPECIFICATION:

Please amend the specification as follows:

A/ Page 1, after the heading "BACKGROUND OF THE INVENTION", insert the paragraph --This application is the national phase under 35 U.S.C. § 371 of PCT International Application No. PCT/CA99/01010 which has an International filing date of October 27, 1999, which designated the United States of America and was published in English.

09830276.052001

Docket No. 4082-0130P

REMARKS

The specification has been amended to provide a cross-reference to the previously filed International Application.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No. 02-2448 for any additional fees required under 37 C.F.R. § 1.16 or under 37 C.F.R. § 1.17; particularly, extension of time fees.

Respectfully submitted,

BIRCH, STEWART, KOLASCH & BIRCH, LLP

By ______________________
F. Prince Butler, #25,666

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Falls Church, VA 22040-0747
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16 / 1999 (16.11.99)

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CA 99/1010

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Certification — *Certification*

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[illegible]s is to certify that the documents [illegible] hereto and identified below are [illegible] documents on file in [illegible]e.

Specification and Drawings, as original[illegible] [illegible]ication for Patent Serial No: **2,,252,170**, on October 2[illegible], 1998, by [illegible] **SHERBROOKE**, assignee of Bruno Bessette and Roch Lefebvre, for "A [illegible]od and Device for High Quality Coding of Wideband Speech and Audio Signals".

PRIORITY DOCUMENT

SUBMITTED OR TRANSMITTED IN COMPLIANCE WITH RULE 17.1(a) OR (b)

Agent certificateur/Certifying Officer

November 16, 1999

Date

Canada

(CIPO 68)

OPIC CIPO

A METHOD AND DEVICE FOR HIGH QUALITY CODING OF WIDEBAND SPEECH AND AUDIO SIGNALS

BACKGROUND OF THE INVENTION

1. Field of the invention:

The present invention relates to an efficient technique for digitally encoding a wideband sound signal, in particular but not exclusively a speech signal, in view of transmitting, or storing, and synthesizing this wideband sound signal.

2. Brief description of the prior art:

The demand for efficient digital wideband speech/audio encoding techniques with a good subjective quality/bit rate trade-off is increasing for numerous applications such as audio/video teleconferencing, multimedia, and wireless applications, as well as Internet and packet network applications. Until recently, telephone bandwidths filtered in the range 200-3400 Hz were mainly used in speech coding applications. However, there is an increasing demand for wideband speech applications in order to increase the intelligibility and naturalness of the speech signals. A bandwidth in the range 50-7000 Hz was found sufficient for delivering a face-to-face speech quality. For audio signals, this range gives an acceptable audio quality, but still lower than the CD quality which operates on the range 20-20000 Hz.

A speech encoder converts a speech signal into a digital bitstream which is transmitted over a communication channel (or stored in a storage medium). The speech signal is digitized (sampled and quantized with usually 16-bits per sample) and the speech encoder has the role of representing these digital samples with a smaller number of bits while maintaining a good subjective speech quality. The speech decoder or synthesizer operates on the transmitted or stored bit stream and converts it back to a sound signal.

One of the best prior art techniques capable of achieving a good quality/bit rate trade-off is the so-called Code Excited Linear Prediction (CELP) technique. According to this technique, the sampled speech signal is processed in successive blocks of L samples usually called *frames* where L is some predetermined number (corresponding to 10-30 ms of speech). In CELP, a linear prediction (LP) filter is computed and transmitted every frame. The L-sample frame is then divided into smaller blocks called *subframes* of size N samples, where $L=kN$ and k is the number of subframes in a frame (N usually corresponds to 4-10 ms of speech). An excitation signal is determined in each subframe, which usually consists of two components: one from the past excitation (also called pitch contribution or adaptive codebook) and the other from an innovation codebook (also called fixed codebook). This excitation signal is transmitted and used at the decoder as the input of the LP synthesis filter in order to obtain the synthesized speech.

An innovation codebook in the CELP context, is an indexed set of N-sample-long sequences which will be referred to as N-dimensional codevectors. Each codebook sequence is indexed by an integer k ranging from 1 to M where M represents the size of the codebook often expressed as a number of bits b, where $M=2^b$.

To synthesize speech according to the CELP technique, each block of N samples is synthesized by filtering an appropriate codevector from a codebook through time varying filters modeling the spectral characteristics of the speech signal. At the encoder end, the synthetic output is computed for all, or a subset, of the codevectors from the codebook (codebook search). The retained codevector is the one producing the synthetic output closest to the original speech signal according to a perceptually weighted distortion measure. This perceptual weighting is performed using a so-called perceptual weighting filter, which is usually derived from the LP filter.

The CELP model has been very successful in encoding telephone band sound signals, and several CELP-based standards exist in a wide range of applications, especially in digital cellular applications. In the telephone band, the sound signal is band-limited to 200-3400 Hz and sampled at 8000 samples/sec. In wideband speech/audio applications, the sound signal is band-limited to 50-7000 Hz and sampled at 16000 samples/sec.

Some difficulties arise when applying the telephone-band optimized CELP model to wideband signals, and additional features need to be added to the model in order to obtain high quality wideband signals. Wideband signals exhibit a much wider dynamic range compared to telephone-band signals, which results in precision problems when a fixed-point implementation of the algorithm is required (which is essential in wireless applications). Further, the CELP model will often spend most of its encoding bits on the low-frequency region, which usually has higher energy contents, resulting in a low-pass output signal. To overcome this problem, the perceptual weighting filter has to be modified in order to suit wideband signals, and pre-emphasis techniques which boost the high frequency regions become important to reduce the dynamic range, yielding a simpler fixed-point implementation, and to ensure a better encoding of the higher frequency contents of the signal. Further, the pitch contents in the spectrum of voiced segments in wideband signals do not extend over the whole spectrum range, and the amount of voicing shows more variation compared to narrow-band signals. Thus, it is important to improve the closed-loop pitch analysis to better accommodate the variations in the voicing level.

At the decoder side, the CELP model uses post-filtering and post-processing techniques in order to improve the perceived synthesized signal. These techniques have to be changed to accomodate wideband signals. Further, in order to lower the bit rate below 16 kbit/s, an efficient method is to down-sample the wideband signals, which enables the encoder to operate on a bandwidth lower than 7000 Hz, thus achieving a reduction in the bit rate. At the decoder side, the decoder signal is upsampled and an efficient high frequency generation technique is needed to recover the full band signal, while maintaining a quality close to the original signal.

OBJECTS OF THE INVENTION

An object of the present invention is therefore to provide a method and device for efficiently encoding wideband (7000 Hz) sound signals using CELP-type encoding techniques, using additional features at both encoder and decoder in order to obtain high a quality reconstructed sound signal, which is also suitable for fixed point algorithmic implementation.

SUMMARY OF THE INVENTION

More specifically, in accordance with the present invention, there is provided a method for encoding wideband sound signals using LP-based, preferably CELP-type encoding techniques, whereby the following new features are adopted in order to obtain high subjective quality of the decoded wideband sound signal:

1. The overall perceptual weighting of the quantization error is obtained by a combination of a preemphasis filter and a modified weighting filter.

In CELP-type coders, the optimum pitch and innovation parameters are searched by minimizing the mean squared error between the input speech and synthesized speech in a perceptually weighted domain. This is equivalent to minimizing the error between the weighted input speech and weighted synthesis speech, where the weighting is performed using a filter having a transfer function $W(z)$ of the form:

$W(z)=A(z/\gamma_1)/A(z/\gamma_2)$ where $0<\gamma_2<\gamma_1\leq 1$.

In analysis-by-synthesis (AbS) coders, analysis show that the quantization error is weighted by the inverse of the weighting filter, $W^{-1}(z)$, which exhibits some of the formant structure in the input signal. Thus, the masking property of the human ear is exploited by shaping the error, so that it has more energy in the formant regions, where it will be masked by the strong signal energy present in those regions. The amount of weighting is controlled by the factors γ_1 and γ_2.

This filter works well with telephone band signals. However, it was found that this filter is not suitable for efficient perceptual weighting when it was applied to wideband signals. It was found that this filter has inherent limitations in modeling the formant structure and the required spectral tilt concurrently. The spectral tilt is more pronounced in wideband signals due to the wide dynamic range between low and high frequencies. It was suggested to add a tilt filter into filter $W(z)$ in order to control the tilt and formant weighting separately.

A novel solution to this problem, forming part of the present invention, is to introduce a preemphasis filter at the input, compute the LP filter $A(z)$ based on the preemphasized speech, and use a modified filter $W(z)$ by fixing its denominator.

The preemphasis filter reduces the dynamic range of the input signal, which renders it more suitable for fixed-point implementation, and improves the encoding of the high frequency contents of the spectrum. The preemphasis is obtained by a fixed FIR filter having a transfer function $P(z)$ in the form:

$$P(z)=1-\mu z^{-1}$$

where μ is a preemphasis factor with a value between 0 and 1. A higher order filter can also be used. Linear prediction (LP) analysis is performed on the preemphasized input signal to obtain the LP filter $A(z)$. A new weighting filter is used, which has a transfer function of the form:

$$W(z)=A(z/\gamma_1)/(1-\gamma_2 z^{-1}) \qquad \text{where } 0<\gamma_2<\gamma_1\leq 1$$

Note that because $A(z)$ is computed based on preemphasized speech, the tilt of the filter $1/A(z/\gamma_1)$ is less pronounced compared to the case when $A(z)$ is computed based on the original speech. Since deemphasis using the filter $P^{-1}(z)=1/(1-\mu z^{-1})$ is performed at the receiver end, the quantization error spectrum is shaped by the filter $W^{-1}(z)P^{-1}(z)$. When μ is set equal to γ_2, which is typically the case, the spectrum of the quantization error is shaped by the filter $1/A(z/\gamma_1)$, with $A(z)$ computed based on the preemphasized speech. Subjective listening showed that this structure of achieving the error shaping by a combination of preemphasis and modified weighting filtering is very efficient for encoding wideband signals, in addition to the advantages of ease of fixed-point algorithmic implementation.

2. The closed-loop pitch analysis is improved to better accommodate wideband signals.

The pitch harmonics in AbS coders are usually modeled using a pitch delay T and an associated gain b. The excitation signal $u(n)$ is derived by adding the past excitation at delay T scaled by a gain b to an innovation component from a fixed codebook scaled by a gain g. That is

$$u(n)=bv_T(n)+gc_k(n)$$

where $v_T(n)$ is the past excitation at delay T samples. For an improved performance, a fractional delay is usually used. In this case, the past excitation is oversampled to achieve the required higher resolution. In most cases, the pitch predictor can be represented by a filter having a transfer function of the form $1/(1-bz^{-T})$, whose spectrum has a harmonic structure over the entire frequency range, with a harmonic frequency related to $1/T$. In case of wideband signals, this structure is not very efficient since the harmonic frequencies don't cover the entire extended spectrum. The harmonic structure exists only up to a certain frequency, depending on the speech segment. A new method which achieves efficient modeling of the harmonic structure of the speech spectrum uses several forms of low pass filters applied to the past excitation and the one yielding higher prediction gain is selected. When subsample pitch resolution is used, the low pass filters can be incorporated into the interpolation filters used to obtain the higher pitch resolution.

3. At the decoder, the innovative contribution to the excitation is enhanced by filtering it through a preemphasis filter whose coefficients are derived from the level of voicing in speech segement in the subframe.

Enhancing the periodicity of the excitation signal improves the quality in case of voiced segments. This was done in the past by filtering the innovation from the fixed codebook through a filter having a transfer function of the form $1/(1-\varepsilon z^{-T})$ where ε is a factor below 0.5 which controls the amount of introduced periodicity. This approach is less efficient in case of wideband signals since it introduces the periodicity over the entire spectrum. A new alternative approach is disclosed whereby the periodicity enhancement is achieved by filtering the innovative signal from the fixed codebook by a filter which emphasizes the high frequencies and reduces the low-frequency contents of the innovation, and whose coefficients are related to the level of periodicity in the signal. In this approach, the innovative contribution is reduced mainly at low frequencies, which enhances the periodicity of the excitation at low frequencies more than high frequencies.

4. A new high-frequency generation procedure is introduced in order to recover the high frequency content of the signal, in case the input signal has been down-sampled.

In order to improve the coding efficiency and reduce the algorithmic complexity of the wideband coding algorithm, the input wideband signal is down-sampled from 16 kHz to around 12.8 kHz. This reduces the number of samples in a frame which reduces the processing time, and reduces the signal bandwidth which enables the reduction in bit rate down to 12 kbit/s while keeping very high quality decoded sound signal. At the decoder, the high frequency contents of the signal needs to be reintroduced to remove the low pass filtering effect from the decoded signal and retrieve the natural sounding quality of wideband signals. A new approach consists of generating the high frequency contents by filling the upper part of the spectrum with a white noise properly scaled in the excitation domain, then converted to the speech domain, preferably but not necessarily by shaping it with the same LP filter used for synthesizing the down-sampled signal.

The objects, advantages and other features of the present invention will become more apparent upon reading of the following non restrictive description of a preferred embodiment thereof, given by way of example only with reference to the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

In the appended drawings:

Figure 1 is a schematic block diagram of a preferred embodiment of a wideband encoding device embodying the present invention;

Figure 2 is a schematic block diagram of a preferred embodiment of a wideband decoding device embodying the present invention, and comprising a method for high frequency generation; and

Figure 3 is a schematic block diagram of a closed-loop pitch analysis device suitable for wideband signals.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

The novel techniques disclosed in the present specification may apply to different LP (Linear Prediction)-based coding systems. However, a CELP-type coding system is used in the preferred embodiment for presenting a non limitative illustration of the techniques disclosed herein.

Figure 1 shows a general block diagram of a CELP-type speech encoding device modified to better accommodate wideband signals.

The sampled input speech is divided into L-sample blocks called "frames". In each frame, different parameters representing the speech signal in the frame are computed, encoded, and transmitted. LP parameters representing the LP synthesis filter are usually computed once every frame. The frame is further divided into smaller blocks of length N, in which excitation parameters (pitch and innovation) are determined. In the CELP literature, these blocks of length N are called "subframes" and the N-sample signals in a subframe are referred to as N-dimensional vectors. In this preferred embodiment, the length N corresponds to 5 ms while the length L corresponds to 20 ms, which means that a frame contains four subframes (N=80 at the sampling rate of 16 kHz and 64 after down-sampling to 12.8 kHz). Various N-dimensional vectors occur in the encoding procedure. A list of the vectors which appear in Figures 1 and 2 as well as a list of transmitted parameters are given herein below:

List of the main *N*-dimensional vectors

- $\mathbf{s}$ Input speech vector (after down-sampling, pre-processing, and preemphasis);
- $\mathbf{s}_w$ Weighted speech vector;
- $\mathbf{s}_0$ Zero-input response of weighted synthesis filter;
- $\mathbf{x}$ Target vector for pitch search;
- $\mathbf{h}$ Impulse response of the combination of synthesis and weighting filters;
- $\mathbf{v}_T$ Adaptive codebook vector at delay T;
- $\mathbf{y}_T$ Filtered adaptive codebook vector ($\mathbf{v}_T$ convolved with $\mathbf{h}$);
- $\mathbf{x}'$ Target vector for pitch search;
- $\mathbf{c}_k$ Innovation codevector at index k (k-th entry from the innovation codebook);
- $\mathbf{c}_f$ Enhanced scaled innovation codevector;
- $\mathbf{u}$ Excitation signal (scaled innovation and pitch codevectors);
- $\mathbf{u}'$ Enhanced excitation;
- $\mathbf{s}'$ Synthesis signal before deemphasis; and
- $\mathbf{s}_h$ Synthesis signal after deemphasis and postprocessing.

List of transmitted parameters

STP	Short term prediction parameters (defining $A(z)$);
T	Pitch lag (or adaptive codebook index);
b	Pitch gain (or adaptive codebook gain);

j	Index of the low-pass filter used on the pitch codevector;
k	Codevector index (innovation codebook entry); and
g	Innovation codebook gain.

In this preferred embodiment, the STP parameters are transmitted once per frame and the rest of the parameters are transmitted four times per frame (every subframe).

ENCODING PRINCIPLE

The sampled speech signal is encoded on a block by block basis by the encoding device of Figure 1 which is broken down into eleven modules numbered from 101 to 111.

The input speech is processed into the above mentioned L-sample blocks called frames.

Referring to Figure 1, the input speech signal is down-sampled in a down-sampling module 101. In this preferred embodiment, the signal is down-sampled from 16 kHz down to 12.8 kHz, using techniques well known in the art. Down-sampling increases the coding efficiency, since a smaller bandwidth is encoded. This also reduces the algorithmic complexity since the number of samples in a frame is decreased. The use of down-sampling becomes significant as the bit rate is reduced ~~below 16 kbit/s, although down-sampling is not essential above 16 kbit/s.~~

After down-sampling, the 320-sample frame of 20 ms is reduced to 256-sample frame (down-sampling ratio of 4/5).

The input frame is then passed into the optional pre-processing block 102, which consists of a high pass filter with a 50 Hz cut-off frequency. High-pass filter 102 removes the unwanted sound components below 50 Hz.

The down-sampled pre-processed signal is denoted by $s_p(n)$, n=0,...,L-1, where L is the length of the frame (256 at 12.8 kHz sampling). In preemphasis 103, the signal $s_p(n)$ is preemphasized using a filter having the following transfer function:

$$P(z)=1-\mu z^{-1}$$

where μ is a preemphasis factor with a value between 0 and 1 (a typical value is μ=0.7). A higher order filter can also be used.

Note that the high-pass filter 102 and preemphasis filter 103 can be interchanged to obtain more efficient fixed-point implementations.

The function of the preemphasis filter 103 is to reduce the dynamic range of the input speech signal, which renders it more suitable for fixed-point implementation. Without preemphasis, it is difficult to implement LP analysis in fixed-point using single-precision arithmetic.

Preemphasis also plays an important role in achieving a proper overall perceptual weighting of the quantization error, which contributes to an improved sound quality. This will be explained later in more details.

The output of the preemphasis filter 103 is denoted $s(n)$. This signal is used for performing LP analysis, a technique well known in the art. The autocorrelation approach is used, where the signal is first windowed using a Hamming window (usually in the order of 30-40 ms). The autocorrelations are computed from the windowed signal, and Levinson-Durbin recursion is used to compute the LP parameters, a_i, where i=1,...,p, and where p is the LP order, which is typically 16 in wideband coding. The parameters a_i are the coefficients of the transfer function of the LP filter:

$$A(z)=1+\sum_{i=1}^{p}a_i z^{-i}$$

LP analysis is performed in module 104, which also performs the quantization and interpolation of the LP parameters. The LP coefficients are transformed into another equivalent domain more suitable for quantization and interpolation purposes. The line spectral pair (LSP) and immitance spectral pair (ISP) domains are two domains in which quantization and interpolation can be efficiently performed. The 16 LP parameters can be quantized in the order of 30 to 50 bits using split or multi-stage quantization, or a combination thereof. The purpose of the interpolation is to enable updating the LP parameters every subframe while transmitting them once every frame, which improves the coder performance without increasing the bit rate.

The following paragraphs will describe the rest of the coding operations performed on a subframe basis. In the following description, the filter $A(z)$ denotes the unquantized interpolated LP filter in the subframe, and the filter $\hat{A}(z)$ denotes the quantized interpolated LP filter in the subframe.

Perceptual Weighting:

In analysis-by-synthesis coders, the optimum pitch and innovation parameters are searched by minimizing the mean squared error between the input speech and synthesized speech in a perceptually weighted domain. This is equivalent to minimizing the error between the weighted input speech and weighted synthesis speech.

The weighted signal $s_w(n)$ is computed in a weighted signal generator 105. Traditionally, the weighted signal $s_w(n)$ is computed by a weighting filter having a transfer function $W(z)$ in the form

$$W(z)=A(z/\gamma_1)/A(z/\gamma_2) \quad \text{where} \quad 0<\gamma_2<\gamma_1\leq 1$$

In analysis-by-synthesis (AbS) coders, analysis shows that the quantization error is weighted by a transfer function, $W^{-1}(z)$, which is the inverse of the transfer function of the filter 105. Transfer function $W^{-1}(z)$ exhibits some of the formant structure in the input signal. Thus, the masking property of the human ear is exploited by shaping the error, so that it has more energy in the formant regions, where it will be masked by the strong signal energy present in those regions. The amount of weighting is controlled by the factors γ_1 and γ_2.

The above traditional weighting filter works well with telephone band signals. However, it was found that this weighting filter is not suitable for efficient perceptual weighting when it was applied to wideband signals. It was found that this filter has inherent limitations in modeling the formant structure and the required spectral tilt concurrently. The spectral tilt is more pronounced in wideband signals due to the wide dynamic range between low and high frequencies. The prior art has suggested to add a tilt filter into $W(z)$ in order to control the tilt and formant weighting separately.

A novel solution to this problem, which is part of the present invention, is to introduce the preemphasis filter 103 at the input, compute the LP filter $A(z)$ based on the preemphasized speech $s(n)$, and use a modified filter $W(z)$ by fixing its denominator.

LP analysis is performed in module 104 on the preemphasized signal $s(n)$ to obtain the LP filter $A(z)$. A new perceptual weighting filter 105 with fixed denominator

$$W(z)=A(z/\gamma_1)/(1-\gamma_2 z^{-1}) \qquad \text{where } 0<\gamma_2<\gamma_1\leq 1$$

is used (a higher order can be used at the denominator). This form decouples the formant weighting from the tilt.

Note that because $A(z)$ is computed based on the preemphasized speech signal $s(n)$, the tilt of the filter $1/A(z/\gamma_1)$ is less pronounced compared to the case when $A(z)$ is computed based on the original speech. Since deemphasis is made at the receiver end using a filter having a transfer function $P^{-1}(z)=1/(1-\mu z^{-1})$, the quantization error spectrum is shaped by a filter having a transfer function $W^{-1}(z)P^{-1}(z)$. When μ is set equal to γ_2, which is typically the case, the spectrum of the quantization error is shaped by a filter whose transfer function is $1/A(z/\gamma_1)$, with $A(z)$ computed based on the preemphasized speech. Subjective listening showed that this structure of achieving the error shaping by a combination of preemphasis and modified weighting filtering is very effcicient for encoding wideband signals, in addition to the advantages of ease of fixed-point algorithmic implementation.

Pitch Analysis:

In order to simplify the pitch analysis, an open-loop pitch lag is first estimated in the open-loop pitch search module 106 using the weighted speech signal $s_w(n)$. Then the closed-loop pitch analysis which is performed in closed-loop pitch search module 107 on a subframe basis is restricted around the open-loop pitch lag which significantly reduces the search complexity of the LTP parameters T and b (pitch lag and pitch gain). Open-loop pitch analysis is usually performed once every 10 ms (two subframes) using techniques well known in the art.

The target signal for LTP (Long Term Prediction) analysis, **x**, is first computed. This is usually done by subtracting the zero-input response of a weighted synthesis filter $W(z)/\hat{A}(z)$ (calculated by a zero-input response generator 108) from the weighted speech signal $s_w^{'}(n)$. More specifically, the target vector x is calculated using the following relation:

$$\mathbf{x}=\mathbf{s}_w-\mathbf{s}_0$$

where x is the N-dimensional target vector, $\mathbf{s}_w$ is the weighted signal vector in the subframe, and $\mathbf{s}_0$ is the zero-input response of the filter $W(z)/\hat{A}(z)$ which is the output of the combined filter $W(z)/\hat{A}(z)$ due to its initial states. $\mathbf{s}_0$ is computed in the zero-input response generator 108.

Just a word to mention that alternative, but mathematically equivalent approaches can be used to compute the target vector.

A N-dimensional impulse response vector **h** of the weighted synthesis filter $W(z)/\hat{A}(z)$ is computed in the impulse response generator 109.

The closed-loop pitch or adaptive codebook parameters are computed in the closed-loop pitch search module 107, which uses the target vector **x** and the impulse response vector **h** as inputs. Traditionally, the pitch prediction was represented by a pitch filter having the following transfer function:

$$1/(1-bz^{-T})$$

where b is the pitch gain and T is the pitch delay or lag. In this case, the pitch contribution to the excitation signal $u(n)$ is given by $bu(n-T)$, where the total excitation is given by

$$u(n)=bu(n-T)+gc_k(n)$$

with g being the innovative codebook gain and $c_k(n)$ the innovation codevector at index k.

This representation has limitations if the delay T is shorter than the subframe length N. In another view point, the pitch contribution can be seen as an adaptive codebook containing the past excitation signal. Generally, each vector in the adaptive codebook is a shift-by-one version of the previous vector (discarding one sample and adding a new sample). For delays $T>N$, the adaptive codebook is equivalent to the filter structure, and a codevector $v_T(n)$ is given by

$$v_T(n)=u(n-T), \qquad n=0,\ldots,N-1.$$

For delays shorter than T, a codevector is built by repeating the available samples from the past excitation until the codevector is completed (this is not equivalent to the filter structure).

In recent coders, a higher pitch resolution is used which significantly improves the quality of voiced sound segments. This is achieved by oversampling the past excitation signal using polyphase interpolation filters. In this case, the codevector $v_T(n)$ may correspond to an interpolated version of the past excitation, with T being a non-integer delay (e.g. 50.25).

The pitch search consists of finding the best delay T and gain b that minimize the mean squared weighted error between the target vector x and the scaled filtered past excitation

$$E = \|\mathbf{x} - b\mathbf{y}_T\|^2$$

where $\mathbf{y}_T$ is the filtered adaptive codevector at delay T:

$$y_T(n) = v_T(n) * h(n) = \sum_{i=0}^{n} v_T(i)h(n-i), \qquad n=0,\ldots,N\text{-}1.$$

It can be shown that the error E is minimized by maximizing the criterion

$$C = \frac{\mathbf{x}^t\mathbf{y}_T}{\sqrt{\mathbf{y}_T^t\mathbf{y}_T}}$$

where t denotes vector transpose.

In the preferred embodiment of the present invention, a 1/3 subsample pitch resolution is used, and the pitch search is composed of three stages.

In the first stage, an open-loop delay is estimated in open-loop pitch search module 106. In the second stage, the search criterion C is seached in the closed-loop pitch search module 107 for integer delays around the estimated open-loop delay (usually ±5), which significantly simplifies the search procedure. A simple procedure is used for updating the filtered codevector $\mathbf{y}_T$ without the need to compute the convolution for every delay. Once an optimum integer delay is found, the fractions around the integer delay are tested in the third stage of the search (module 107).

When the pitch predictor is represented by a filter of the form $1/(1-bz^{-T})$, which is a valid assumption for delays $T>N$, the spectrum of the pitch filter exhibits a harmonic structure over the entire frequency range, with a harmonic frequency related to $1/T$. In case of wideband signals, this structure is not very efficient since the harmonic structure in wideband signals does not cover the entire extended spectrum. The harmonic structure exists only up to a certain frequency, depending on the speech segment. Thus, in order to achieve efficient representation of the pitch contribution in voiced segments of wideband speech, the pitch predictor need to have the flexibility of varying the amount of periodicity over the wideband spectrum.

A new method which achieves efficient modeling of the harmonic structure of the speech spectrum is disclosed in the present specification, whereby several forms of low pass filters are applied to the past excitation and the one with higher prediction gain is selected.

When subsample pitch resolution is used, the low pass filters can be incorporated into the interpolation filters used to obtain the higher pitch resolution. In this case, the third stage of the pitch search, in which the fractions around the chosen integer delay are tested, is repeated for the several interpolation filters having different low-pass characteristics and the fraction and filter index which maximize the search criterion C are selected.

A simpler approach, is to complete the search in the three stages described above, to determine the optimum fractional delay using only one interpolation filter with certain frequency response, and select the optimum low-pass filter shape at the end by applying the different pre-determined low-pass filters to the chosen adaptive codevector v_T and select the low-pass filter which minimizes the pitch prediction error.

Figure 3 shows a schematic block diagram of a preferred embodiment of the proposed approach.

In module 303, the past excitation codevector is memorized. Module 301 is responsive to the target vector x and to the past excitation codevector from memory module 303 to conduct a pitch codebook search minimizing the above-defined search criterion C. From the result of the search conducted in module 301, module 302 generates the optimum codevector v_T.

Suppose that K filter characteristics are used (they could be low-pass or band-pass). Once the optimum codevector v_T is determined, K filtered versions of v_T are computed using the K different frequency shaping filters such as $305^{(j)}$, where j=1, ... , K. These filtered versions are denoted $\mathbf{v}_f^{(j)}$, j=1,...,K. The different vectors $\mathbf{v}_f^{(j)}$ are convolved in modules $304^{(j)}$, where j=1, ... , K, with the impulse response **h** to obtain the vectors $\mathbf{y}^{(j)}$, j=1,...,K. The selected frequency shaping filter $305^{(j)}$ is the one which minimizes the mean squared pitch prediction error

$$e^{(j)} = \left\|\mathbf{x} - b^{(j)}\mathbf{y}^{(j)}\right\|^2, \quad j=1,\ldots,K$$

To calculate the mean squared pitch prediction error for each value of $y^{(j)}$, the value $y^{(j)}$ is multiplied by the gain b by means of an amplifier $307^{(j)}$ and the value $b^{(j)}y^{(j)}$ is subtracted from the target vector x by means of subtractors $308^{(j)}$.

The gain $b^{(j)}$ associated with the frequency shaping filter at index j, is given by

$$b^{(j)} = \mathbf{x}^t\mathbf{y}^{(j)} / \left\|\mathbf{y}^{(j)}\right\|^2.$$

In the same manner, optimum codevector v_T is convolved with the impulse response **h** to obtain the vectors y. To calculate the mean squared pitch prediction error for y, the value y is multiplied by the gain b by means of an amplifier $307^{(j)}$ and the value by is subtracted from the target vector x by means of subtractors 308. The gain b is given by

$$b = x^t y / \|y\|^2$$

In module 309, the parameters b, T, and j are chosen based on v_T or $v_T^{(j)}$ which minimizes the mean squared pitch prediction error e.

The pitch codebook index T is encoded and transmitted. The pitch gain b is quantized and transmitted. With this new approach, extra information is needed to encode the index j of the selected frequency shaping filter. If two filters are used, then one bit is needed to represent this information.

Innovative codebook search:

Once the pitch, or LTP (Long Term Prediction) parameters *b*, *T*, and *j* are determined, we proceed by searching for the optimum innovative excitation by means of module 110 of Figure 1. First, the target vector **x** is updated by subtracting the LTP contribution:

$$\mathbf{x}' = \mathbf{x} - b\mathbf{y}_T$$

where *b* is the pitch gain and $\mathbf{y}_T$ is the filtered adaptive codebook vector (the past excitation at delay *T* filtered with the selected low pass filter and convolved with the inpulse response **h** as described with reference to Figure 3).

The search procedure in CELP is *performed* by finding the optimum excitation codevector $\mathbf{c}_k$ and gain *g* which minimize the mean-squared error between the target vector and the scaled filtered codevector

$$E = \|\mathbf{x}' - g\mathbf{H}\mathbf{c}_k\|^2$$

where H is a lower triangular convolution matrix derived from the impulse response vector **h**.

In the preferred embodiment of the present invention, the innovative codebook search is performed in module 110 by means of an algebraic codebook as described in US patent numbers 5,444,816 (Adoul et al.) issued on August 22, 1995; 5,699,482 granted to Adoul et al., on December

17, 1997; 5,754,976 granted to Adoul et al., on May 19, 1998; and 5,701,392 (Adoul et al.) dated December 23, 1997.

Once the optimum codevector and its gain are chosen by module 110, the codebook index *k* and gain *g* are encoded and transmitted.

Referring to Figure 1, the parameters *b, T, j, Â(z), k* and *g* are multiplexed through a multiplexer 112 before being encoded and tranmitted

Memory update:

In module 111 (Figure 1), the states of the weighted synthesis filter are updated by filtering the excitation signal $\mathbf{u}=g\mathbf{c}_k+b\mathbf{v}_T$ through the weighted synthesis filter. At the end of this filtering, the states of the filter are memorized and used in the next subframe as initial states for computing the zero-input response in generator module 108.

Similar to the target vector, other alternative, but mathematically equivalent, approaches can be used to update the filter states.

<u>**DECODING PRINCIPLE**</u>

The speech decoding device of Figure 2 illustrates the various steps carried out between the digital input 222 (input to the demultiplexer 217) and the output sampled speech 223 (output of the adder 221).

The demultiplexer 217 extracts the synthesis model parameters from the binary information received from a digital input channel. From each received binary frame, the extracted parameters are:

- the short-term prediction parameters STP (once per frame);

- the long-term prediction (LTP) parameters *T*, *b*, and *j* (for each subframe); and

- the innovation *codebook* index *k* and gain *g* (for each subframe).

The current speech signal is synthesized based on these parameters as will be explained hereinbelow.

The innovative excitation generator 218 is responsive to the index *k* to produce the innovation codevector $\mathbf{c}_k$, which is scaled by the decoded gain factor *g* through an amplifier 224. In the preferred embodiment, an algebraic codebook as described in the above mentioned US patent numbers 5,444,816; 5,699,482; 5,754,976; and 5,701,392 is used to represent the innovative excitation.

The generated scaled codevector at the output of the amplifier 224 is processed through a frequency-dependent pitch enhancer 205.

Enhancing the periodicity of the excitation signal improves the quality in case of voiced segments. This was done in the past by filtering the innovation from the fixed codebook through a filter in the form $1/(1-\varepsilon z^{-T})$ where ε is a factor below 0.5 which controls the amount of introduced periodicity. This approach is less efficient in case of wideband signals since it introduces the periodicity over the entire spectrum. A new alternative approach, which is part of the present invention, is disclosed whereby the periodicity enhancement is achieved by filtering the innovative signal from the fixed codebook by a filter $F(z)$ whose frequency response emphasizes the higher frequencies more than lower frequencies. The coefficients of $F(z)$ are related to the amount of periodicity in the signal. An efficient way to derive the filter coefficients is to relate them to the amount of pitch contribution to the total excitation. This results in a frequency response depending on the subframe periodicity, where higher frequencies are more strongly emphasized (stronger overall slope) for higher pitch gains. This filter has the effect of lowering the energy of the innovative excitation at low frequencies when the signal is more periodic, which enhances the periodicity of the excitation at lower frequencies more than higher frequencies. Suggested forms of this filter are

(1) $F(z)=1-\sigma z^{-1}$ or (2) $F(z)=-\alpha z+1-\alpha z^{-1}$

where σ or α are factors derived from the level of periodicity of the signal. The second 3-tape form of $F(z)$ is used in this preferred embodiment. The factor α is computed in the voicing factor generator 204 as follows:
The ratio of pitch contribution to the total excitation is first computed by

$$R_p = \frac{b^2 \mathbf{v}_T^t \mathbf{v}_T}{\mathbf{u}^t \mathbf{u}} = \frac{b^2 \sum_{n=0}^{N-1} v_T^2(n)}{\sum_{n=0}^{N-1} u^2(n)}$$

where $\mathbf{v}_T$ is the pitch codebook vector, b is the pitch gain, and $\mathbf{u}$ is the excitation vector given at the output of the adder 219 by

$$\mathbf{u} = b\mathbf{v}_T + g\mathbf{c}_k$$

Just a word to mention that the term $b\mathbf{v}_T$ is produced by the pitch codebook 201 in response to the pitch lag T and the past value of $\mathbf{u}$ stored in memory 203. The adaptive codevector from the pitch codebook 201 is then processed through a low-pass filter whose cut-off frequency is adjusted by means of the index j from the demultiplexer 217. The resulting codevector $\mathbf{v}_T$ is then multiplied by the gain g from the demultiplexer 217 through an amplifier 226 to obtain the signal $b\mathbf{v}_T$.

The factor α is given by

$$\alpha = qR_p \quad \text{bounded by} \quad \alpha < q$$

where q is a factor which controls the amount of enhancement (q is set to 0.25 in this preferred embodiment).

The enhanced signal $\mathbf{c}_f$ is computed by filtering the scaled innovative vector $g\mathbf{c}_k$ through the enhancing filter $F(z)$.

The enhanced excitation signal $\mathbf{u}'$ is computed by the adder 220 as

$$\mathbf{u}' = b\mathbf{v}_T + \mathbf{c}_f$$

Note that this process is not performed at the encoder. Thus, it is essential to update the content of the adaptive codebook using the excitation without enhancement to keep synchronism between the encoder and decoder. Therefore, the excitation signal **u** is used to update the memory of the adaptive codebook and the enhaced excitation signal **u'** is used at the input of the LP synthesis filter 206.

The synthesized signal **s'** is computed by filtering the enhanced excitation signal **u'** through the LP synthesis filter 206 which has the form $1/\hat{A}(z)$, where $\hat{A}(z)$ is the interpolated LP filter in the current subframe. As can be seen in Figure 2, the LP coefficients 225 from the demultiplexer 217 are supplied to the LP filter 206 to adjust the parameters of the LP filter 206 accordingly. The deemphasis filter 207 is the inverse of the preemphasis filter 103 of Figure 1. The transfer function of the preemphasis filter 108 is given by

$$D(z)=1/(1-\mu z^{-1})$$

The vector **s'** is filtered through the deemphasis filter $D(z)$ (module 207) to obtain the vector $\mathbf{s}_d$, which is passed through the postprocessing module 208 comprising a high-pass filter to remove the unwanted frequencies below 50 Hz.

The over-sampling module 209 conducts the inverse process of the down-sampling module 101 of Figure 1. In this preferred embodiment, oversampling converts from the 12.8 kHz sampling rate to the original 16 kHz sampling rate, using techniques well known in the art. The oversampled synthesis signal is denoted $\hat{s}$.

The synthesis signal does not contain the higher frequency components which were lost by the downsampling process (module 101 of Figure 1) at the encoder. This gives a low-pass perception of the synthesis speech. To restore the full band of the original signal, a high frequency generation procedure is disclosed. This procedure is performed in modules 212 through 216 of Figure 2.

In this new approach, the high frequency contents are generated by filling the upper part of the spectrum with a white noise properly scaled in the excitation domain, then converted to the speech domain, preferably by shaping it with the same LP filter used for synthesizing the down-sampled signal.

The high frequency generation procedure, which is part of the present invention, is detailed hereinbelow.

The random noise generator 213 generates a white noise sequence w' with a flat spectrum over the entire frequency bandwidth, using techniques well known in the art. The generated sequence is of length N' which is the subframe length in the original domain. Note that N is the subframe length in the down-sampled domain. In this preferred embodiment, N=64 and N'=80 which correspond to 5 ms.

The white noise sequence is properly scaled in the gain adjusting module 214. Gain adjustment comprises the following steps. First, the energy of the generated noise sequence is set equal to the energy of the enhanced excitation signal u' computed by an energy computing module 210, and the resulting scaled noise sequence w is given by

$$w(n) = w'(n)\sqrt{\frac{\sum_{n=0}^{N-1} u^2(n)}{\sum_{n=0}^{N'-1} w'^2(n)}}, \qquad n=0,\ldots,N'-1$$

The second step in the gain scaling is to take into account the voicing of the synthesized signal at the output of generator 204 so as to reduce the energy of the generated noise proportional to the voicing. In this preferred embodiment, this is implemented by measuring the tilt of the synthesis signal through a spectral tilt calculator 212 and reducing the energy accordingly. When the tilt is very strong, which corresponds to voiced segments, the noise energy is further reduced. The tilt factor is computed in module 212 as the first correlation coefficient of the synthesis signal $\mathbf{s}_h$ and it is given by

$$tilt = \frac{\sum_{n=1}^{N-1} s_h(n)s_h(n-1)}{\sum_{n=0}^{N-1} s_h^2(n)}, \quad \text{bounded by } tilt \geq 0 \text{ and } tilt \geq r_v.$$

r_v is given by

$r_v = (E_v - E_c)/(E_v + E_c)$ where E_v is the energy of the scaled pitch codevector and E_c is the energy of the scaled innovative codevector. r_v is mostly less than *tilt* but this bound was introduced as a precaution against high frequency tones where the tilt value is high and the value of r_v is small. So this bound reduces the noise energy for such tonal signals.

The tilt value is 0 in case of flat spectrum and 1 in case of strongly voiced signals. The scaling factor derived from the tilt is given by

$$g_t = 10^{-0.6 tilt}$$

When the tilt is close to zero, the scaling factor is close to 1, which does not result in energy reduction. When the tilt value is 1, the scaling factor results in a reduction of 12 dB in the energy of the generated noise.

Once the noise is properly scaled, it is brought into the speech domain using the spectral shaper 215. In the preferred embodiment, this is achieved by filtering the noise through a bandwidth expanded version of the same LP synthesis filter used in the down-sampled domain ($1/\hat{A}(z/0.8)$).

The filtered scaled noise sequence is then band-pass filtered to the required frequency range to be restored using the band-pass filter 216. In the preferred embodiment, the band-pass filter 216 restricts the noise sequence to the frequency range 5.6-7.2 kHz. The resulting band-pass noise sequence **z** is added to the oversampled synthesized speech signal $\hat{s}$ to obtain the final reconstructed sound signal s_{out} on the output 223.

Although the present invention has been described hereinabove by way of a preferred embodiment thereof, this embodiment can be modified at will, within the scope of the appended claims, without departing from the spirit and nature of the subject invention.

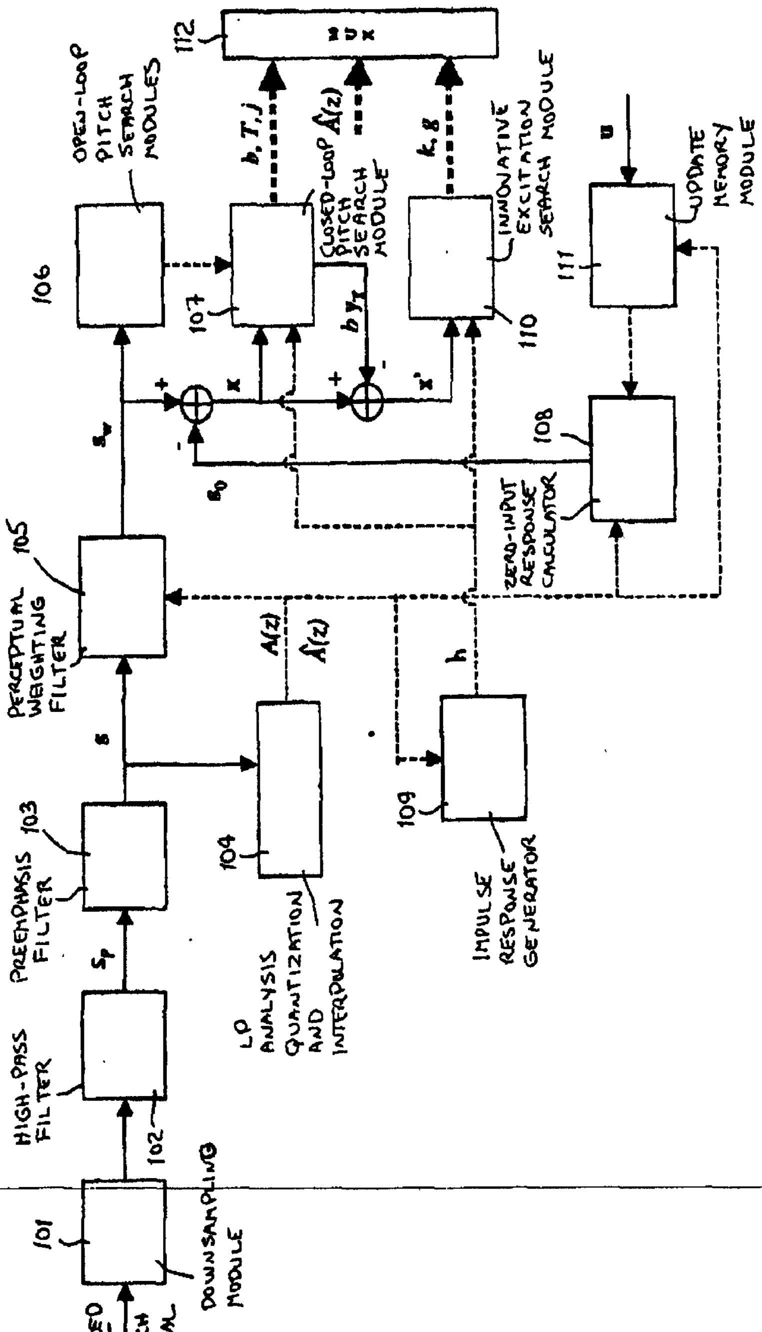
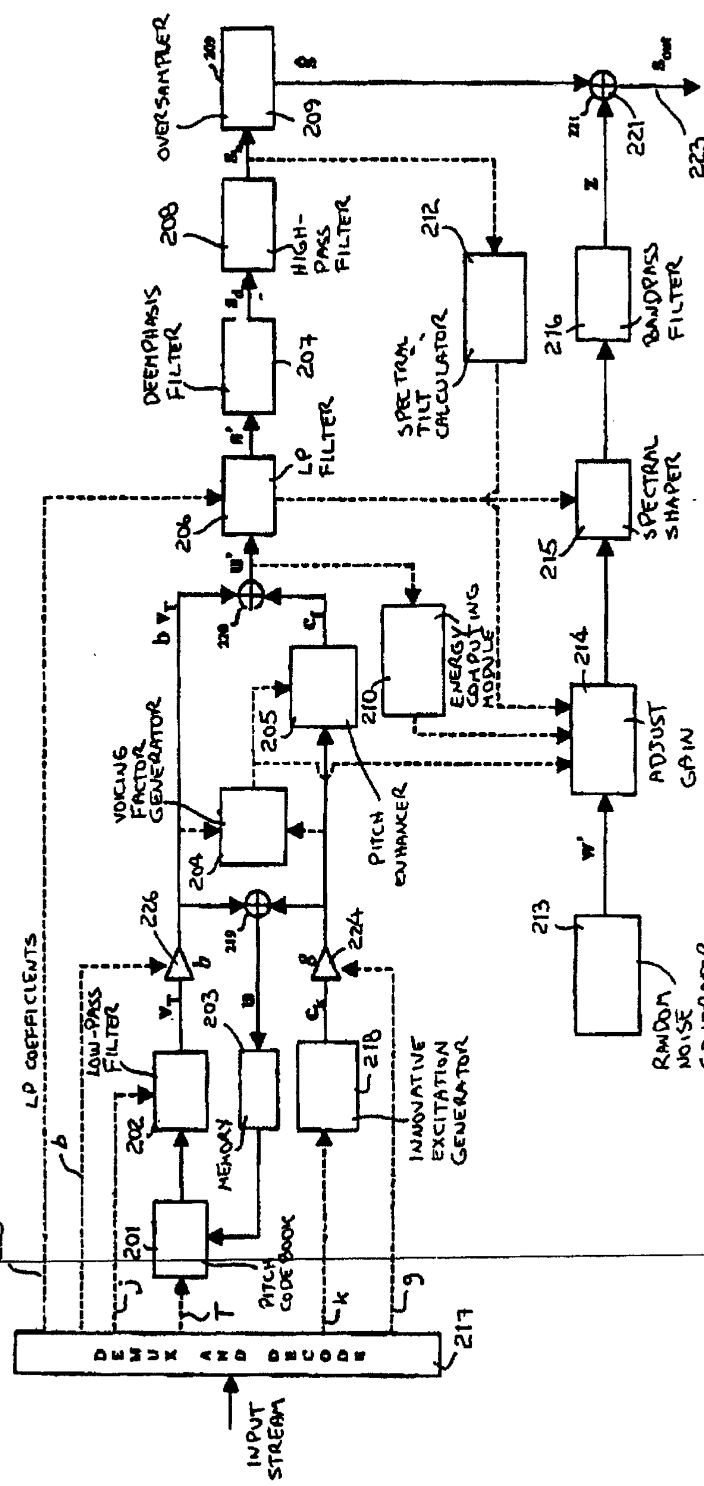

SAMPLED INPUT SPEECH SIGNAL
101
DOWNSAMPLING MODULE
HIGH-PASS FILTER
102
PREEMPHASIS FILTER
103
LP ANALYSIS QUANTIZATION AND INTERPOLATION
104
PERCEPTUAL WEIGHTING FILTER
105
OPEN-LOOP PITCH SEARCH MODULES
106
CLOSED-LOOP PITCH SEARCH MODULE
107
ZERO-INPUT RESPONSE CALCULATOR
108
IMPULSE RESPONSE GENERATOR
109
INNOVATIVE EXCITATION SEARCH MODULE
110
UPDATE MEMORY MODULE
111
MUX
112

Figure 1


OVERSAMPLER
HIGH-PASS FILTER
DEEMPHASIS FILTER
LP FILTER
SPECTRAL TILT CALCULATOR
VOICING FACTOR GENERATOR
PITCH ENHANCER
ENERGY COMPUTING MODULE
SPECTRAL SHAPER
BANDPASS FILTER
ADJUST GAIN
RANDOM NOISE GENERATOR
OUTPUT SPEECH
LP COEFFICIENTS
LOW-PASS FILTER
MEMORY
PITCH CODEBOOK
INNOVATIVE EXCITATION GENERATOR
DEMUX AND DECODE
INPUT STREAM
201
202
203
204
205
206
207
208
209
210
212
213
214
215
216
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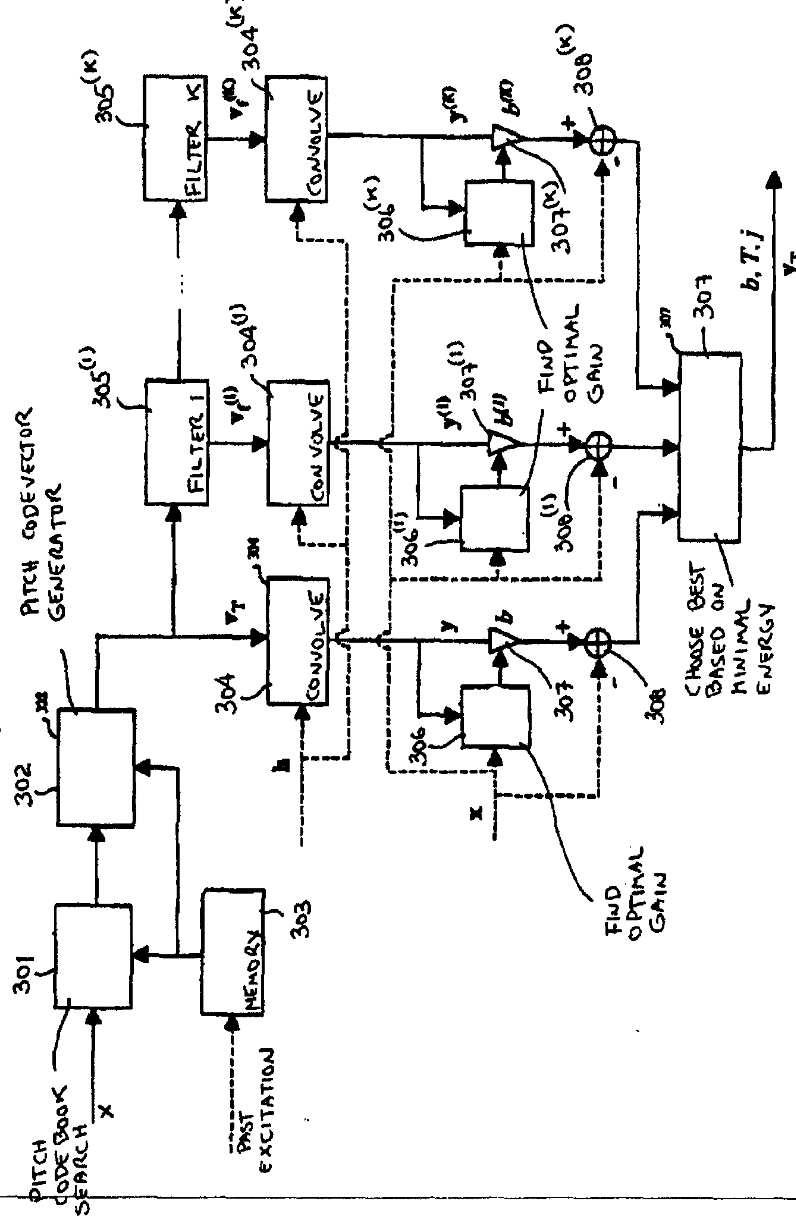
218
221
223
224
225
226

Figure 2



PITCH CODEBOOK SEARCH
X
PAST EXCITATION
301
MEMORY
303
302
PITCH CODEVECTOR GENERATOR
h
304
CONVOLVE
FILTER 1
305(1)
CONVOLVE
304(1)
FILTER K
305(K)
CONVOLVE
304(K)
306
307
308
FIND OPTIMAL GAIN
306(1)
307(1)
308(1)
306(K)
307(K)
308(K)
FIND OPTIMAL GAIN
CHOOSE BEST BASED ON MINIMAL ENERGY
307
b, T, j
y_T

Figure 3

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INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification 7 : G10L 21/02 — A1

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(71) Applicant *(for all designated States except US)*: VOICAGE CORPORATION [CA/CA]; 750, chemin Lucerne, Suite 200, Ville Mont-Royal, Quebec H3R 2H6 (CA).

(72) Inventors; and
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(81) Designated States: AE, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CR, CU, CZ, DE, DK, DM, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).

Published
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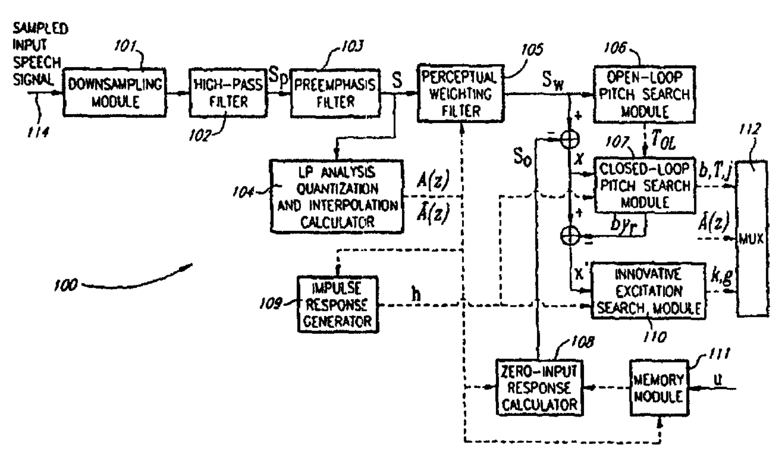
Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.

(54) Title: PERCEPTUAL WEIGHTING DEVICE AND METHOD FOR EFFICIENT CODING OF WIDEBAND SIGNALS



(57) Abstract

A perceptual weighting device for producing a perceptually weighted signal in response to a wideband signal comprises a signal preemphasis filter, a synthesis filter claculator, and a perceptual weighting filter. The signal preemphasis filter enhances high frequency content of the wideband signal to thereby produce a preemphasised signal. The signal preemphasis filter has a transfer function of the form: $P(z)=1-\mu z^{-1}$ wherein μ is a preemphasis factor having a value located between 0 and 1. The synthesis filter calculator is responsive to the preemphasised signal for producing synthesis filter coefficients. Finally, the perceptual weighting filter processes the preemphasised signal in relation to the synthesis filter coefficients to produce the perceptually weighted signal. The perceptual weighting filter has a transfer function, with fixed denominator, of the form: $W(z)\ A\ (z/\gamma_1)\ /\ (1-\gamma_2 z^{-1})$ where $0<\gamma_2<\gamma_1\leq 1$ and γ_2 and γ_1 are weighting control values, whereby weighting of the wideband signal in a format region is substantially decoupled from a spectral tilt of this wideband signal.

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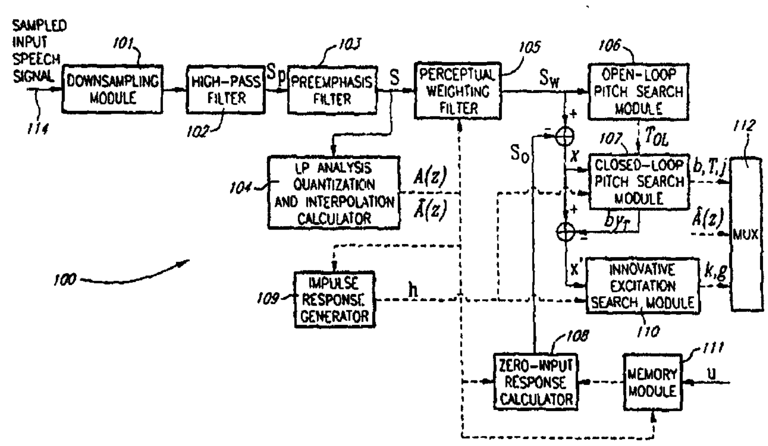

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PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference GP/12916.9	**FOR FURTHER ACTION**	See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)
International application No. PCT/CA99/01010	International filing date *(day/month/year)* 27/10/1999	Priority date *(day/month/year)* 27/10/1998
International Patent Classification (IPC) or national classification and IPC G10L21/02		
Applicant VOICE AGE CORPORATION et al.		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.

2. This REPORT consists of a total of 5 sheets, including this cover sheet.

   ☐ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

   These annexes consist of a total of sheets.

3. This report contains indications relating to the following items:

   I ☒ Basis of the report
   II ☐ Priority
   III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
   IV ☐ Lack of unity of invention
   V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations suporting such statement
   VI ☐ Certain documents cited
   VII ☒ Certain defects in the international application
   VIII ☒ Certain observations on the international application

Date of submission of the demand 28/04/2000	Date of completion of this report 01.08.2000
Name and mailing address of the international preliminary examining authority: European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Authorized officer Greiser, N Telephone No. +49 89 2399 7402

Form PCT/IPEA/409 (cover sheet) (January 1994)

I. Basis of the report

1. This report has been drawn on the basis of (*substitute sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to the report since they do not contain amendments.*):

Description, pages:

1-45 as originally filed

Claims, No.:

1-49 as originally filed

Drawings, sheets:

1/4-4/4 as originally filed

2. The amendments have resulted in the cancellation of:

☐ the description, pages:
☐ the claims, Nos.:
☐ the drawings, sheets:

3. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)):

4. Additional observations, if necessary:

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes:	Claims	1-49
	No:	Claims	
Inventive step (IS)	Yes:	Claims	1-49
	No:	Claims	
Industrial applicability (IA)	Yes:	Claims	1-49
	No:	Claims	

2. Citations and explanations

see separate sheet

VII. Certain defects in the international application

The following defects in the form or contents of the international application have been noted:

see separate sheet

VIII. Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

see separate sheet

To Section V:

1. The technical field of invention is a perceptual weighting device which is employed to minimize the error between a wideband speech signal and a synthesized weighted wideband speech signal in an analysis-by-synthesis codec.

   Document D1= EP-0465057 discloses a perceptual weighting device which comprises a cascade of a perceptual weighting filter and a preemphasis filter for coding wideband speech signals employed in a CELP based codec. The inventors realize that said prior-art perceptual weighting device may not efficiently encode a wideband speech signal. To solve the technical problem the inventors suggest to introduce a synthesis filter calculator responsive to a preemphasised signal for producing synthesis filter coefficients, and a perceptual weighting filter which is responsive to said preemphasised signal and said synthesis filter coefficients.

   Under the interpretation of Section VIII of this Report, the subject-matter of claim 1 is novel. Moreover, the subject-matter of claim 1 is non-obvious and, hence, inventive.

2. Claim 8 claims a method for producing a perceptually weighted signal in response to a wideband speech signal corresponding to apparatus claim 1. Under the interpretation of Section VIII of this Report, claim 8 is novel and inventive.

3. Dependent claims 2-7 and 9-49 are novel and appear to involve an inventive step.

To Section VII:

4. Contrary to the requirement of Rule 5.1 (a)(ii) PCT, the relevant background art D1 is not mentioned in the description, nor is this document identified therein. Moreover, the independent claims should be formulated in the two-part form (Rule 6.3 (b) PCT). In detail, a perceptual weighting device comprising a signal preemphasis filter is part of the prior art D1 and, therefore, should form the definition of the claimed subject-matter of claim 1 (preamble); the characterising portion should contain the technical features of a synthesis filter calculator, and a perceptual weighting filter. To increase the intelligibility of the claims reference

signs in parentheses should be inserted (Rule 6.2 (b) PCT).

To Section VIII:

5. The subject-matter of claim 1 is too broad and, hence, not clear. In its present form, claim 1 claims a perceptual weighting device for producing a perceptually weighted signal in response to a wideband signal. Since the description specifies a perceptual weighting technique for wideband speech signals, claim 1 is insufficiently supported by the description. To remedy the deficiency, it is suggested to claim a perceptual weighting device for producing a perceptually weighted signal in response to a wideband <u>speech</u> signal (amendment is underlined). The same objection applies to method claim 8. For the sake of completeness, the term "wideband speech signal" should be used in claims 15, 22, 29, 36, and 43 as well.

Copy for the Elected Office (EO/US)

PCT/CA99/01010

09/830276

PATENT COOPERATION TREATY

PCT

NOTIFICATION OF THE RECORDING OF A CHANGE

(PCT Rule 92bis.1 and Administrative Instructions, Section 422)

From the INTERNATIONAL BUREAU

To:

DUBUC, Jean, H.
Goudreau Gage Dubuc
The Stock Exchange Tower
Suite 3400
800 Place Victoria
Montreal, Quebec H4Z 1E9
CANADA

Date of mailing (day/month/year) 12 December 2001 (12.12.01)	
Applicant's or agent's file reference GP/12916.9	**IMPORTANT NOTIFICATION**
International application No. PCT/CA99/01010	**International filing date** (day/month/year) 27 October 1999 (27.10.99)

1. The following indications appeared on record concerning:

[X] the applicant [ ] the inventor [ ] the agent [ ] the common representative

Name and Address	State of Nationality	State of Residence
VOICAGE CORPORATION 750, chemin Lucerne Suite 250 Ville Mont-Royal, Québec H3R 2H6 Canada	CA	CA
	Telephone No.	
	Facsimile No.	
	Teleprinter No.	

2. The International Bureau hereby notifies the applicant that the following change has been recorded concerning:

[ ] the person [X] the name [ ] the address [ ] the nationality [ ] the residence

Name and Address	State of Nationality	State of Residence
VOICEAGE CORPORATION 750, chemin Lucerne Suite 250 Ville Mont-Royal, Quebec H3R 2H6 Canada	CA	CA
	Telephone No.	
	Facsimile No.	
	Teleprinter No.	

3. Further observations, if necessary:

4. A copy of this notification has been sent to:

[X] the receiving Office
[ ] the International Searching Authority
[ ] the International Preliminary Examining Authority
[ ] the designated Offices concerned
[X] the elected Offices concerned
[ ] other:

The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland	Authorized officer François BAECHLER
Facsimile No.: (41-22) 740.14.35	Telephone No.: (41-22) 338.83.38

Form PCT/IB/306 (March 1994)

004534019

PATENT COOPERATION TREATY

From the INTERNATIONAL BUREAU

PCT **NOTIFICATION OF ELECTION** (PCT Rule 61.2)	To: Assistant Commissioner for Patents United States Patent and Trademark Office Box PCT Washington, D.C.20231 ETATS-UNIS D'AMERIQUE in its capacity as elected Office
Date of mailing (day/month/year) 02 June 2000 (02.06.00)	
International application No. PCT/CA99/01010	**Applicant's or agent's file reference** GP/12916.9
International filing date (day/month/year) 27 October 1999 (27.10.99)	**Priority date** (day/month/year) 27 October 1998 (27.10.98)
Applicant BESSETTE, Bruno et al	

1. The designated Office is hereby notified of its election made:

[X] in the demand filed with the International Preliminary Examining Authority on:

28 April 2000 (28.04.00)

[ ] in a notice effecting later election filed with the International Bureau on:

2. The election [X] was [ ] was not

made before the expiration of 19 months from the priority date or, where Rule 32 applies, within the time limit under Rule 32.2(b).

The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland Facsimile No.: (41-22) 740.14.35	Authorized officer Beate Giffo-Schmitt Telephone No.: (41-22) 338.83.38

PATENT COOPERATION TREATY

PCT	From the INTERNATIONAL BUREAU
NOTIFICATION OF THE RECORDING OF A CHANGE (PCT Rule 92bis.1 and Administrative Instructions, Section 422)	To: DUBUC, Jean, H. Goudreau Gage Dubuc The Stock Exchange Tower Suite 3400 800 Place Victoria Montreal, Quebec H4Z 1E9 CANADA
Date of mailing (day/month/year) 02 June 2000 (02.06.00)	
Applicant's or agent's file reference GP/12916.9	**IMPORTANT NOTIFICATION**
International application No. PCT/CA99/01010	**International filing date** (day/month/year) 27 October 1999 (27.10.99)

1. The following indications appeared on record concerning:

☐ the applicant ☐ the inventor ☒ the agent ☐ the common representative

Name and Address	State of Nationality	State of Residence
DUBUC, Jean, H. Goudreau Gage Dubuc & Martineau Walker The Stock Exchange Tower Suite 3400 800 Place Victoria Montreal, Quebec H4Z 1E9 Canada	Telephone No. 514 397 7609 Facsimile No. 514 397 4382 Teleprinter No.	

2. The International Bureau hereby notifies the applicant that the following change has been recorded concerning:

☐ the person ☐ the name ☒ the address ☐ the nationality ☐ the residence

Name and Address	State of Nationality	State of Residence
DUBUC, Jean, H. Goudreau Gage Dubuc The Stock Exchange Tower Suite 3400 800 Place Victoria Montreal, Quebec H4Z 1E9 Canada	Telephone No. 514 397 7609 Facsimile No. 514 397 4382 Teleprinter No.	

3. Further observations, if necessary:

The change in the agent's address in the demand has been considered as a request for change under Rule 92bis. In case of disagreement, the applicant should immediately notify the International Bureau accordingly.

4. A copy of this notification has been sent to:

☒ the receiving Office
☐ the International Searching Authority
☒ the International Preliminary Examining Authority
☐ the designated Offices concerned
☒ the elected Offices concerned
☐ other:

The International Bureau of WIPO **34, chemin des Colombettes** **1211 Geneva 20, Switzerland** Facsimile No.: (41-22) 740.14.35	Authorized officer Beate Giffo-Schmitt Telephone No.: (41-22) 338.83.38

Form PCT/IB/306 (March 1994) 003326529

Copy for the Elected Office (EO/US) PCT/CA99/01010

PATENT COOPERATION TREATY

PCT

From the INTERNATIONAL BUREAU

To:

DUBUC, Jean, H.
Goudreau Gage Dubuc
The Stock Exchange Tower
Suite 3400
800 Place Victoria
Montreal, Quebec H4Z 1E9
CANADA

NOTIFICATION OF THE RECORDING OF A CHANGE

(PCT Rule 92bis.1 and Administrative Instructions, Section 422)

Date of mailing (day/month/year) 23 August 2000 (23.08.00)	
Applicant's or agent's file reference GP/12916.9	**IMPORTANT NOTIFICATION**
International application No. PCT/CA99/01010	**International filing date** (day/month/year) 27 October 1999 (27.10.99)

1. The following indications appeared on record concerning:

[X] the applicant [ ] the inventor [ ] the agent [ ] the common representative

Name and Address	State of Nationality	State of Residence
VOICAGE CORPORATION 750, chemin Lucerne Suite 200 Ville Mont-Royal, Quebec H3R 2H6 Canada	CA	CA
	Telephone No.	
	Facsimile No.	
	Teleprinter No.	

2. The International Bureau hereby notifies the applicant that the following change has been recorded concerning:

[ ] the person [ ] the name [X] the address [ ] the nationality [ ] the residence

Name and Address	State of Nationality	State of Residence
VOICAGE CORPORATION 750, chemin Lucerne Suite 250 Ville Mont-Royal, Quebec H3R 2H6 Canada	CA	CA
	Telephone No.	
	Facsimile No.	
	Teleprinter No.	

3. Further observations, if necessary:

4. A copy of this notification has been sent to:

[X] the receiving Office
[ ] the International Searching Authority
[X] the International Preliminary Examining Authority
[ ] the designated Offices concerned
[X] the elected Offices concerned
[ ] other:

The International Bureau of WIPO **34, chemin des Colombettes** **1211 Geneva 20, Switzerland** Facsimile No.: (41-22) 740.14.35	Authorized officer I. Britel Telephone No.: (41-22) 338.83.38

Form PCT/IB/306 (March 1994) 003483304

INTERNATIONAL ; RCH REPORT

Inte)plication No
PCT/CA 99/01010

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 G10L21/02

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 G10L

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	EP 0 465 057 A (AMERICAN TELEPHONE & TELEGRAPH) 8 January 1992 (1992-01-08) abstract; figure 2 page 6, line 7 - line 26	1
A	EP 0 732 686 A (AT & T CORP) 18 September 1996 (1996-09-18) abstract	1

[ ] Further documents are listed in the continuation of box C

[X] Patent family members are listed in annex.

° Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance
"E" earlier document but published on or after the international filing date
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance, the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance, the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
25 February 2000	03/03/2000

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Van Doremalen, J

2

Form PCT/ISA/210 (second sheet) (July 1992)

INTERNATIONAL RCH REPORT

informati. . patent family members

Intr pplication No
PCT/CA 99/01010

Patent document cited in search report		Publication date	Patent family member(s)			Publication date
EP 0465057	A	08-01-1992	US	5235669	A	10-08-1993
			DE	69123500	D	23-01-1997
			DE	69123500	T	17-04-1997
			EP	0732686	A	18-09-1996
			JP	4233600	A	21-08-1992
EP 0732686	A	18-09-1996	US	5235669	A	10-08-1993
			DE	69123500	D	23-01-1997
			DE	69123500	T	17-04-1997
			EP	0465057	A	08-01-1992
			JP	4233600	A	21-08-1992

Form PCT/ISA/210 (patent family annex) (July 1992)

P/ ⁻NT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference GP/12916.9	FOR FURTHER ACTION see Notification of Transmittal of International Search Report (Form PCT/ISA/220) as well as, where applicable, item 5 below.	
International application No. PCT/CA 99/01010	International filing date (day/month/year) 27/10/1999	(Earliest) Priority Date (day/month/year) 27/10/1998
Applicant VoiceAge Corporation et al.		

This International Search Report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This International Search Report consists of a total of 2 sheets.

[X] It is also accompanied by a copy of each prior art document cited in this report.

1. **Basis of the report**
   a. With regard to the **language**, the international search was carried out on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.
      [ ] the international search was carried out on the basis of a translation of the international application furnished to this Authority (Rule 23.1(b)).
   b. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international search was carried out on the basis of the sequence listing :
      [ ] contained in the international application in written form.
      [ ] filed together with the international application in computer readable form.
      [ ] furnished subsequently to this Authority in written form.
      [ ] furnished subsequently to this Authority in computer readible form.
      [ ] the statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
      [ ] the statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished

2. [ ] **Certain claims were found unsearchable** (See Box I).
3. [ ] **Unity of invention is lacking** (see Box II).

4. With regard to the **title**,
   [X] the text is approved as submitted by the applicant.
   [ ] the text has been established by this Authority to read as follows:

5. With regard to the **abstract**,
   [X] the text is approved as submitted by the applicant.
   [ ] the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box III. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. The **figure of the drawings** to be published with the abstract is Figure No. 1
   [X] as suggested by the applicant.
   [ ] because the applicant failed to suggest a figure.
   [ ] because this figure better characterizes the invention.
   [ ] None of the figures.

Form PCT/ISA/210 (first sheet) (July 1998)

INTERNATIONAL SEARCH REPORT

International Application No
PC . 99/01010

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 G10L21/02

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 G10L

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	EP 0 465 057 A (AMERICAN TELEPHONE & TELEGRAPH) 8 January 1992 (1992-01-08) abstract; figure 2 page 6, line 7 - line 26	1
A	EP 0 732 686 A (AT & T CORP) 18 September 1996 (1996-09-18) abstract	1

[ ] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
25 February 2000	03/03/2000

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Van Doremalen, J

2

Form PCT/ISA/210 (second sheet) (July 1992)

INTERNATIONAL SEARCH REPORT

Informa... on patent family members

International Application No
PC' 99/01010

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 0465057 A	08-01-1992	US 5235669 A	10-08-1993
		DE 69123500 D	23-01-1997
		DE 69123500 T	17-04-1997
		EP 0732686 A	18-09-1996
		JP 4233600 A	21-08-1992
EP 0732686 A	18-09-1996	US 5235669 A	10-08-1993
		DE 69123500 D	23-01-1997
		DE 69123500 T	17-04-1997
		EP 0465057 A	08-01-1992
		JP 4233600 A	21-08-1992

Form PCT/ISA/210 (patent family annex) (July 1992)

UNITED STATES PA   ' AND TRADEMARK OFFICE

Commissioner for Patents, Box PCT
United States Patent and Trademark Office
Washington, D.C. 20231
www.uspto.gov

U.S. APPLICATION NO.	FIRST NAMED APPLICANT		ATTY. DOCKET NO.
09/830276	BESSETTE	B	4082-0130P

BIRCH STEWART KOLASCH & BIRCH
PO BOX 747
FALLS CHURCH, VA 22040 0747

INTERNATIONAL APPLICATION NO.
PCT/CA99/01010

I.A. FILING DATE	PRIORITY DATE
27 OCT 99	27 OCT 98

DATE MAILED: 22 MAY 2001

NOTIFICATION OF MISSING REQUIREMENTS UNDER 35 U.S.C. 371 IN THE UNITED STATES DESIGNATED/ELECTED OFFICE (DO/EO/US)

1. The following items have been submitted by the applicant or the IB to the United States Patent and Trademark Office as ☐ a Designated Office (37 CFR 1.494) ☒ an Elected Office (37 CFR 1.495):

- ☒ U.S. Basic National Fee.
- ☒ Indication of Small Entity Status.
- ☒ Copy of the international application.
- ☐ Translation of the international application into English.
- ☐ Oath or Declaration of inventors(s).
- ☐ Translation of Article 19 amendments into English.
- ☐ Copy of Article 19 amendments.
- ☐ Other:
- ☐ Priority Document.
- ☒ The International Preliminary Examination Report in English and its Annexes, if any.
- ☐ Translation of Annexes to the International Preliminary Examination Report into English.

2. ☒ Applicant has requested early processing under 35 U.S.C. 371(f) but has not filed the following indicated items and/or the indicated items in paragraph 3 below. The Basic National Fee and the copy of the international application must be filed prior to 20 or 30 months from the priority date to avoid abandonment.
- ☐ U.S. Basic National Fee.
- ☐ Copy of the international application.

3. The following items **MUST** be furnished within the period set forth below in order to complete the requirements for acceptance under 35 U.S.C. 371:
- ☐ a. Translation of the application into English. A processing fee will be required if submitted later than the appropriate 20 or 30 months from the priority date.
  - ☐ The current translation is defective for the reasons indicated on the attached Notice of Defective Translation.
- ☐ b. Processing fee for providing the translation of the application and/or the Annexes later than the appropriate 20 or 30 months from the priority date (37 CFR 1.492(f)).
- ☒ c. Oath or declaration of the inventors, in compliance with 37 CFR 1.497(a) and (b), properly identifying the application (preferably by the International application number and international filing date). A surcharge will be required if submitted later than the appropriate 20 or 30 months from the priority date.
  - ☐ The current oath or declaration does not comply with 37 CFR 1.497(a) and (b) for the reasons indicated on the attached PCT/DO/EO/917.
- ☐ d. Surcharge for providing the oath or declaration later than the appropriate 20 or 30 months from the priority date (37 CFR 1.492(e)).

4. Additional claim fees of $________ as a ☐ large entity ☐ small entity, including any required multiple dependent claim fee, are required. Applicant must submit the additional claim fees or cancel the additional claims for which fees are due (37 CFR 1.492(g)). See attached PTO-875.

5. ☐ Applicant has not submitted the required sequence listing pursuant to 37 CFR 1.821-1.825. See attached PCT/DO/EO/920.

ALL OF THE ITEMS SET FORTH IN 3(a)-3(d), 4 AND 5 ABOVE MUST BE SUBMITTED WITHIN TWO (2) MONTHS FROM THE DATE OF THIS NOTICE OR BY 22 OR 32 MONTHS (where 37 CFR 1.495 applies) FROM THE PRIORITY DATE FOR THE APPLICATION, WHICHEVER IS LATER. FAILURE TO PROPERLY RESPOND WILL RESULT IN ABANDONMENT.

The time period set above may be extended by filing a petition and fee for extension of time under the provisions of 37 CFR 1.136(a).

6. If box 3a or 3c is checked, a translation of the Annexes MUST be submitted no later than the time period set above or the Annexes will be cancelled. A processing fee will be required if submitted later than 20 or 30 months from the priority date.

7. ☐ The Article 19 amendments are cancelled since a translation was not provided by the appropriate 20 (37 CFR 1.494(d)) or 30 (37 CFR 1.495(d)) months from the priority date.

Applicant is reminded that any communication to the United States Patent and Trademark Office must be mailed to the address given in the heading and include the U.S. application no. shown above. (37 CFR 1.5)

A copy of this notice MUST be returned with this response.

Enclosed: ☐ PCT/DO/EO/917 ☐ Notice of Defective Translation ☐ PTO-875 ☐ PCT/DO/EO/920

Winston M Alvarado
Telephone: 703-305-6421

FORM PCT/DO/EO/905 (March 2001)

JC17 Rec'' ''CT/PTO 2 0 JUN 2001 PCT

09/830276

BOX PCT
PATENT
4082-0130P

OIPE JC152 JUN 2 0 2001 PATENT & TRADEMARK OFFICE

IN THE U.S. PATENT AND TRADEMARK OFFICE

APPLICANT:	Bruno BESSETTE et al.
INTERNATIONAL APPL. NO.:	PCT/CA99/01010
APPL. NO.:	09/830,276
FILED:	April 25, 2001 Int'l: October 27, 1999
FOR:	PERCEPTUAL WEIGHTING DEVICE AND METHOD FOR EFFICIENT CODING OF WIDEBAND SIGNALS

LETTER SUBMITTING ADDITIONAL DOCUMENTS FOR
ENTERING NATIONAL PHASE FOR A PCT APPLICATION

BOX PCT
Assistant Commissioner for Patents — June 20, 2001
Washington, DC 20231

Sir:

Under the provisions of 37 C.F.R. § 1.494 or 37 C.F.R. § 1.495, attached hereto are the following additional items necessary for entering the national phase in connection with the above-identified PCT international application.

☒ Executed Declaration and Power of Attorney.

☒ Original ☐ Photocopy

☐ The specification attached to the executed Declaration and Power of Attorney is a true copy of the specification which was filed in the U.S. Patent and Trademark Office on including any amendments thereto (if applicable) filed on even date therewith.

☒ The undersigned hereby declares that "Attorney Docket No. 4082-0130P" on page 1 of the attached inventors' Declaration corresponds to Appl. No. 09/830,276 filed April 25, 2001 entitled "PERCEPTUAL WEIGHTING DEVICE AND METHOD FOR EFFICIENT CODING OF WIDEBAND SIGNALS".

☐ English language specification, claims, and Abstract with ( ) sheets of drawings.

☒ Applicant claims small entity status under 37 C.F.R. § 1.27.

☐ Attached is a copy of Form PCT/DO/EO/905.

☐ ____

____

☐ No extension fee is required because the undersigned has not yet received the Notification of Missing Requirements (Form PCT/DO/EO/905). However, if for some reason it is determined that an extension of time is necessary, applicant hereby respectfully petitions for an extension of time for the filing of the present paper in accordance with the provisions of 37 C.F.R. § 1.136 and 37 C.F.R. § 1.17.

☐ Applicant(s) hereby respectfully petitions for ( ) month(s) extension of time for the filing of the present paper in accordance with the provisions of 37 C.F.R. § 1.136 and 37 C.F.R. § 1.17. The required fee of $0.00 is attached hereto.

Appl. No. 09/830,276

The Government Filing Surcharge in the amount of $0.00 in accordance with 37 C.F.R. §§ 1.494 and 1.492 was previously paid for concurrently with the filing of the application on .

☒ Submitted concurrently herewith **under separate cover** for recording is an Assignment.

☐ A check in the amount of $0.00 to cover the above-mentioned fees is enclosed.

☐ A Fee of $0.00 to cover the increase in fees of the filing Surcharge is enclosed.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No. 02-2448 for any additional fee required under 37 C.F.R. §§ 1.16 or 1.17; particularly, extension of time fees.

Respectfully submitted,

BIRCH, STEWART, KOLASCH & BIRCH, LLP

By F. Prince Butler, #25,666

P.O. Box 747
Falls Church, VA 22040-0747
(703) 205-8000

FPB/tm
4082-0130p

Attachments

(Rev. 01/22/01)

Attorney Docket No. 4082-0130P

BIRCH, STEWART, KOLASCH & BIRCH, LLP

P.O. Box 747 • Falls Church, Virginia 22040-0747
Telephone: (703) 205-8000 • Facsimile: (703) 205-8050

PLEASE NOTE: YOU MUST COMPLETE THE FOLLOWING

COMBINED DECLARATION AND POWER OF ATTORNEY FOR PATENT AND DESIGN APPLICATIONS

As a below named inventor, I hereby declare that: my residence, post office address and citizenship are as stated next to my name; that I verily believe that I am the original, first and sole inventor (if only one inventor is named below) or an original, first and joint inventor (if plural inventors are named below) of the subject matter which is claimed and for which a patent is sought on the invention entitled:

Insert Title: PERCEPTUAL WEIGHTING DEVICE AND METHOD FOR EFFICIENT CODING OF WIDEBAND SIGNALS

Fill in Appropriate Information - For Use Without Specification Attached:

the specification of which is attached hereto. If not attached hereto,
the specification was filed on April 25, 2001 as United States Application Number ______;
and amended on ______ (if applicable) and/or
the specification was filed on October 27, 1999 as PCT International Application Number PCT/CA99/01010; and was amended under PCT Article 19 on ______ (if applicable)

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose information which is material to patentability as defined in Title 37, Code of Federal Regulations, §1.56.

I do not know and do not believe the same was ever known or used in the United States of America before my or our invention thereof, or patented or described in any printed publication in any country before my or our invention thereof or more than one year prior to this application, that the same was not in public use or on sale in the United States of America more than one year prior to this application, that the invention has not been patented or made the subject of an inventor's certificate issued before the date of this application in any country foreign to the United States of America on an application filed by me or my legal representative or assigns more than twelve months (six months for designs) prior to this application, and that no application for patent or inventor's certificate on this invention has been filed in any country foreign to the United States of America prior to this application by me or my legal representatives or assigns, except as follows.

I hereby claim foreign priority benefits under Title 35, United States Code, §119(a)-(d) of any foreign application(s) for patent or inventor's certificate listed below and have also identified below any foreign application for patent or inventor's certificate having a filing date before that of the application on which priority is claimed:

Insert Priority Information: (if appropriate)

Prior Foreign Application(s) — Priority Claimed

(Number)	(Country)	(Month/Day/Year Filed)	Yes	No
2,252,170	CANADA	27 October 1998	☒	☐
			☐	☐
			☐	☐
			☐	☐

I hereby claim the benefit under Title 35, United States Code, §119(e) of any United States provisional applications(s) listed below.

Insert Provisional Application(s): (if any)

(Application Number)	(Filing Date)

All Foreign Applications, if any, for any Patent or Inventor's Certificate Filed More than 12 Months (6 Months for Designs) Prior to the Filing Date of This Application:

Insert Requested Information: (if appropriate)

Country	Application Number	Date of Filing (Month/Day/Year)

I hereby claim the benefit under Title 35, United States Code, §120 of any United States and/or PCT application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States and/or PCT application in the manner provided by the first paragraph of Title 35, United States Code, §112, I acknowledge the duty to disclose information which is material to the patentability as defined in Title 37, Code of Federal Regulations, §1.56 which became available between the filing date of the prior application and the national or PCT international filing date of this application.

Insert Prior U.S. Application(s): (if any)

(Application Number)	(Filing Date)	(Status - patented, pending, abandoned)

Attorney Docket No. 4082-0130P

I hereby appoint the following attorneys to prosecute this application and/or an international application based on this application and to transact all business in the Patent and Trademark Office connected therewith and in connection with the resulting patent based on instructions received from the entity who first sent the application papers to the attorneys identified below, unless the inventor(s) or assignee provides said attorneys with a written notice to the contrary:

Raymond C. Stewart	(Reg. No. 21,066)	Terrell C. Birch	(Reg. No. 19,382)
Joseph A. Kolasch	(Reg. No. 22,463)	James M. Slattery	(Reg. No. 28,380)
Bernard L. Sweeney	(Reg. No. 24,448)	Michael K. Mutter	(Reg. No. 29,680)
Charles Gorenstein	(Reg. No. 29,271)	Gerald M. Murphy, Jr.	(Reg. No. 28,977)
Leonard R. Svensson	(Reg. No. 30,330)	Terry L. Clark	(Reg. No. 32,644)
Andrew D. Meikle	(Reg. No. 32,868)	Marc S. Weiner	(Reg. No. 32,181)
Joe McKinney Muncy	(Reg. No. 32,334)	Donald J. Daley	(Reg. No. 34,313)
John W. Bailey	(Reg. No. 32,881)	John A. Castellano	(Reg. No. 35,094)
Gary D. Yacura	(Reg. No. 35,416)	Thomas S. Auchterlonie	(Reg. No. 37,275)
Mark J. Nuell	(Reg. No. 36,623)	F. Prince Butler	(Reg. No. 25,666)

20 -

Send Correspondence to:

BIRCH, STEWART, KOLASCH & BIRCH, LLP or Customer No. 2292
P.O. Box 747 • Falls Church, Virginia 22040-0747
Telephone: (703) 205-8000 • Facsimile: (703) 205-8050

PLEASE NOTE: YOU MUST COMPLETE THE FOLLOWING:

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Full Name of First or Sole Inventor: Insert Name of Inventor; Insert Date This Document is Signed; Insert Residence; Insert Citizenship; Insert Post Office Address — 1-00

GIVEN NAME/FAMILY NAME	INVENTOR'S SIGNATURE		DATE*
Bruno BESSETTE	Bruno Bessette		June 6, 2001
Residence (City, State & Country)		CITIZENSHIP	
1546 Perodeau, Rock Forest, Quebec J1N 1L2, CANADA CAX		Canadian	
MAILING ADDRESS (Complete Street Address including City, State & Country)			
Same as above			

Full Name of Second Inventor, if any: see above — 2-00

GIVEN NAME/FAMILY NAME	INVENTOR'S SIGNATURE		DATE*
Redwan SALAMI	R Salami		June 6, 2001
Residence (City, State & Country)		CITIZENSHIP	
963 Leo Laliberte, Sherbrooke, Quebec J1J 4L3, CANADA CAX		Canadian	
MAILING ADDRESS (Complete Street Address including City, State & Country)			
Same as above			

Full Name of Third Inventor, if any: see above — 3-00

GIVEN NAME/FAMILY NAME	INVENTOR'S SIGNATURE		DATE*
Roch LEFEBVRE	Roch Lefebvre		June 6, 2001
Residence (City, State & Country)		CITIZENSHIP	
259, avenue de la Bourgade, Canton de Magog, Quebec J1K 5R9, CANADA CAX		Canadian	
MAILING ADDRESS (Complete Street Address including City, State & Country)			
Same as above			

Full Name of Fourth Inventor, if any: see above

GIVEN NAME/FAMILY NAME	INVENTOR'S SIGNATURE		DATE*
Residence (City, State & Country)		CITIZENSHIP	
MAILING ADDRESS (Complete Street Address including City, State & Country)			

Page 2 of 2
(Rev. 01/22/01)

*DATE OF SIGNATURE

Application Assignment Record

According to the application transmittal letter, an assignment recording ownership was filed with this application; however, a copy of this record was not located in the original file history record obtained from the United States Patent and Trademark Office. Upon your request, we will attempt to obtain the assignment documents from the Assignment Recordation Branch of of the United States Patent and Trademark Office or from a related application case (if applicable). Please note that additional charges will apply for this service.

UNITED STATES PATENT AND TRADEMARK OFFICE

Commissioner for Patents, Box PCT
United States Patent and Trademark Office
Washington, D.C. 20231
www.uspto.gov

U.S. APPLICATION NO		FIRST NAMED APPLICANT		ATTY. DOCKET NO.
09/830276		BESSETTE	B	4082-0130P

BIRCH STEWART KOLASCH & BIRCH
PO BOX 747
FALLS CHURCH, VA 22040 0747

OIPE JUN 2 0 2001 PATENT & TRADEMARK OFFICE

7-23-01 DOCKETED ES
Perfect

INTERNATIONAL APPLICATION NO	
PCT/CA99/01010	
I.A. FILING DATE	PRIORITY DATE
27 OCT 99	27 OCT 98

DATE MAILED: 22 MAY 2001

NOTIFICATION OF MISSING REQUIREMENTS UNDER 35 U.S.C. 371 IN THE UNITED STATES DESIGNATED/ELECTED OFFICE (DO/EO/US)

1. The following items have been submitted by the applicant or the IB to the United States Patent and Trademark Office as ☐ a Designated Office (37 CFR 1.494) ☒ an Elected Office (37 CFR 1.495):
   - ☒ U.S. Basic National Fee.
   - ☒ Copy of the international application.
   - ☐ Oath or Declaration of inventors(s).
   - ☐ Copy of Article 19 amendments.
   - ☐ Priority Document.
   - ☒ The International Preliminary Examination Report in English and its Annexes, if any.
   - ☐ Translation of Annexes to the International Preliminary Examination Report into English.
   - ☒ Indication of Small Entity Status.
   - ☐ Translation of the international application into English.
   - ☐ Translation of Article 19 amendments into English.
   - ☐ Other:

2. ☒ Applicant has requested early processing under 35 U.S.C. 371(f) but has not filed the following indicated items and/or the indicated items in paragraph 3 below. The Basic National Fee and the copy of the international application must be filed prior to 20 or 30 months from the priority date to avoid abandonment.
   - ☐ U.S. Basic National Fee.
   - ☐ Copy of the international application.

3. The following items **MUST** be furnished within the period set forth below in order to complete the requirements for acceptance under 35 U.S.C. 371:
   - ☐ a. Translation of the application into English. A processing fee will be required if submitted later than the appropriate 20 or 30 months from the priority date.
     - ☐ The current translation is defective for the reasons indicated on the attached Notice of Defective Translation.
   - ☐ b. Processing fee for providing the translation of the application and/or the Annexes later than the appropriate 20 or 30 months from the priority date (37 CFR 1.492(f)).
   - ☒ c. Oath or declaration of the inventors, in compliance with 37 CFR 1.497(a) and (b), properly identifying the application (preferably by the International application number and international filing date). A surcharge will be required if submitted later than the appropriate 20 or 30 months from the priority date.
     - ☐ The current oath or declaration does not comply with 37 CFR 1.497(a) and (b) for the reasons indicated on the attached PCT/DO/EO/917.
   - ☐ d. Surcharge for providing the oath or declaration later than the appropriate 20 or 30 months from the priority date (37 CFR 1.492(e)).

4. Additional claim fees of $__________ as a ☐ large entity ☐ small entity, including any required multiple dependent claim fee, are required. Applicant must submit the additional claim fees or cancel the additional claims for which fees are due (37 CFR 1.492(g)). See attached PTO-875.

5. ☐ Applicant has not submitted the required sequence listing pursuant to 37 CFR 1.821-1.825. See attached PCT/DO/EO/920.

ALL OF THE ITEMS SET FORTH IN 3(a)-3(d), 4 AND 5 ABOVE MUST BE SUBMITTED WITHIN TWO (2) MONTHS FROM THE DATE OF THIS NOTICE OR BY 22 OR 32 MONTHS (where 37 CFR 1.495 applies) FROM THE PRIORITY DATE FOR THE APPLICATION, WHICHEVER IS LATER. FAILURE TO PROPERLY RESPOND WILL RESULT IN ABANDONMENT.

The time period set above may be extended by filing a petition and fee for extension of time under the provisions of 37 CFR 1.136(a).

6. If box 3a or 3c is checked, a translation of the Annexes MUST be submitted no later than the time period set above or the Annexes will be cancelled. A processing fee will be required if submitted later than 20 or 30 months from the priority date.
7. ☐ The Article 19 amendments are cancelled since a translation was not provided by the appropriate 20 (37 CFR 1.494(d)) or 30 (37 CFR 1.495(d)) months from the priority date.

Applicant is reminded that any communication to the United States Patent and Trademark Office must be mailed to the address given in the heading and include the U.S. application no. shown above. (37 CFR 1.5)

A copy of this notice MUST be returned with this response.

Enclosed: ☐ PCT/DO/EO/917 ☐ Notice of Defective Translation
☐ PTO-875 ☐ PCT/DO/EO/920

Winston M Alvarado
Telephone: 703-305-6421

FORM PCT/DO/EO/905 (March 2001)

UNITED STATES PATEN D TRADEMARK OFFICE

Commissioner for Patents, Box PCT
United States Patent and Trademark Office
Washington, D.C. 20231
www.uspto gov

U.S. APPLICATION NO.	FIRST NAMED APPLICANT	ATTY. DOCKET NO.
09/830276	BESSETTE B	4082-0130P

BIRCH STEWART KOLASCH & BIRCH
PO BOX 747
FALLS CHURCH, VA 22040 0747

INTERNATIONAL APPLICATION NO	
PCT/CA99/01010	
I A. FILING DATE	PRIORITY DATE
27 OCT 99	27 OCT 98

DATE MAILED 28 JUN 2001

NOTIFICATION OF ACCEPTANCE OF APPLICATION UNDER 35 U.S.C. 371 AND 37 CFR 1.494 OR 1.495

1. The applicant is hereby advised that the United States Patent and Trademark Office in its capacity as ☐ a Designated Office (37 CFR 1.494), ☒ an Elected Office (37 CFR 1.495), has determined that the above-identified international application has met the requirements of 35 U.S.C. 371, and is **ACCEPTED** for national patentability examination in the United States Patent and Trademark Office.

2. The United States Application Number assigned to the application is shown above and the relevant dates are:

20 JUN 2001	20 JUN 2001
DATE OF RECEIPT OF 35 U.S.C. 371(c)(1), (c)(2) and (c)(4) REQUIREMENTS	DATE OF RECEIPT OF ALL 35 U.S.C. 371 REQUIREMENTS

A Filing Receipt (PTO-103X) will be issued for the present application in due course. **THE DATE APPEARING ON THE FILING RECEIPT AS THE "FILING DATE" IS THE DATE ON WHICH THE LAST OF THE 35 U.S.C. 371 REQUIREMENTS HAS BEEN RECEIVED IN THE OFFICE. THIS DATE IS SHOWN ABOVE.** *The filing date of the above-identified application is the international filing date of the international application (Article 11(3) and 35 U.S.C. 363).* Once the Filing Receipt has been received, send all correspondence to the Group Art Unit designated thereon.

3. ☒ A request for immediate examination under 35 U.S.C. 371(f) was received on 25 APR 2001 and the application will be examined in turn.

4. The following items have been received:
- ☒ U.S. Basic National Fee.
- ☒ Copy of the international application.
- ☐ Translation of the international application into English.
- ☒ Oath or Declaration of inventors(s).
- ☐ Copy of Article 19 amendments. ☐ Translation of Article 19 amendments into English.
  The Article 19 amendments ☐ have ☐ not been entered.
- ☐ The International Preliminary Examination Report in English and its Annexes, if any.
- ☐ Copy of the Annexes to the International Preliminary Examination Report (IPER).
  ☐ Translation of Annexes to the IPER into English.
  The Annexes ☐ have ☐ not been entered.
- ☒ Preliminary amendment(s) filed 25 APR 2001 and ________
- ☒ Information Disclosure Statement(s) filed 25 APR 2001 and ________.
- ☐ Assignment document.
- ☒ Power of Attorney and/or Change of Address.
- ☐ Substitute specification filed ________.
- ☒ Indication of Small Entity Status.
- ☒ Priority Document.
- ☒ Copy of the International Search Report ☒ and copies of the references cited therein.
- ☐ Other:

Applicant is reminded that any communication to the United States Patent and Trademark Office must be mailed to the address given in the heading and include the U.S. application no. shown above (37 CFR 1.5).

Winston M. Alvarado

Telephone: 703-305-6421

FORM PCT/DO/EO/903 (March 2001)

09/830125

U.S. Appl. No. ____________ International Appl. No. CA99-01010

Application filed by : ☐ 20 months ☐ 30 months

WIPO PUBLICATION INFORMATION :

Publication No.: WO 00/25304 Publication Language : English

Publication Date : 04 May, 2000 Not Published : ☐ U.S. only designated ☐ EP request

Screening Done by : Winston Alvarado, National Stage Processing Paralegal Specialist (703) 305-3631

INTERNATIONAL APPLICATION PAPERS IN THE APPLICATION FILE :

- ☒ International Application *(RECORD COPY)*
- ☐ Article 19 Amendments
- ☒ PCT/IB/331
- ☒ PCT/IPEA/409 IPER (PCT/IPEA/416 on front)
- ☐ Annexes to 409
- ☒ Priority Document (s) No. 1
- ☐ International Appl. on Double Sided Paper *(COPIES MADE)*
- ☐ Request form PCT/RO/101
- ☒ PCT/ISA/210 - Search Report
- ☒ Search Report References
- ☐ Other : ____________

RECEIPTS FROM THE APPLICANT *(other than checked above)* :

- ☒ Baisc National Fee *(paid or authorized to charge)*
  - ☒ Description
  - ☒ Claims
  - ☐ Words in the Drawing Figure(s)
  - ☐ Article 19 Amendments
  - ☐ Annexes to 409
    - ☐ entered ☐ not entered
- ☒ Oath/ Declaration (executed)
- ☐ DNA Diskette
- ☒ Preliminary Amendment(s) Filed on : 04-25-01
- ☒ Information Disclosure Statement(s) Filed on : 04-25-01
- ☐ Assignment Document
- ☒ Power of Attorney/ Change of Address
- ☐ Substitute Specification Filed on : ____________
- ☒ Verified Small Status Claim *(If submitted after Receipt Date - Is it timely ? Y/N)*
- ☐ Other : ____________

NOTES :

35 U.S.C. 371 - Receipt of Request (PTO-1390)	04-25-01
Date Acceptable Oath/ Declaration Received	06-20-01
Date Complete 35 U.S.C. 371	06-20-01
102(e) Date	06-20-01
Date of Completion of DO/ EO 906 - Notification of Missing 102(e) Requirements	
Date of Completion of DO/ EO 907 - Notification of Acceptance for 102(e) Date	
Date of Completion of DO/ EO 911 - Application Accepted Under 35 U.S.C. 111	
Date of Completion of DO/ EO 905 - Notification of Missing Requirements	05-18-01
Date of Completion of DO/ EO 916 - Notification of Defective Response	
Date of Completion of DO/ EO 903 - Notification of Acceptance	06-27-01
Date of Completion of DO/ EO 909 - Notification of Abandonment	

DOC/EX BIBLIOGRAPHY DATA ENTRY

~~RECEIPT DATE - INVALID DATE FIELD WAS ENTERED~~

SERIAL NUMBER: 09 / ' 830276
PCT NUMBER: PCT / CA99 / 01010
FAMILY NAME: BESSETTE
GIVEN NAME: BRUNO
PRIORITY CLAIMED (Y/N): Y
NO BASIC FEE (Y/N): N
ATTORNEY DOCKET NUMBER: 4081-0130P

RECEIPT DATE: [illegible]
IA FILING DATE: [illegible]
DELAY WAIVED (Y/N): [illegible]
DEMAND RECEIVED (Y/N): [illegible]
PRIORITY DATE: [illegible]
US DESIGNATED ONLY (Y/N):
COUNTRY:

CORRESPONDENCE NAME/ADDRESS: CUSTOMER NUMBER: 002292 TELEPHONE [illegible]
FAX [illegible]

NAME: BIRCH STEWART KOLASCH & BIRCH

STREET: PO BOX 747

CITY: FALLS CHURCH
STATE/COUNTRY: VA ZIP: 220400747
EMAIL:
APPLICATION TITLES:
PERCEPTUAL WEIGHTING DEVICE AND METHOD FOR EFFICIENT CODING OF WIDEBAND
SIGNALS

TAB TO LAST POSITION,PUSH SEND

2641

PATENT
4082-0130P

OIPE JC177
SEP 18 2001
PATENT & TRADEMARK OFFICE

IN THE U.S. PATENT AND TRADEMARK OFFICE

RECEIVED
SEP 20 2001
Technology Center 2600

Applicant:	Bruno BESSETTE et al.	Conf.:	
Appl. No.:	09/830,276	Group:	
Filed:	June 20, 2001	Examiner:	
For:	PERCEPTUAL WEIGHTING DEVICE AND METHOD FOR EFFICIENT CODING OF WIDEBAND SIGNALS		

H
10/11/01
NB

INFORMATION DISCLOSURE STATEMENT
(SUBMISSION AFTER FILING OF AN APPLICATION
BUT BEFORE FINAL REJECTION OR NOTICE OF ALLOWANCE
OR CONCURRENTLY WITH A RULE 53(d) CPA APPLICATION
OR WITH A RULE 1.114 RCE APPLICATION)

Assistant Commissioner for Patents
Washington, DC 20231

September 18, 2001

Sir:

Pursuant to 37 C.F.R. §§ 1.97 and 1.98, applicant(s) hereby submit(s) an Information Disclosure Statement for consideration by the Examiner.

I. LIST OF PATENTS, PUBLICATIONS OR OTHER INFORMATION

The patents, publications, or other information submitted for consideration by the Office are listed on the PTO-1449(s), attached hereto.

II. COPIES (check at least one box)

a. ☒ Submitted herewith is a legible copy of (i) each U.S. and foreign patent; (ii) each publication or that portion which caused it to be listed; and (iii) all other information or that portion which caused it to be listed.

b. ☐ Some or all of the documents listed on the PTO-1449 are not enclosed because they were cited in the International Search Report and copies should already be in the PTO file. If copies are needed, please contact the undersigned.

III. CONCISE EXPLANATION OF THE RELEVANCE
(check at least one box)

a. ☒ **DOCUMENTS IN THE ENGLISH LANGUAGE**

The attached patents, publications, or other information in the English language do not require a statement of relevancy.

b. ☐ **DOCUMENTS NOT IN THE ENGLISH LANGUAGE**

A concise explanation of the relevance of all patents, publications, or other information listed that is not in the English language is as follows:

c. ☐ **ENGLISH LANGUAGE SEARCH REPORT**

An English language version of the search report or action that indicates the degree of relevance found by the foreign office is attached, thereby satisfying the requirement for a concise explanation. See MPEP 609(A)(3).

d. ☐ **OTHER**

The following additional information is provided for the Examiner's consideration.

FEES

IV. ☒ THIS IDS IS BEING FILED UNDER 37 C.F.R. § 1.97(b): (check one box)

a. ☐ within three months of the filing date of a national application (37 C.F.R. § 1.97(b)(1)). No fee or statement is required. (This section is not to be used with RCE's and CPA's).

b. ☐ within three months of the date of entry of the national stage as set forth in § 1.491 in an international application (37 C.F.R. § 1.97(b)(2)). No fee or statement is required.

c. ☐ concurrently with the filing of a Continued Prosecution Application under 37 C.F.R. § 1.53(d) or concurrently with the filing of a Request for Continued Examination under § 1.114 (37 C.F.R. § 1.97(b)(4)). No fee or statement is required.

d. ☒ before the mailing date of a first Action on the merits (37 C.F.R. § 1.97(b)(3)). No fee or statement is required.
In the event that a first Office Action on the merits has been issued, please consider this IDS under 37 C.F.R. § 1.97(c) and see the statement under 37 C.F.R. § 1.97(e) below, or, if no statement has been made, charge our deposit account in the amount of $180.00 as required by 37 C.F.R. § 1.17(p).

V. ☐ THIS IDS IS BEING FILED UNDER 37 C.F.R. § 1.97(c): (check one box)

before the mailing date of a Final Office Action under 37 C.F.R. § 1.113 (See 37 C.F.R. § 1.97(c)(1)) or before the mailing date of a Notice of Allowance under 37 C.F.R. § 1.311 (See 37 C.F.R. § 1.97(c)(2)).

a. ☐ No statement; therefore, a fee in the amount of $180.00 as required by 37 C.F.R. § 1.17(p).
or
b. ☐ See the statement below. No fee is required.

VI. STATEMENT UNDER 37 C.F.R. § 1.97(e) (check only one box)

The undersigned hereby states that

a. ☐ each item of information contained in the IDS was first cited in any communication from a foreign Patent Office in a counterpart foreign application not more than three months prior to the filing of this IDS; or

b. ☐ no item of information contained in the IDS was cited in a communication from a foreign Patent Office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of IDS was known to any individual designated in 37 C.F.R. § 1.56(c) more than three months prior to the filing of the IDS.

c. ☐ Some of the items of information were cited in a communication from a foreign Patent Office. As to this information, the undersigned states that each item of information contained in the IDS was cited in a communication from a foreign Patent Office in a counterpart foreign application not more than three months prior to the filing of this IDS. As to the remaining information, the undersigned hereby states that no item of this remaining information contained in the IDS was cited in a communication from a foreign Patent Office in a counterpart foreign application and, to the best of my knowledge after making reasonable inquiry, was known to any individual designated in 37 C.F.R. § 1.56(c) more than three months prior to the filing of this statement.

VII. PAYMENT OF FEES (check one box)

☐ A check in the amount of $180.00 as required by 37 C.F.R. § 1.17(p) is enclosed for the above-identified fee.

☐ Please charge Deposit Account No. 02-2448 in the amount required by 37 C.F.R. § 1.17(p) for the above-indicated fee. A triplicate copy of this paper is attached.

☒ No fee is required.

If the Examiner has any questions concerning this IDS, he/she is requested to contact the undersigned. If it is determined that this IDS has been filed under the wrong rule, the PTO is requested to consider this IDS under the proper rule and charge the appropriate fee to Deposit Account No. 02-2448.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No. 02-2448 for any additional fees required under 37 C.F.R. § 1.16 or under § 1.17; particularly, extension of time fees.

Respectfully submitted,

BIRCH, STEWART, KOLASCH & BIRCH, LLP

By
F. Prince Butler, #25,666

P.O. Box 747
Falls Church, VA 22040-0747
(703) 205-8000

FPB/ndb
4082-0130P

Enclosures:
- ☒ PTO-1449
- ☒ Documents
- ☐ Foreign Search Report
- ☐ Fee
- ☐ Other:

(Rev. 03/08/01)

.heet 1 of 1 (9/17/01)

Form PTO-1449

INFORMATION DISCLOSURE CITATION IN AN APPLICATION

(Use several sheets if necessary)

ATTY DOCKET NO.	APPLICATION NO.
4082-0130P	09/830,276
APPLICANT	
FILING DATE	GROUP
June 20, 2001	2641

U.S. PATENT DOCUMENTS

EXAMINER INITIAL	DOCUMENT NUMBER	DATE	NAME	CLASS	SUB CLASS	FILING DATE IF APPROPRIATE
JW	5 4 4 4 8 1 6	1995-08-22	Adoul et al.			
JW	5 6 9 9 4 8 2	1997-12-16	Adoul et al.			
JW	5 7 0 1 3 9 2	1997-12-23	Adoul et al.			
JW	5 7 5 4 9 7 6	1998-05-19	Adoul et al.			

OIPE JC177 SEP 1 8 2001 PATENT & TRADEMARK OFFICE

RECEIVED SEP 2 0 2001 Technology Center 2600

FOREIGN PATENT DOCUMENTS

	DOCUMENT NUMBER	DATE	COUNTRY	CLASS	SUB CLASS	TRANSLATION YES	TRANSLATION NO

OTHER DOCUMENTS (Include Name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.) date, page(s), volume-issue number(s), publisher, city and/or country where published.

JW		"Predictive Coding of Speech Signals and Subjective Error Criteria" by Bishnus S. Atal et al., IEEE Transaction ASSP, Vol. 27, No. 3, pp. 247-254 6/1979

EXAMINER	DATE CONSIDERED
	4/8/04

EXAMINER: Initial if citation considered, whether or not citation is in conformance with M.P.E.P. 609; Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant

4082-0130P

FPB/ndb

Other Prior Art

According to the information contained in form PTO-1449 or PTO-892, there are one or more other prior art/non-patent literature documents missing from the original file history record obtained from the United States Patent and Trademark Office. Upon your request we will attempt to obtain these documents from alternative resources. Please note that additional charges will apply for this service.

OIPE JUN 1 0 2003 PATENT & TRADEMARK OFFICE JC98

DT20 Rec'd PCT/PTO 10 JUN 2003 #7 PCT QA 9/10/03

PATENT
4510-0106P

IN THE U.S. PATENT AND TRADEMARK OFFICE

Applicant: BESSETTE, et al. Conf.: 4949

Appl. No.: 09/830,276 Group: 2641

Filed: June 20, 2001

For: PERCEPTUAL WEIGHTING DEVICE AND METHOD FOR EFFICIENT CODING OF WIDEBAND SIGNALS

NOTIFICATION OF ERRONEOUS PAYMENT OF SMALL ENTITY FEES UNDER 37 C.F.R. § 1.28

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

June 10, 2003

Sir:

It is respectfully noted that the above-identified application does not qualify for small entity status under 37 C.F.R. § 1.27(a).

Small entity status was established with the filing of the application on April 25, 2002, and the small entity filing fee was paid in good faith. It has since been discovered that this status as a small entity was established in error, without the intent to deceive.

It is therefore respectfully requested that the error be excused. The following items are being submitted to comply with the requirements of 37 C.F.R. 1.28(c):

(1) Separate submission for each application or patent. This request is being submitted in connection with U.S. Patent Appl. No. 09/830,276.

Adjustment date: 00/00/0000
04/27/2001 MNGUYEN 00000077 09830276
01 FC:971 130.00 OP
02 FC:254 -65.00 OP
03 FC:967 261.00 OP
Repln. Ref: 06/19/2003 WCLAYBRO 00121741 09830276 Name/Number:09830276
FC: 9204 $20.00 CR

(2) Payment of deficiency owed.

(i) A $711.00 small entity filing fee and additional claims fee under 37 C.F.R. §

06/19/2003 WCLAYBRO 00000010 09830276
01 FC:1613 860.00 OP
02 FC:1615 522.00 OP
03 FC:1617 130.00 OP

1.482 and $65.00 Surcharge Fee under § 1.492(e) was paid on April 25, 2001, with check number 4017462. Accordingly, the deficiency owed is $776.00.

(ii) A check in the amount of $776.00 is attached hereto, as payment of the deficiency owed.

It is again noted that the previous establishment of small entity status was made in error, without the intent to deceive. As it is believed that the requirements of 37 C.F.R. § 1.28(c)(1) and (c)(2) have been met, it is respectfully requested that the error be excused and that the U.S. Patent and Trademark Office forward appropriate notification to the undersigned.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No. 02-2448 for any additional fees required under 37 C.F.R. § 1.16 or under 37 C.F.R. § 1.17; particularly, extension of time fees.

Respectfully submitted,

BIRCH, STEWART, KOLASCH & BIRCH, LLP

By Marc S. Weiner hs
Marc S. Weiner, #32,181

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MSW/HNS/lab
4510-0106P

UNITED STATES PATENT AND TRADEMARK OFFICE

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO	CONFIRMATION NO
09/830,276	06/20/2001	Bruno Bessette	4082-0130P	4949

2292 7590 10/24/2003

BIRCH STEWART KOLASCH & BIRCH
PO BOX 747
FALLS CHURCH, VA 22040-0747

EXAMINER	
WOZNIAK, JAMES S	
ART UNIT	**PAPER NUMBER**
2655	8

DATE MAILED 10/24/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

PTO-90C (Rev. 10/03)

11

Office Action Summary	Application No. 09/830,276	Applicant(s) BESSETTE ET AL.	
	Examiner James S. Wozniak	Art Unit 2655	

-- *The MAILING DATE of this communication appears on the cover sheet with the correspondence address* --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *20 June 2001* .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-49* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-49* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *20 June 2001* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

Detailed Action

Drawings

1. The drawings are objected to because:

In Fig. 1:

- The entire device, Element 100, should have a border similar to that of Fig 4, Element 401, so as to clearly show that the element number is associated with the device as a whole.

In Fig. 3:

- The reference 107, used to designate a particular embodiment of the invention, is also used in Fig. 1 to represent the closed-loop pitch search module. A new reference number should be assigned to this embodiment of the invention so as to prevent association with the closed-loop pitch search module in Fig. 1.
- The entire device, Element 107, should have a border similar to that of Fig. 4, Element 401, so as to clearly show that the element number is associated with the device as a whole.
- The following reference sign is not mentioned in the description: Element 107.

A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

Specification

2. The abstract of the disclosure does not commence on a separate sheet in accordance with 37 CFR 1.52(b)(4). A new abstract of the disclosure is required and must be presented on a separate sheet, apart from any other text.

3. The disclosure is objected to because of the following informalities: on Page 8, Line 2, a space should be inserted between "to" and "μ".

Appropriate correction is required.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. **Claims 1-21** are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent: 5,664,055 to Kroon et al in view of U.S. Patent: 6,064,962 to Oshikiri et al, in further view of EP 0465057 A1 to Ordentlich.

Kroon discloses a speech coding system and method that features a perceptual weighting filter (Fig. 3, Element 165) as a means for minimizing the error between an original signal and synthesized speech (Col. 4, Lines 59-64). The system also contains a synthesis filter (Fig. 4, Element 260) which synthesizes a speech signal based upon LPC coefficients (Col. 6, Lines 46-48). Further, the system utilizes a tilt compensation filter in removing the spectral tilt from the speech portion of a speech signal (Col. 27, Lines 49-53). The perceptual weighting filter transfer function of the disclosed invention has a transfer function of (Col. 16, 17, Lines 66-67, 1-7):

$$W(z)=\frac{A(z/\gamma_1)}{A(z/\gamma_2)}=\frac{1+\sum_{i=1}^{10}\gamma_1{}^i a_i z^{-i}}{1+\sum_{i=1}^{10}\gamma_2{}^i a_i z^{-i}},$$

where γ_1 is greater than γ_2 and both constants have values between 0 and 1 (Col. 17, Lines 41-46). Kroon also teaches a decoder that utilizes a codebook search (Col. 17, Lines 46-61) in the identification of the pitch (Col. 4, Lines 40-44) and target vector associated with a speech signal. In addition to the decoder, Kroon further states that the codebook is commonly applied to the encoder of a speech compression system (Col. 1, Lines 52-55).

Kroon does not teach: a pre-emphasis filter as recited in Claims 1, 8, and 15, a pre-emphasis filter transfer function as stated in Claims 2, 9, and 16, a pre-emphasis factor, μ, with a value of 0.7 as recited in Claims 3, 10, and 17, a system which includes a pre-emphasis filter applied to Claims 4, 6, 11, 13, 18, and 20, nor a configuration in which γ_2 is set equal to μ as recited in Claims 5, 7, 12, 14, 19, and 21.

With respect to **Claims 1, 2, 8, 9, 15, and 16**, Oshikiri teaches a formant emphasis filter for use in a CELP system that contains a spectrum filter that can utilize a design constant, μ, which has a value between 0 and 1. The spectrum filter also has a function term of the form: $(1-\mu z^{-1})$ (Col. 2, Lines 1-9)

With respect to **Claims 4, 6, 11, 13, 18, and 20**, Oshikiri teaches the pre-emphasis filter above, combined with the speech coding system taught by Kroon.

With respect to **Claims 3, 10, and 17**, Ordentlich teaches a digital communication CELP coding system that suggests a μ value of 0.7 (δ, Page 6, Lines 40-41).

Kroon, Oshikiri, and Ordentlich are analogous art because they are from a similar field of endeavor in speech coding in a CELP system. Thus, it would have been obvious to a person of ordinary skill in the art, at the time of invention, to combine the pre-emphasis filter containing a constant μ as disclosed by Oshikiri, μ specifically valued at 0.7 as taught by Ordentlich, with the speech coding system and method containing a perceptual weighting filter, synthesis filter, and the use of a codebook search as taught by Kroon to further overcome the spectral tilt of the system by enhancing the high frequency segment of the speech signal. Also, since γ_2 has similar range restrictions to μ, it would be obvious to have the option to set its value equal that of μ, as needed, so as to cancel out the pre-emphasis as recited in **Claims 5, 7, 12, 14, 19, and 21**. Therefore, it would have been obvious to combine Oshikiri and Ordentlich with Kroon for the benefit of obtaining a speech coding system with the ability to further filter spectral tilt and produce a more enhanced coded speech signal, to obtain the invention as specified in Claims 1-21.

6. **Claims 22-49** are rejected under 35 U.S.C. 103(a) as being unpatentable over Kroon in view of Oshikiri in further view of Ordentlich as applied to Claims 1-21, and yet in further view of U.S. Patent: .5,754,976 to Adoul et al.

Kroon in view of Oshikiri teach the coder of Claim 15. Oshikiri teaches the voice coder utilized in mobile communications (Col. 1, Lines 16-17), and Ordentlich a μ value of 0.7, but do not teach: a cellular communication system, comprising mobile transmitter/receiver units, base stations, a control terminal, a communication subsystem, a transmitter including such an encoder, and a cellular receiver including its decoder as recited in Claims 22, 29, 36, and 43, nor Claims 23-28, 30-35, 37-42, and 44-49.

However, with respect to **Claims 22, 29, 36, and 43**, Adoul teaches a speech coding method utilizing a codebook search for use in a cellular communication system covering a large geographical area and divided into a number of cells and comprised of mobile transmitter/receiver units, cellular base stations, a means for controlling communication between base stations, a bi-directional wireless communication subsystem, a transmitter including a means of encoding a speech signal, and a receiver including a receiving circuit (Col. 3, Lines 41-58).

With respect to **Claims 23-28, 30-35, 37-42, and 44-49**, Adoul teaches the cellular communication system above in combination with the method for speech coding taught by Kroon in view of Oshikiri as applied to Claims 1-21.

Kroon, Oshikiri, Ordentlich, and Adoul are analogous art because they are from a similar field of endeavor in speech signal coding. Thus, it would have been obvious to a person of ordinary skill in the art, at the time of invention, to combine the use of the speech coder with a μ value of 0.7 of Kroon, Oshikiri, and Ordentlich in a cellular network as taught by Adoul, with the method of speech coding featuring spectral tilt filtering and the use of a codebook search as taught by Kroon in view of Oshikiri to implement the speech coding process in a useful application in cellular networking. Therefore, it would have been obvious to combine Adoul with Kroon in view of Oshikiri in further view of Ordentlich for the benefit of obtaining a speech coding system usable in a cellular network, to obtain the invention as specified in Claims 22-49.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure:

- U.S. Patent: 6,449,590 to Gao- teaches a speech encoding device coupled with a codebook for obtaining pitch parameters. The device also contains a synthesis filter, a perceptual weighting filter, and can be utilized in cellular telephone applications.
- U.S. Patent: 6,006,174 to Lin et al- teaches a speech encoder and decoder utilizing a pre-emphasis filter with a transfer function of: $P(z) = 1 - a^{*}z^{-1}$, a word vector codebook for pitch analysis, and a perceptual weighing circuit.
- U.S. Patent: 5,359,696 to Gerson et al- teaches a digital speech coder featuring perceptual weighting and a codebook search.
- U.S. Patent: 5,307,401 to Tzeng- teaches a speech encoding method utilizing a perceptual weighting circuit, synthesis filter, and a filter design constant μ.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to James S. Wozniak whose telephone number is (703) 305-8669. The examiner can normally be reached on Mondays-Thursdays, 7:30-5:00, Friday, 7:30-4, Off Alternate Fridays.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Talivaldis Ivars Smits can be reached at (703) 306-3011. The fax/phone number for the Technology Center 2600 where this application is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the technology center receptionist whose telephone number is (703) 306-0377.

James S. Wozniak
10/20/2003

TĀLIVALDIS IVARS ŠMITS
PRIMARY EXAMINER

Notice of References Cited	Application/Control No. 09/830,276	Applicant(s)/Patent Under Reexamination BESSETTE ET AL.	
	Examiner James S. Wozniak	Art Unit 2655	Page 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	Classification
	A	US-5,307,441	04-1994	Tzeng, Forrest F.-T.	704/222
	B	US-5,359,696	10-1994	Gerson et al.	704/223
	C	US-5,664,055	09-1997	Kroon, Peter	704/223
	D	US-6,006,174	12-1999	Lin et al.	704/201
	E	US-6,064,962	05-2000	Oshikiri et al.	704/262
	F	US-6,449,590	09-2002	Gao, Yang	704/219
	G	US-			
	H	US-			
	I	US-			
	J	US-			
	K	US-			
	L	US-			
	M	US-			

FOREIGN PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	Classification
	N					
	O					
	P					
	Q					
	R					
	S					
	T					

NON-PATENT DOCUMENTS

*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
	U	
	V	
	W	
	X	

*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.

OIPE JAN 23 2004 PATENT & TRADEMARK OFFICE

PATENT
4510-0106P

IN THE U.S. PATENT AND TRADEMARK OFFICE

Applicant:	BESSETTE, et al.	Conf.:	4949
Appl. No.:	09/830,276	Group:	2655
Filed:	June 20, 2001	Examiner:	J. Wozniak
For:	PERCEPTUAL WEIGHTING DEVICE AND METHOD FOR EFFICIENT CODING OF WIDEBAND SIGNALS		

RECEIVED
JAN 26 2004
Technology Center 2600

SMALL ENTITY TRANSMITTAL FORM

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

January 23, 2004

Sir:

Transmitted herewith is an amendment in the above-identified application.

☐ Applicant claims small entity status under 37 C.F.R. § 1.27.

☐ The enclosed document is being transmitted via the Certificate of Mailing provisions of 37 C.F.R. § 1.8.

☐ The enclosed document is being transmitted via facsimile.

The fee has been calculated as shown below:

	CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR		PRESENT EXTRA	RATE	ADDITIONAL FEE
TOTAL	49	-	49	=	0	$ 9	$0.00
INDEPENDENT	2	-	3	=	0	$ 43	$0.00
☐ FIRST PRESENTATION OF A MULTIPLE DEPENDENT CLAIM						$145	$0.00
						TOTAL	$0.00

Appl. No. 09/830,276

☐ Petition for ( ) month(s) extension of time pursuant to 37 C.F.R. §§ 1.17 and 1.136(a). $0.00 for the extension of time.

☒ No fee is required.

☐ Check(s) in the amount of $0.00 is(are) enclosed.

☐ Please charge Deposit Account No. 02-2448 in the amount of $0.00. This form is submitted in triplicate.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No. 02-2448 for any additional fees required under 37 C.F.R. §§1.16 or 1.17; particularly, extension of time fees.

Respectfully submitted,

BIRCH, STEWART, KOLASCH & BIRCH, LLP

By
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Attachment(s) Proposed Drawings Corrections for Figures 1 and 3

(Rev. 09/30/03)

Appl No: 09/830,276
Attorney Docket: 4510-0106P

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicants:	BESSETTE, et al.	Conf.:	4949
Appl No:	09/830,276	Art Unit:	2655
Filed:	June 20, 2001	Examiner:	J. Wozniak
For:	PERCEPTUAL WEIGHTING DEVICE AND METHOD FOR EFFICIENT CODING OF WIDEBAND SIGNALS		

9/13
1-30-04

REPLY UNDER 37 C.F.R. § 1.111

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

January 23, 2004

Sir:

In reply to the Examiner's Non-Final Office Action dated October 24, 2004, the following amendments and remarks are respectfully submitted in connection with the above-identified application as follows:

- Amendments to the Specification beginning on page 2;
- Replacement Abstract;
- Remarks/Arguments beginning on page 4; and
- Proposed drawing changes.

AMENDMENTS TO THE SPECIFICATION

B1

IN THE ABSTRACT OF THE DISCLOSURE:

Please replace the Abstract of the Disclosure currently of record with the attached new Abstract of the Disclosure.

IN THE SPECIFICATION:

Please replace the paragraph beginning and ending on page 8, line 2 with the following rewritten paragraph.

B2

- the variable γ_2 is set equal ~~toμ~~ to μ.

AMENDMENTS TO THE DRAWINGS

Attached hereto are 2 sheets of proposed drawing corrections for Figures 1 and 3 as required in the Office Action. *See Office Action, page 2, item 1.* More specifically:

- As suggested in the Office Action, Figure 1 has been amended to insert the entire device 100 within a dashed-line border; and
- As suggested in the Office Action, Figure 3 has been amended to insert the entire device 107 within a dashed-line border. In fact, Figure 3 illustrates a schematic block diagram of the closed-loop pitch search module 107 of Figure 1, supplied in both Figures 1 and 3 with the open-loop pitch delay T_{OL}, the target signal x and the impulse response h. To respect the rule that the same elements in the various figures should be identified by the same reference numerals, the closed-loop pitch search module has been identified by the reference 107 in both figures. Reference 107 is mentioned in page 28, lines 5 and 11.

No new matter is introduced. Applicants respectfully requests that proposed drawing corrections be approved.

REMARKS

Favorable reconsideration and allowance of the present application are respectfully requested in view of the following remarks. Claims 1-49 are pending. Claims 1 and 8 are independent.

FORM 1449 ACKNOWLEDGMENT REQUESTED

It is noted that Applicant has not yet received initialed copies of the PTO-1449 for the present application. Applicants respectfully requests that such form be provided.

OBJECTION TO THE SPECIFICATION

The specification is objected to for minor informalities. *See Office Action, items 2 and 3*. A new abstract has been submitted herewith and the specification has been amended to address this objection. Applicants respectfully request that the objection to the specification be withdrawn.

DRAWINGS

The drawings are objected to for minor informalities. *See Office Action, item 1*. Proposed drawing corrections have been submitted herewith as noted above. Applicants respectfully request that the objection to the drawings be withdrawn.

§ 103 REJECTION - KROON, OHIKIRI, ORDENTLICH

Claims 1-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kroon et al (USPN. 5, 664,055, hereinafter "Kroon") in view of Oshikiri et al. (USPN 6,064,962, hereinafter "Oshikiri"), in further view of Ordentlich (EP 0 465 057 A1). Applicants respectfully traverse.

For a Section 103 rejection to be proper, a *prima facie* case of obviousness must be established. *See M.P.E.P. 2142.* One requirement to establish *prima facie case* of obviousness is that the prior art references, when combined, must teach or suggest all claim limitations. *See M.P.E.P. 2142; M.P.E.P. 706.02(j).* Thus, if the cited references fail to teach or suggest one or more elements, then the rejection is improper and must be withdrawn.

In this instance, independent claim 1 recites

- a signal pre-emphasis filter for enhancing a high frequency content of the wideband signal;

- a synthesis filter calculator for producing synthesis filter coefficients in response to the pre-emphasised signal; and
- a perceptual weighting filter for filtering the pre-emphasised signal in relation to the synthesis filter coefficients, this perceptual weighting filter having a transfer function with fixed denominator whereby weighting of the wideband signal in a formant region is substantially decoupled from a spectral tilt of the wideband signal.

Independent claim 8 recites similar features. Page 22, lines 4-11 of the present patent application indicates that:

(a) The prior art has suggested to add a tilt filter into the weighting filter W(z) in order to control the tilt and formant weighting of the wideband input signal separately; and

(b) A novel solution to this problem is, in accordance with the present invention, to introduce the pre-emphasis filter 103 at the input, compute the LP filter $A(z)$ based on the pre-emphasized speech $s(n)$, and use a modified weighting filter $W(z)$ by fixing its denominator.

Kroon describes a speech coding system comprising a perceptual weighting filter 165 (Figure 3) to minimize the error between the original and synthesized speech according to a perceptually weighted distortion measure (Column 4, lines 59-64). This perceptual weighting filter has a transfer function of the form:

$$W(z) = \frac{A(z/\gamma_1)}{A(z/\gamma_2)} = \frac{1 + \sum_{i=1}^{10} \gamma_1^i a_i z^{-i}}{1 + \sum_{i=1}^{10} \gamma_2^i a_i z^{-i}}$$

where γ_1 is greater than γ_2 and both constants have values located between 0 and 1 (Description from column 16, line 65 to column 17, line 63).

The denominator of the perceptual weighting filter of Kroon varies in time with the LP parameters a_i and accordingly is not fixed as required by claim 1 of the present patent application.

Kroon further indicates (column 17, lines 8-13) that the values of γ_1 and γ_2 determine the frequency response of the filter W(z). By proper adjustment of these variables it is possible to make the weighting more effective. This is accomplished by making γ_1 and γ_2 a function of the spectral shape of the input signal. This adaptation is done once per 10 ms frame, but an interpolation procedure for each first subframe is used to smooth this adaptation process. This further evidences that the denominator of the perceptual weighting filter of Kroon is not fixed.

Kroon further evidences that the denominator of the perceptual weighting filter is not fixed by stating (column 17, lines 41-47) that: if the interpolated spectrum for a subframe is classified as flat, the weight factors are set to γ_1=0.94 and γ_2=0.6; if the spectrum is classified as tilted, the value of γ_1 is set to 0.98, and the value of γ_2 is adapted to the strength of the resonance in the LP synthesis filter, but is bounded between 0.4 and 0.7; and if a strong resonance is present, the value of γ_2 is set closer to the upperbound.

In the Office Action, it is admitted that that Kroon does not teach or suggest:

- a pre-emphasis filter as recited in claims 1, 8 and 15;
- a pre-emphasis filter transfer function as stated in claims 2, 9 and 16;
- a pre-emphasis factor μ with a value of 0.7 as recited in claims 3, 10 and 17;
- a system which includes a pre-emphasis filter applied to claims 4, 6, 11, 13, 18 and 20;

- a configuration in which γ_2 is set equal to μ as recited in claims 5, 7, 12, 14, 19 and 21.

Therefore, since Kroon describes no pre-emphasis filter, it cannot describe calculation of the synthesis filter coefficients in response to a pre-emphasized signal as recited in claim 1 of the present patent application.

The examiner indicates that Oshikiri teaches (column 2, lines 1-9) a formant emphasis filter with a function term of the form $(1-\mu z^{-1})$.

The pre-emphasis filter of claim 1 of the present patent application is supplied with the wideband signal for enhancing a high frequency content of the wideband signal. The operation of the formant emphasis filter of Oshikiri is different: the terms A(z/ß) and $(1-\mu z^{-1})$ act to compensate the excessive spectral tilt of the term A(z/ß), so that the problem on the unclear synthesized sound can be solved.

Looking at the figures of Oshikiri, for example Figures 14, 32, 34, and 40, the LPC filter parameters are supplied to the formant emphasis filter (13). Therefore, Oshikiri fail to teach that the synthesis filter coefficients are calculated from a pre-emphasized signal, as recited in claim 1 of the present patent application. Therefore, Oshikiri cannot teach this characteristic to Kroon.

Also, Oshikiri appears to describe no perceptual weighting filter; the formant emphasis filter of Oshikiri is used at the decoder and, therefore, this filter is not used for perceptually weighting the sound signal at the encoder. Therefore, Oshikiri cannot teach Kroon to use a perceptual weighting filter with a fixed denominator, or to combine a pre-emphasis filter with a perceptual weighting filter having a fixed denominator.

In view of the above comments, it is respectfully submitted that Kroon and Oshikiri, taken separately or in combination, fails to describe the combination of a signal pre-emphasis filter, a calculator of the synthesis filtered coefficients in response to the pre-emphasized signal, and a perceptual weighting filter with fixed denominator, in order to control the tilt and formant weighting of the wideband input signal separately.

Ordentlich has not been, and indeed cannot be, relied upon to correct at least the above-noted deficiencies of Kroon and Oshikiri. For at least the above noted reasons, independent claims 1 and 8 are distinguishable over the combination of Kroon, Oshikiri, and Ordentlich.

Claims 2-7 and 9-21 depend from independent claims 1 and 8, directly or indirectly. Therefore for at least the reasons stated with respect to claims 1 and 8 as well as on their own merit, these dependent claims are also distinguishable over the combination of Kroon, Oshikiri, and Ordentlich.

Although only independent claims 1 and 8 have been discussed in the above arguments, this should not be interpreted as an admission that the other claims contain no patentable subject matter.

Applicants respectfully request that the rejection of claims 1-21 based on the combination of Kroon, Oshikiri, and Ordentlich be withdrawn.

§ 103 REJECTION - KROON, OHIKIRI, ORDENTLICH, ADOUL

Claims 22-49 are rejected under 35 U.S.C. 103(a) as being Kroon in view of Oshikiri in further view of Ordentlich as applied to claim 1-21, and yet in further view of Adoul et al (USPN 5,754,976, hereinafter "Adoul"). Applicants respectfully traverse.

It is noted that claims 22-49 depend from independent claim 1. It has been shown above that independent claim 1 is distinguishable over the combination of Kroon, Oshikiri, and Ordentlich. Adoul has not been, and indeed cannot be, relied upon to correct the deficiencies of the combination of Kroon, Oshikiri, and Ordentlich. Thus, independent claim 1 is distinguishable over the combination of Kroon, Oshikiri, Ordentlich, and Adoul.

Therefore, for at least due to their dependency thereon as well as on their own merits, claims 22-49 are also distinguishable over the combination of Kroon, Oshikiri, Ordentlich, and Adoul.

Applicants respectfully request that the rejection of claims 22-49 based on the combination of Kroon, Oshikiri, Ordentlich, and Adoul be withdrawn.

CONCLUSION

All objections and rejections raised in the Office Action having been addressed, it is respectfully submitted that the present application is in condition for allowance. Should there be any outstanding matters that need to be resolved, the

Examiner is respectfully requested to contact Hyung Sohn (Reg. No. 44,346), to conduct an interview in an effort to expedite prosecution in connection with the present application.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No. 02-2448 for any additional fees required under 37 C.F.R. §§ 1.16 or 1.17; particularly, extension of time fees.

Respectfully submitted,

BIRCH, STEWART, KOLASCH &, BIRCH, LLP

By: [signature]
Marc S. Weiner
Reg. No. 32,181

P.O. Box 747
Falls Church, VA 22040-0747
(703) 205-8000

HNS
MSW/HNS/kmr
4510-0106P

Attachment(s): Proposed drawing corrections for Figures 1 and 3

ABSTRACT OF THE DISCLOSURE

A perceptual weighting device for producing a perceptually weighted signal in response to a wideband signal comprises a signal pre-emphasis filter, a synthesis filter calculator, and a perceptual weighting filter. The signal pre-emphasis filter enhances the high frequency content of the wideband signal to thereby produce a pre-emphasized signal. The signal pre-emphasis filter has a transfer function of the form: $P(z)=1-\mu z^{-1}$, wherein μ is a pre-emphasis factor having a value located between 0 and 1. The synthesis filter calculator is responsive to the pre-emphasized signal for producing synthesis filter coefficients. Finally, the perceptual weighting filter processes the pre-emphasized signal in relation to the synthesis filter coefficients to produce the perceptually weighted signal. The perceptual weighting filter has a transfer function, with fixed denominator, of the form: $W(z)=A(z/\gamma_1)/(1-\gamma_2 z^{-1})$ where $0<\gamma_2<\gamma_1\leq 1$.

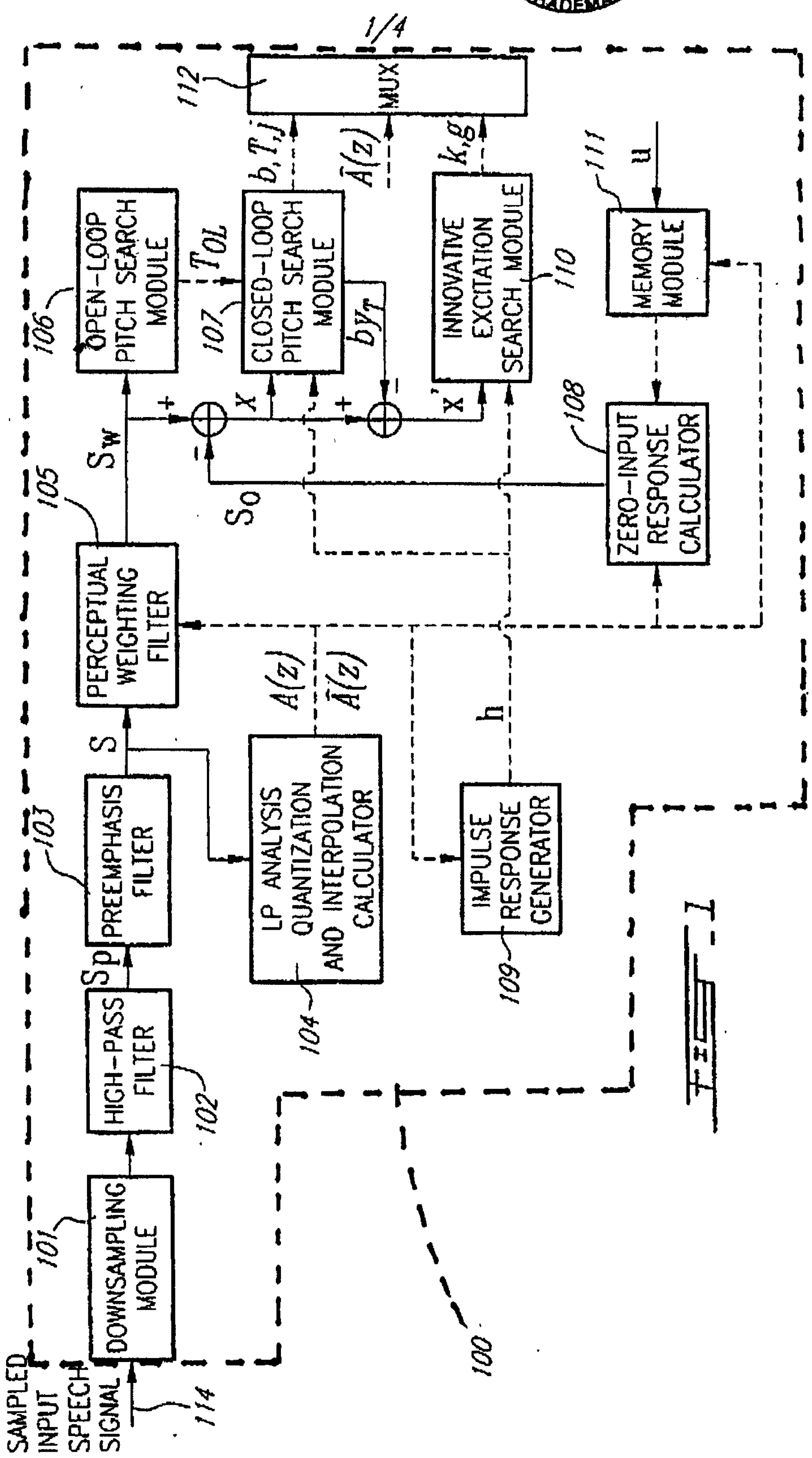
SAMPLED INPUT SPEECH SIGNAL
114
DOWNSAMPLING MODULE
101
HIGH-PASS FILTER
102
Sp
PREEMPHASIS FILTER
103
S
PERCEPTUAL WEIGHTING FILTER
105
Sw
OPEN-LOOP PITCH SEARCH MODULE
106
T_OL
CLOSED-LOOP PITCH SEARCH MODULE
107
b,T,j
by_T
x
x'
So
LP ANALYSIS QUANTIZATION AND INTERPOLATION CALCULATOR
104
A(z)
Â(z)
IMPULSE RESPONSE GENERATOR
109
h
INNOVATIVE EXCITATION SEARCH MODULE
110
k,g
MUX
112
ZERO-INPUT RESPONSE CALCULATOR
108
MEMORY MODULE
111
u
100

FIG. 1

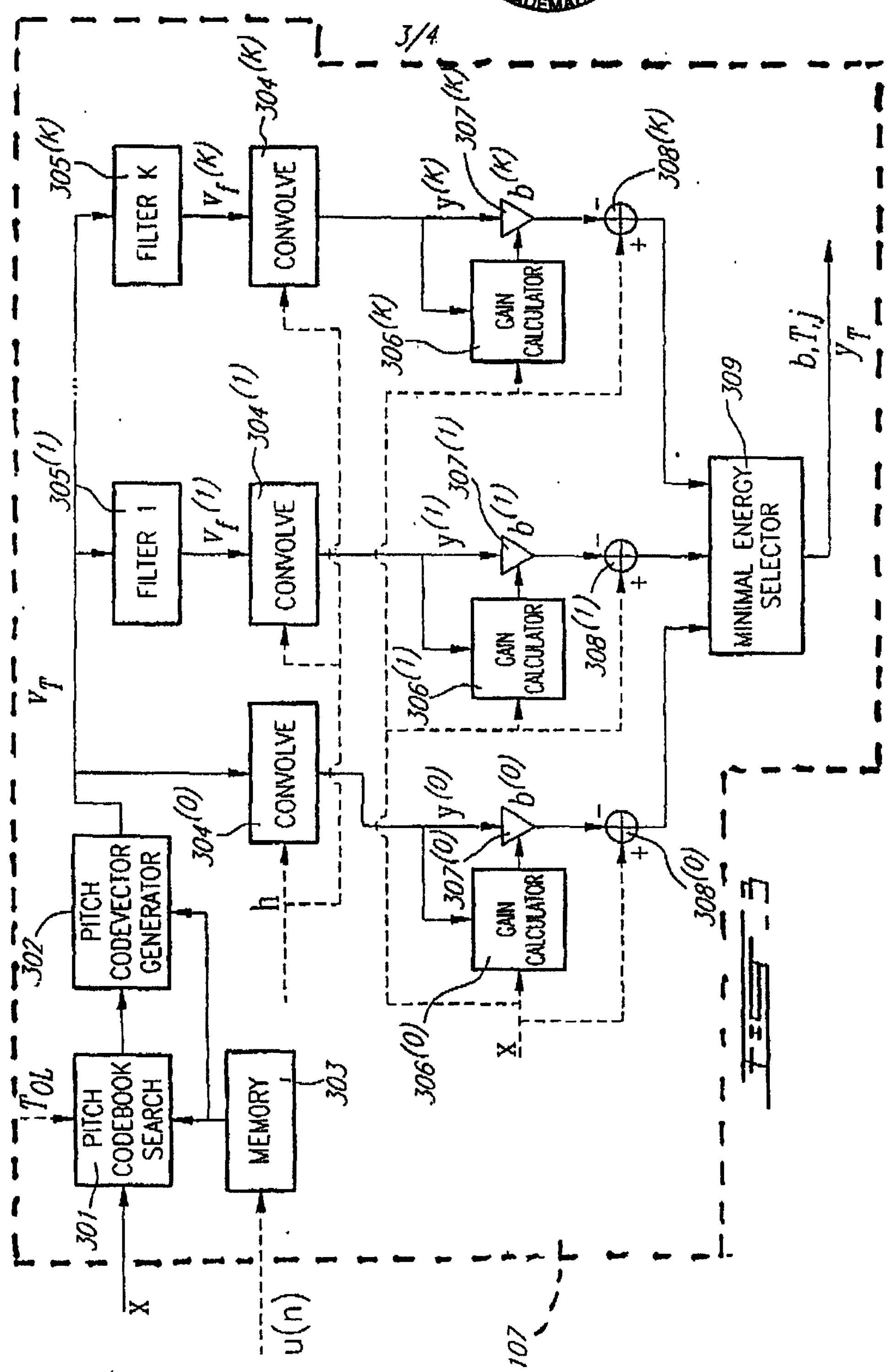
PITCH CODEBOOK SEARCH
PITCH CODEVECTOR GENERATOR
MEMORY
CONVOLVE
FILTER 1
FILTER K
GAIN CALCULATOR
MINIMAL ENERGY SELECTOR
301
302
303
$304^{(0)}$
$304^{(1)}$
$304^{(K)}$
$305^{(1)}$
$305^{(K)}$
$306^{(0)}$
$306^{(1)}$
$306^{(K)}$
$307^{(0)}$
$307^{(1)}$
$307^{(K)}$
$308^{(0)}$
$308^{(1)}$
$308^{(K)}$
309
107
T_{OL}
v_T
$v_f^{(1)}$
$v_f^{(K)}$
$y^{(0)}$
$y^{(1)}$
$y^{(K)}$
$b^{(0)}$
$b^{(1)}$
$b^{(K)}$
x
h
u(n)
b, T, j
y_T

FIG. 3

265.

PATENT
4510-0106P

IN THE U.S. PATENT AND TRADEMARK OFFICE

Applicant:	Bruno BESSETTE et al.	Conf.:	4949
Appl. No.:	09/830,276	Group:	2655
Filed:	June 20, 2001	Examiner:	J. WOZNIAK
For:	PERCEPTUAL WEIGHTING DEVICE AND METHOD FOR EFFICIENT CODING OF WIDEBAND SIGNALS		

1005
4-804
04

INFORMATION DISCLOSURE STATEMENT
(SUBMISSION AFTER FILING OF AN APPLICATION
BUT BEFORE FINAL REJECTION OR NOTICE OF ALLOWANCE
OR CONCURRENTLY WITH A RULE 1.114 RCE APPLICATION)

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

April 1, 2004

Sir:

Pursuant to 37 C.F.R. §§ 1.97 and 1.98, applicant(s) hereby submit(s) an Information Disclosure Statement for consideration by the Examiner.

I. LIST OF PATENTS, PUBLICATIONS OR OTHER INFORMATION

The patents, publications, or other information submitted for consideration by the Office are listed on the PTO-1449(s), attached hereto.

II. COPIES (check at least one box)

a. ☒ This application was filed before June 30, 2003. Accordingly, submitted herewith is a legible copy of (i) each U.S. and foreign patent; (ii) each publication or that portion which caused it to be listed; and (iii) all other information or that portion which caused it to be listed.

b. ☐ This application was filed on or after June 30, 2003. Accordingly, copies of cited U.S. patents and patent application publications therefore are not included. Copies of foreign

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patent documents and non-patent literature are included.

c. ☐ Some or all of the documents listed on the PTO-1449 are not enclosed because they were cited in the International Search Report and copies should already be in the PTO file. If copies are needed, please contact the undersigned.

III. CONCISE EXPLANATION OF THE RELEVANCE
(check at least one box)

a. ☒ **DOCUMENTS IN THE ENGLISH LANGUAGE**

The patents, publications, or other information listed on the attached PTO 1449 are in the English language and therefore, do not require a statement of relevancy.

b. ☒ **DOCUMENTS NOT IN THE ENGLISH LANGUAGE**

A concise explanation of the relevance of all patents, publications, or other information listed that is not in the English language is as follows:

Equivalents have been submitted for all patents, publications or other information and each equivalent is indicated on the attached PTO-1449.

c. ☒ **ENGLISH LANGUAGE SEARCH REPORT**

An English language version of the search report or action that indicates the degree of relevance found by the foreign office is attached, thereby satisfying the requirement for a concise explanation. See MPEP 609(III)(A)(3).

d. ☒ **OTHER**

The following additional information is provided for the Examiner's consideration.

A copy of the translation of the Decision on Grant issued from the Patent Office of the Russian Federation in the corresponding Russian Patent Application No. 2001114194 is submitted herewith.

FEES

IV. ☐ THIS IDS IS BEING FILED UNDER 37 C.F.R. § 1.97(b): (check one box)

a. ☐ within three months of the filing date of a national application (37 C.F.R. § 1.97(b)(1)). No fee or statement is required. *(This section is not to be used with RCE's.)*

b. ☐ within three months of the date of entry of the national stage as set forth in § 1.491 in an international application (37 C.F.R. § 1.97(b)(2)). No fee or statement is required.

c. ☐ concurrently with the filing of a Request for Continued Examination under § 1.114 (37 C.F.R. § 1.97(b)(4)). No fee or statement is required.

d. ☐ before the mailing date of a first Action on the merits (37 C.F.R. § 1.97(b)(3)). No fee or statement is required.
In the event that a first Office Action on the merits has been issued, please consider this IDS under 37 C.F.R. § 1.97(c) and see the statement under 37 C.F.R. § 1.97(e) below, or, if no statement has been made, charge our deposit account in the amount of $180.00 as required by 37 C.F.R. § 1.17(p).

V. ☒ THIS IDS IS BEING FILED UNDER 37 C.F.R. § 1.97(c): (check one box)

before the mailing date of a Final Office Action under 37 C.F.R. § 1.113 (See 37 C.F.R. § 1.97(c)(1)) or before the mailing date of a Notice of Allowance under 37 C.F.R. § 1.311 (See 37 C.F.R. § 1.97(c)(2)).

a. ☒ No statement; therefore, a fee in the amount of $180.00 as required by 37 C.F.R. § 1.17(p).

or

b. ☐ See the statement below. No fee is required.

VI. STATEMENT UNDER 37 C.F.R. § 1.97(e) (check only one box)

The undersigned hereby states that

a. ☐ each item of information contained in the IDS was first cited in any communication from a foreign Patent Office in a counterpart foreign application not more than three months prior to the filing of this IDS; or

b. ☐ no item of information contained in the IDS was cited in a communication from a foreign Patent Office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of IDS was known to any individual designated in 37 C.F.R. § 1.56(c) more than three months prior to the filing of the IDS.

c. ☐ Some of the items of information were cited in a communication from a foreign Patent Office. As to this information, the undersigned states that each item of information contained in the IDS was first cited in a communication from a foreign Patent Office in a counterpart foreign application not more than three months prior to the filing of this IDS. As to the remaining information, the undersigned hereby states that no item of this remaining information contained in the IDS was cited in a communication from a foreign Patent Office in a counterpart foreign application and, to the best of my knowledge after making reasonable inquiry, was known to any individual designated in 37 C.F.R. § 1.56(c) more than three months prior to the filing of this statement.

VII. PAYMENT OF FEES (check one box)

☒ A check in the amount of $180.00 as required by 37 C.F.R. § 1.17(p) is enclosed for the above-identified fee.

☐ Please charge Deposit Account No. 02-2448 in the amount required by 37 C.F.R. § 1.17(p) for the above-indicated fee. A triplicate copy of this paper is attached.

☐ No fee is required.

If the Examiner has any questions concerning this IDS, he/she is requested to contact the undersigned. If it is determined that this IDS has been filed under the wrong rule, the PTO is requested to consider this IDS under the proper rule and charge the appropriate fee to Deposit Account No. 02-2448.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No. 02-2448 for any additional fees required under 37 C.F.R. § 1.16 or under § 1.17; particularly, extension of time fees.

Respectfully submitted,

BIRCH, STEWART, KOLASCH & BIRCH, LLP

By ______________________
Marc S. Weiner, #32,181

HNS
MSW/HNS/kmr
4510-0106P

P.O. Box 747
Falls Church, VA 22040-0747
(703) 205-8000

Attachment(s):
- ☒ PTO-1449
- ☒ Documents
- ☒ Foreign Search Report
- ☒ Fee
- ☐ Other:

(Rev. 02/12/2004)

Sheet 1 of 1 (4/1/04)

OIPE JC174 APR 0 1 2004 PATENT & TRADEMARK OFFICE

Form PTO-1449 **INFORMATION DISCLOSURE CITATION IN AN APPLICATION** (Use several sheets if necessary)	ATTY. DOCKET NO. 4510-0106P	APPLICATION NO. 09/830,276
	APPLICANT BESSETTE et al.	
	FILING DATE June 20, 2001	GROUP 2655

U.S. PATENT DOCUMENTS

EXAMINER INITIAL	DOCUMENT NUMBER	Kind	DATE	NAME	CLASS	SUB CLASS	FILING DATE IF APPROPRIATE
JW	US 4,932,061	B1	1990-06-05	Kroon et al.			
JW	US 5,963,898	B1	1999-10-05	Navarro et al.			(= WO 96/21220)
JW	US 6,192,334	B1	2001-02-20	Nomura			(= JP 10-282997)
JW	US 5,519,807	B1	1996-05-21	Cellario et al.			(= JP 6-348300)
	US						
	US						
	US						

RECEIVED
APR 0 5 2004
Technology Center 2600

FOREIGN PATENT DOCUMENTS

	Office	DOCUMENT NUMBER	Kind	DATE	COUNTRY	CLASS	SUB CLASS	TRANSLATION YES	NO
JW	WO	96/21220		1996-07-11	WO			(= USP 5,963,898)	
JW	JP	02-012300	A	1990-01-17	JP			English Abstract	
JW	JP	03-116199	A	1991-05-17	JP			(= EP 402947)	
JW	JP	10-282997	A	1998-10-23	JP			(= USP 6,192,334)	
JW	JP	6-348300	A	1994-12-22	JP			(= USP 5,519,807)	
JW	EP	0 465 057	A1	1992-01-08	EP			English	
JW	EP	0 732 686	A2	1996-09-18	EP			English	

OTHER DOCUMENTS (Include Name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.) date, page(s), volume-issue number(s), publisher, city and/or country where published.

	~~NAZAROV V.M. et al., "Methods of digital processing and transmission of speech signals," Moscow, Sovetskoye Radio's Publishers, 1985, pp. 10-12~~

EXAMINER	DATE CONSIDERED 4/8/04

EXAMINER: Initial if citation considered, whether or not citation is in conformance with M.P.E.P. 609; Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

4510-0106P

MSW/HNS/kmr

Other Prior Art

According to the information contained in form PTO-1449 or PTO-892, there are one or more other prior art/non-patent literature documents missing from the original file history record obtained from the United States Patent and Trademark Office. Upon your request we will attempt to obtain these documents from alternative resources. Please note that additional charges will apply for this service.

Interview Summary	Application No.	Applicant(s)	
	09/830,276	BESSETTE ET AL.	
	Examiner	Art Unit	
	James S. Wozniak	2655	

All participants (applicant, applicant's representative, PTO personnel):

(1) *James S. Wozniak*. (3)_____.

(2) *Hyung Sohn*. (4)_____.

Date of Interview: *4/1/04*.

Type: a)☒ Telephonic b)☐ Video Conference
c)☐ Personal [copy given to: 1)☐ applicant 2)☐ applicant's representative]

Exhibit shown or demonstration conducted: d)☐ Yes e)☒ No.
If Yes, brief description: _____.

Claim(s) discussed: *1, 8, 9, 15, 22, 29, 36, and 43*.

Identification of prior art discussed: _____.

Agreement with respect to the claims f)☒ was reached. g)☐ was not reached. h)☐ N/A.

Substance of Interview including description of the general nature of what was agreed to if an agreement was reached, or any other comments: *Discussion of examiner's amendment that specified a wideband "speech" signal in the above claims that was agreed upon by the attorney*.

(A fuller description, if necessary, and a copy of the amendments which the examiner agreed would render the claims allowable, if available, must be attached. Also, where no copy of the amendments that would render the claims allowable is available, a summary thereof must be attached.)

THE FORMAL WRITTEN REPLY TO THE LAST OFFICE ACTION MUST INCLUDE THE SUBSTANCE OF THE INTERVIEW. (See MPEP Section 713.04). If a reply to the last Office action has already been filed, APPLICANT IS GIVEN ONE MONTH FROM THIS INTERVIEW DATE, OR THE MAILING DATE OF THIS INTERVIEW SUMMARY FORM, WHICHEVER IS LATER, TO FILE A STATEMENT OF THE SUBSTANCE OF THE INTERVIEW. See Summary of Record of Interview requirements on reverse side or on attached sheet.

Examiner Note: You must sign this form unless it is an Attachment to a signed Office action.

Examiner's signature, if required

Summary of Record of Interview Requirements

Manual of Patent Examining Procedure (MPEP), Section 713.04, Substance of Interview Must be Made of Record
A complete written statement as to the substance of any face-to-face, video conference, or telephone interview with regard to an application must be made of record in the application whether or not an agreement with the examiner was reached at the interview.

Title 37 Code of Federal Regulations (CFR) § 1.133 Interviews
Paragraph (b)
In every instance where reconsideration is requested in view of an interview with an examiner, a complete written statement of the reasons presented at the interview as warranting favorable action must be filed by the applicant. An interview does not remove the necessity for reply to Office action as specified in §§ 1.111, 1.135. (35 U.S.C. 132)

37 CFR §1.2 Business to be transacted in writing.
All business with the Patent or Trademark Office should be transacted in writing. The personal attendance of applicants or their attorneys or agents at the Patent and Trademark Office is unnecessary. The action of the Patent and Trademark Office will be based exclusively on the written record in the Office. No attention will be paid to any alleged oral promise, stipulation, or understanding in relation to which there is disagreement or doubt.

The action of the Patent and Trademark Office cannot be based exclusively on the written record in the Office if that record is itself incomplete through the failure to record the substance of interviews.

It is the responsibility of the applicant or the attorney or agent to make the substance of an interview of record in the application file, unless the examiner indicates he or she will do so. It is the examiner's responsibility to see that such a record is made and to correct material inaccuracies which bear directly on the question of patentability.

Examiners must complete an Interview Summary Form for each interview held where a matter of substance has been discussed during the interview by checking the appropriate boxes and filling in the blanks. Discussions regarding only procedural matters, directed solely to restriction requirements for which interview recordation is otherwise provided for in Section 812.01 of the Manual of Patent Examining Procedure, or pointing out typographical errors or unreadable script in Office actions or the like, are excluded from the interview recordation procedures below. Where the substance of an interview is completely recorded in an Examiners Amendment, no separate Interview Summary Record is required.

The Interview Summary Form shall be given an appropriate Paper No., placed in the right hand portion of the file, and listed on the "Contents" section of the file wrapper. In a personal interview, a duplicate of the Form is given to the applicant (or attorney or agent) at the conclusion of the interview. In the case of a telephone or video-conference interview, the copy is mailed to the applicant's correspondence address either with or prior to the next official communication. If additional correspondence from the examiner is not likely before an allowance or if other circumstances dictate, the Form should be mailed promptly after the interview rather than with the next official communication.

The Form provides for recordation of the following information:

- Application Number (Series Code and Serial Number)
- Name of applicant
- Name of examiner
- Date of interview
- Type of interview (telephonic, video-conference, or personal)
- Name of participant(s) (applicant, attorney or agent, examiner, other PTO personnel, etc.)
- An indication whether or not an exhibit was shown or a demonstration conducted
- An identification of the specific prior art discussed
- An indication whether an agreement was reached and if so, a description of the general nature of the agreement (may be by attachment of a copy of amendments or claims agreed as being allowable). Note: Agreement as to allowability is tentative and does not restrict further action by the examiner to the contrary.
- The signature of the examiner who conducted the interview (if Form is not an attachment to a signed Office action)

It is desirable that the examiner orally remind the applicant of his or her obligation to record the substance of the interview of each case. It should be noted, however, that the Interview Summary Form will not normally be considered a complete and proper recordation of the interview unless it includes, or is supplemented by the applicant or the examiner to include, all of the applicable items required below concerning the substance of the interview.

A complete and proper recordation of the substance of any interview should include at least the following applicable items:

1) A brief description of the nature of any exhibit shown or any demonstration conducted,
2) an identification of the claims discussed,
3) an identification of the specific prior art discussed,
4) an identification of the principal proposed amendments of a substantive nature discussed, unless these are already described on the Interview Summary Form completed by the Examiner,
5) a brief identification of the general thrust of the principal arguments presented to the examiner,
   (The identification of arguments need not be lengthy or elaborate. A verbatim or highly detailed description of the arguments is not required. The identification of the arguments is sufficient if the general nature or thrust of the principal arguments made to the examiner can be understood in the context of the application file. Of course, the applicant may desire to emphasize and fully describe those arguments which he or she feels were or might be persuasive to the examiner.)
6) a general indication of any other pertinent matters discussed, and
7) if appropriate, the general results or outcome of the interview unless already described in the Interview Summary Form completed by the examiner.

Examiners are expected to carefully review the applicant's record of the substance of an interview. If the record is not complete and accurate, the examiner will give the applicant an extendable one month time period to correct the record.

Examiner to Check for Accuracy

If the claims are allowable for other reasons of record, the examiner should send a letter setting forth the examiner's version of the statement attributed to him or her. If the record is complete and accurate, the examiner should place the indication, "Interview Record OK" on the paper recording the substance of the interview along with the date and the examiner's initials.

Transaction History Date ________

Date information retrieved from USPTO Patent Application Information Retrieval (PAIR) system records at www.uspto.gov

Notice of Allowability	Application No. 09/830,276	Applicant(s) BESSETTE ET AL.
	Examiner James S. Wozniak	Art Unit 2655

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to 1/22/04.
2. ☒ The allowed claim(s) is/are 1-49.
3. ☒ The drawings filed on 22 January 2004 are accepted by the Examiner.
4. ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
   a) ☒ All b) ☐ Some* c) ☐ None of the:
   1. ☒ Certified copies of the priority documents have been received.
   2. ☐ Certified copies of the priority documents have been received in Application No. _____.
   3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

   * Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

5. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
6. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
   (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
   1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
   (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.

   Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
7. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☐ Notice of References Cited (PTO-892)
2. ☐ Notice of Draftperson's Patent Drawing Review (PTO-948)
3. ☒ Information Disclosure Statements (PTO-1449 or PTO/SB/08), Paper No./Mail Date 6, 10
4. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material
5. ☐ Notice of Informal Patent Application (PTO-152)
6. ☒ Interview Summary (PTO-413), Paper No./Mail Date 11.
7. ☒ Examiner's Amendment/Comment
8. ☒ Examiner's Statement of Reasons for Allowance
9. ☐ Other _____.

Detailed Action

Response to Arguments/Amendments

1. Applicant's arguments, see Amendment, Pages 5-10, filed 1/22/04, with respect to Claims 1-49 have been fully considered and are persuasive. The rejection of Claims 1-49 has been withdrawn, upon authorization of the below examiner's amendment.

2. Based on the amendments to the drawings and specification, the examiner has withdrawn the previous objections directed towards minor informalities.

Information Disclosure Statement

3. Nazarov et al ("Methods of Digital Processing and Transmission of Speech Signals," 1985), included in the information disclosure statement filed 4/1/04, has not been considered because no copy of the document has been received.

EXAMINER'S AMENDMENT

4. An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it MUST be submitted no later than the payment of the issue fee.

Authorization for this examiner's amendment was given in a telephone interview with Hyung Sohn on 4/1/2004.

Claims 1, 8, 9, 15, 22, 29, 36, and 43 have been amended as follows:

1. (*Currently amended*) A perceptual weighting device for producing a perceptually weighted signal in response to a wideband speech signal in order to reduce a difference between the [[a]] wideband speech signal and a subsequently synthesized wideband speech signal, said perceptual weighting device comprising:

a) a signal preemphasis filter responsive to the wideband speech signal for enhancing a high frequency content of the wideband speech signal to thereby produce a preemphasised signal;

b) a synthesis filter calculator responsive to said preemphasised signal for producing synthesis filter coefficients; and

c) a perceptual weighting filter, responsive to said preemphasised signal and said synthesis filter coefficients, for filtering said preemphasised signal in relation to said synthesis filter coefficients to thereby produce said perceptually weighted signal, said perceptual weighting filter having a transfer function with fixed denominator whereby weighting of said wideband speech signal in a formant region is substantially decoupled from a spectral tilt of said wideband speech signal.

8. (*Currently amended*) A method for producing a perceptually weighted signal in response to a wideband speech signal in order to reduce a difference between the [[a]] weighted wideband speech signal and a subsequently synthesized weighted wideband speech signal, said method comprising:

a) filtering the wideband speech signal to produce a preemphasised signal with enhanced high frequency content;

b) calculating, from said preemphasised signal, synthesis filter coefficients; and

c) filtering said preemphasised signal in relation to said synthesis filter coefficients to thereby produce a perceptually weighted speech signal, wherein said filtering comprises processing the preemphasis signal through a perceptual weighting filter having a transfer function with fixed denominator whereby weighting of said wideband speech signal in a formant region is substantially decoupled from a spectral tilt of said wideband speech signal.

8

9. (*Currently amended*) A method for producing a perceptually weighted signal as defined in claim 8, wherein filtering the wideband speech signal comprises filtering through a transfer function of the form:

$P(z) = 1 - \mu z^{-1}$

wherein μ is a preemphasis factor having a value located between 0 and 1.

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15. (*Currently amended*) An encoder for encoding a wideband speech signal, comprising:

a) a perceptual weighting device as recited in claim 1;

13

b) [[an]] a pitch codebook search device responsive to said perceptually weighted signal for producing pitch codebook parameters and an innovative search target vector;

c) an innovative codebook search device, responsive to said synthesis filter coefficients and to said innovative search target vector, for producing innovative codebook parameters; and

d) a signal forming device for producing an encoded wideband speech signal comprising said pitch codebook parameters, said innovative codebook parameters, and said synthesis filter coefficients.

---

22. (*Currently amended*) A cellular communication system for servicing a large geographical area divided into a plurality of cells, comprising:

a) mobile transmitter/receiver units;

b) cellular base stations respectively situated in said cells;

c) a control terminal for controlling communication between the cellular base stations;

d) a bidirectional wireless communication sub-system between each mobile unit situated in one cell and the cellular base station of said one cell, said bidirectional wireless communication sub-system comprising, in both the mobile unit and the cellular base station:

i) a transmitter including an encoder for encoding a wideband speech signal as recited in claim 15 and a transmission circuit for transmitting the encoded wideband speech signal; and

ii) a receiver including a receiving circuit for receiving a transmitted encoded wideband speech signal and a decoder for decoding the received encoded wideband speech signal.

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29. (*Currently amended*) A cellular mobile transmitter/receiver unit comprising:

a) a transmitter including an encoder for encoding a wideband speech signal as recited in claim 15 and a transmission circuit for transmitting the encoded wideband speech signal; and

C5

b) a receiver including a receiving circuit for receiving a transmitted encoded wideband speech signal and a decoder for decoding the received encoded wideband speech signal.

C4

36. (*Currently amended*) A cellular network element comprising:

a) a transmitter including an encoder for encoding a wideband speech signal as defined in claim 15 and a transmission circuit for transmitting the encoded wideband speech signal; and

b) a receiver including a receiving circuit for receiving a transmitted encoded wideband speech signal and a decoder for decoding the received encoded wideband speech signal.

---

43. (*Currently amended*) In a cellular communication system for servicing a large geographical area divided into a plurality of cells, comprising: mobile transmitter/receiver units; cellular base stations, respectively situated in said cells; and control terminal for controlling communication between the cellular base stations:

C4

a bidirectional wireless communication sub-system between each mobile unit situated in one cell and the cellular base station of said one cell, said bidirectional wireless communication sub-system comprising, in both the mobile unit and the cellular base station:

> a) a transmitter including an encoder for encoding a wideband speech signal as recited in claim 15 and a transmission circuit for transmitting the encoded wideband speech signal; and
>
> b) a receiver including a receiving circuit for receiving a transmitted encoded wideband speech signal and a decoder for decoding the received encoded wideband speech signal.

Allowable Subject Matter

5. **Claims 1-49** are allowable over the prior art of record for the following reasons:

With respect to independent claims, 1 and 8, the prior art teaches:

- Kroon et al (U.S. Patent: 5,664,055)- teaches the use of a synthesis filter, for outputting synthesized speech based upon LP coefficients and a perceptual weighting filter, used to compensate for spectral tilt to produce an audible synthesized speech, that is defined by the transfer function:

$$W(z) = \frac{A(z/\gamma_1)}{A(z/\gamma_2)} = \frac{1+\sum_{i=1}^{10}\gamma_1{}^i a_i z^{-i}}{1+\sum_{i=1}^{10}\gamma_2{}^i a_i z^{-i}}$$

- Oshikiri et al (U.S. Patent: 6,064,962)- teaches the use of a pre-emphasis filter to compensate for spectral tilt defined by the transfer function:

$$(1-\mu z^{-1})$$

6. The combination of Kroon et al and Oshikiri et al fail to specifically disclose or fairly suggest a pre-emphasis filter for producing pre-emphasized speech which is used to calculate LP coefficients that are further utilized with a perceptual weighting filter, having a fixed denominator, to compensate for spectral tilt in a wideband speech signal.

Dependent Claims 2-7 and 9-49 are allowable as they further limit their parent claims.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Conclusion

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to James S. Wozniak whose telephone number is (703) 305-8669 and email is James.Wozniak@uspto.gov. The examiner can normally be reached on Mondays-Fridays, 8:30-4:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Talivaldis Ivars Smits can be reached at (703) 306-3011. The fax/phone number for the Technology Center 2600 where this application is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the technology center receptionist whose telephone number is (703) 306-0377.

James S. Wozniak
4/8/04

TĀLIVALDIS IVARS ŠMITS
PRIMARY EXAMINER

Am

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

NOTICE OF ALLOWANCE AND FEE(S) DUE

2292 7590 04/14/2004

BIRCH STEWART KOLASCH & BIRCH
PO BOX 747
FALLS CHURCH, VA 22040-0747

EXAMINER	
WOZNIAK, JAMES S	
ART UNIT	PAPER NUMBER
2655	11

DATE MAILED: 04/14/2004

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/830,276	06/20/2001	Bruno Bessette	4082-0130P	4949

TITLE OF INVENTION: PERCEPTUAL WEIGHTING DEVICE AND METHOD FOR EFFICIENT CODING OF WIDEBAND SIGNALS

APPLN. TYPE	SMALL ENTITY	ISSUE FEE	PUBLICATION FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	NO	$1330	$0	$1330	07/14/2004

THE APPLICATION IDENTIFIED ABOVE HAS BEEN EXAMINED AND IS ALLOWED FOR ISSUANCE AS A PATENT. PROSECUTION ON THE MERITS IS CLOSED. THIS NOTICE OF ALLOWANCE IS NOT A GRANT OF PATENT RIGHTS. THIS APPLICATION IS SUBJECT TO WITHDRAWAL FROM ISSUE AT THE INITIATIVE OF THE OFFICE OR UPON PETITION BY THE APPLICANT. SEE 37 CFR 1.313 AND MPEP 1308.

THE ISSUE FEE AND PUBLICATION FEE (IF REQUIRED) MUST BE PAID WITHIN THREE MONTHS FROM THE MAILING DATE OF THIS NOTICE OR THIS APPLICATION SHALL BE REGARDED AS ABANDONED. THIS STATUTORY PERIOD CANNOT BE EXTENDED. SEE 35 U.S.C. 151. THE ISSUE FEE DUE INDICATED ABOVE REFLECTS A CREDIT FOR ANY PREVIOUSLY PAID ISSUE FEE APPLIED IN THIS APPLICATION. THE PTOL-85B (OR AN EQUIVALENT) MUST BE RETURNED WITHIN THIS PERIOD EVEN IF NO FEE IS DUE OR THE APPLICATION WILL BE REGARDED AS ABANDONED.

HOW TO REPLY TO THIS NOTICE:

I. Review the SMALL ENTITY status shown above.

If the SMALL ENTITY is shown as YES, verify your current SMALL ENTITY status:

A. If the status is the same, pay the TOTAL FEE(S) DUE shown above.

B. If the status is changed, pay the PUBLICATION FEE (if required) and twice the amount of the ISSUE FEE shown above and notify the United States Patent and Trademark Office of the change in status, or

If the SMALL ENTITY is shown as NO:

A. Pay TOTAL FEE(S) DUE shown above, or

B. If applicant claimed SMALL ENTITY status before, or is now claiming SMALL ENTITY status, check the box below and enclose the PUBLICATION FEE and 1/2 the ISSUE FEE shown above.

☐ Applicant claims SMALL ENTITY status. See 37 CFR 1.27.

II. PART B - FEE(S) TRANSMITTAL should be completed and returned to the United States Patent and Trademark Office (USPTO) with your ISSUE FEE and PUBLICATION FEE (if required). Even if the fee(s) have already been paid, Part B - Fee(s) Transmittal should be completed and returned. If you are charging the fee(s) to your deposit account, section "4b" of Part B - Fee(s) Transmittal should be completed and an extra copy of the form should be submitted.

III. All communications regarding this application must give the application number. Please direct all communications prior to issuance to Mail Stop ISSUE FEE unless advised to the contrary.

IMPORTANT REMINDER: Utility patents issuing on applications filed on or after Dec. 12, 1980 may require payment of maintenance fees. It is patentee's responsibility to ensure timely payment of maintenance fees when due.

PTOL-85 (Rev. 11/03) Approved for use through 04/30/2004.

PART B - FEE(S) TRANSMITTAL

Complete and send this form, together with applicable fee(s), to: Mail **Mail Stop ISSUE FEE**
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450
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INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 4 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

CURRENT CORRESPONDENCE ADDRESS (Note: Legibly mark-up with any corrections or use Block 1)

2292 7590 04/14/2004

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FALLS CHURCH, VA 22040-0747

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I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being facsimile transmitted to the USPTO, on the date indicated below.

(Depositor's name)

(Signature)

(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/830,276	06/20/2001	Bruno Bessette	4082-0130P	4949

TITLE OF INVENTION: PERCEPTUAL WEIGHTING DEVICE AND METHOD FOR EFFICIENT CODING OF WIDEBAND SIGNALS

APPLN. TYPE	SMALL ENTITY	ISSUE FEE	PUBLICATION FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	NO	$1330	$0	$1330	07/14/2004

EXAMINER	ART UNIT	CLASS-SUBCLASS
WOZNIAK, JAMES S	2655	704-268000

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).

❑ Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.

❑ "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-02 or more recent) attached. **Use of a Customer Number is required.**

2. For printing on the patent front page, list (1) the names of up to 3 registered patent attorneys or agents OR, alternatively, (2) the name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed.

1 ______
2 ______
3 ______

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. Inclusion of assignee data is only appropriate when an assignment has been previously submitted to the USPTO or is being submitted under separate cover. Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE

(B) RESIDENCE: (CITY and STATE OR COUNTRY)

Please check the appropriate assignee category or categories (will not be printed on the patent); ❑ individual ❑ corporation or other private group entity ❑ government

4a. The following fee(s) are enclosed:

❑ Issue Fee

❑ Publication Fee

❑ Advance Order - # of Copies ______

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❑ Payment by credit card. Form PTO-2038 is attached.

❑ The Director is hereby authorized by charge the required fee(s), or credit any overpayment, to Deposit Account Number ______ (enclose an extra copy of this form).

Director for Patents is requested to apply the Issue Fee and Publication Fee (if any) or to re-apply any previously paid issue fee to the application identified above.

(Authorized Signature) (Date)

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/830,276	06/20/2001	Bruno Bessette	4082-0130P	4949

2292 7590 04/14/2004

BIRCH STEWART KOLASCH & BIRCH
PO BOX 747
FALLS CHURCH, VA 22040-0747

EXAMINER	
WOZNIAK, JAMES S	

ART UNIT	PAPER NUMBER
2655	

DATE MAILED: 04/14/2004

Determination of Patent Term Extension under 35 U.S.C. 154 (b)
(application filed after June 7, 1995 but prior to May 29, 2000)

The Patent Term Extension is 0 day(s). Any patent to issue from the above-identified application will include an indication of the 0 day extension on the front page.

If a Continued Prosecution Application (CPA) was filed in the above-identified application, the filing date that determines Patent Term Extension is the filing date of the most recent CPA.

Applicant will be able to obtain more detailed information by accessing the Patent Application Information Retrieval (PAIR) system (http://pair.uspto.gov).

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (703) 305-1383. Questions relating to issue and publication fee payments should be directed to the Customer Service Center of the Office of Patent Publication at (703) 305-8283.

PTOL-85 (Rev. 11/03) Approved for use through 04/30/2004.

Transaction History Date ____
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2292 7590 04/14/2004

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(Depositor's name)
(Signature)
(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/830,276	06/20/2001	Bruno Bessette	4082-0130P	4949

TITLE OF INVENTION: PERCEPTUAL WEIGHTING DEVICE AND METHOD FOR EFFICIENT CODING OF WIDEBAND SIGNALS

APPLN. TYPE	SMALL ENTITY	ISSUE FEE	PUBLICATION FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	~~NO~~ YES	$1330	$0	~~$1330~~ $665	07/14/2004

EXAMINER	ART UNIT	CLASS-SUBCLASS
WOZNIAK, JAMES S	2655	704-268000

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).

☐ Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.

☐ "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-02 or more recent) attached. Use of a Customer Number is required.

2. For printing on the patent front page, list (1) the names of up to 3 registered patent attorneys or agents OR, alternatively, (2) the name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed.

1 ~~Birch, Stewart,~~
2 ~~Kolasch & Birch,~~ LLP
3 ____

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. Inclusion of assignee data is only appropriate when an assignment has been previously submitted to the USPTO or is being submitted under separate cover. Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE: Voiceage Corporation
(B) RESIDENCE: (CITY and STATE OR COUNTRY): Quebec, CANADA

Please check the appropriate assignee category or categories (will not be printed on the patent): ☐ individual ☒ corporation or other private group entity ☐ government

4a. The following fee(s) are enclosed:

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☒ A check in the amount of the fee(s) is enclosed.
☐ Payment by credit card. Form PTO-2038 is attached.
☐ The Director is hereby authorized by charge the required fee(s), or credit any overpayment, to Deposit Account Number ____ (enclose an extra copy of this form).

Director for Patents is requested to apply the Issue Fee and Publication Fee (if any) or to re-apply any previously paid issue fee to the application identified above.

(Authorized Signature) (Date)
Marc S. Weiner, #32,181 7/13/04

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07/15/2004 MBERHE1 00000127 09830276
01 FC:2501 665.00 OP
02 FC:8001 12.00 OP

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PTOL-85 (Rev. 11/03) Approved for use through 04/30/2004. OMB 0651-0033 U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

Transaction History Date ____
Date information retrieved from USPTO Patent Application Information Retrieval (PAIR) system records at www.uspto.gov

*RETURN TO FMF - LOCATION 7540 #12

QUERY CONTROL FORM		RTIS USE ONLY
Application No. 09/830,276	Prepared by JTG	Tracking Number
Examiner-GAU Wozniak, 2655	Date 8/9/04	Week Date
	No. of queries 1	

JACKET			
a. Serial No.	f. Foreign Priority	k. Print Claim(s)	p. PTO-1449
b. Applicant(s)	g. Disclaimer	l. Print Fig.	q. PTOL-85b
c. Continuing Data	h. Microfiche Appendix	m. Searched Column	r. Abstract
d. PCT	i. Title	n. PTO-270/328	s. Sheets/Figs
e. Domestic Priority	j. Claims Allowed	o. PTO-892	t. Other

SPECIFICATION
a. Page Missing
b. Text Continuity
c. Holes through Data
d. Other Missing Text
e. Illegible Text
f. Duplicate Text
g. Brief Description
h. Sequence Listing
i. Appendix
j. Amendments
k. Other

CLAIMS
a. Claim(s) Missing
b. Improper Dependency
c. Duplicate Numbers
d. Incorrect Numbering
e. Index Disagrees
f. Punctuation
g. Amendments
h. Bracketing
i. Missing Text
j. Duplicate Text
k. Other

Sheets/Figs:
MESSAGE Approved drawings has red corrections marks on them

Please resolve

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13

Thanks
initials JTG

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initials 87

E-5 (Rev. 10/15/02) *LOCATION 7540

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OCT 1 9 2004
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PATENT
4510-0106P

IN THE U.S. PATENT AND TRADEMARK OFFICE

#13

Applicant:	BASSETTE, et al.	Conf.:	4949
Appl. No.:	09/830,276	Group:	2641
Filed:	June 20, 2001		
For:	PERCEPTUAL WEIGHTING DEVICE AND METHOD FOR EFFICIENT CODING OF WIDEBAND SIGNALS		

NOTIFICATION OF ERRONEOUS PAYMENT OF SMALL ENTITY FEES UNDER 37 C.F.R. § 1.28

RECEIVED
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OFFICE OF PETITIONS

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

It is respectfully noted that the above-identified application does not qualify for small entity status under 37 C.F.R, § 1.27(a).

Small entity status was established with the filing of the application on April 25, 2002, and the small entity filing fee was paid in good faith. It has since been discovered that this status as a small entity was established in error, without the intent to deceive.

It is therefore respectfully requested that the error be excused. The following items are being submitted to comply with the requirements of 37 C.F.R. 1.28(c):

(1) Payment of deficiency owed.

10/26/2004 DALLEN 00000009 09830276
01 FC:1461 665.00 OP

(i) A $665.00 small entity Issue Fee was paid on July 13, 2004, with check number 9030280. Accordingly, the deficiency owed is $665.00.

00000013 022448 09830276
-0.04 DA

(ii) A check in the amount of $665.00 is attached hereto, as payment of the deficiency owed.

It is again noted that the previous establishment of small entity status was made in error, without the intent to deceive. As it is believed that the requirements of 37 C.F.R. § 1.28(c)(1) and (c)(2) have been met, it is respectfully requested that the error be excused and that the U.S. Patent and Trademark Office forward appropriate notification to the undersigned.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No. 02-2448 for any additional fees required under 37 C.F.R. § 1.16 or under 37 C.F.R. § 1.17; particularly, extension of time fees.

Respectfully submitted,

BIRCH, STEWART, KOLASCH & BIRCH, LLP

By [signature]
Marc S. Weiner, #32,181
HNS

P.O. Box 747
Falls Church, VA 22040-0747
(703) 205-8000

MSW/HNS/jm
4510-0106P

UNITED STATES PATENT AND TRADEMARK OFFICE

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Paper No. 14

BIRCH STEWART KOLASCH & BIRCH
P O BOX 747
FALLS CHURCH, VA 22040-0747

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DEC 13 2004

OFFICE OF PETITIONS

In re Patent No. 6,807,524 :
Issue Date: October 19, 2004 :
Application No. 09/830,276 : ON PETITION
Filed: June 20, 2001 :
Patentee: Bruno Bessette, et al. :

This is a notice regarding your request for acceptance of a fee deficiency submission under 37 CFR 1.28. On September 1, 1998, the Court of Appeals for the Federal Circuit held that 37 CFR 1.28(c) is the sole provision governing the time for correction of the erroneous payment of the issue fee as a small entity. **See DH Technology v. Synergystex International, Inc. 154 F.3d 1333, 47 USPQ2d 1865 (Fed. Cir. Sept. 1, 1998).**

The Office no longer investigates or rejects original or reissue applications under 37 CFR 1.56. **1098 Off. Gaz. Pat. Office 502 (January 3, 1989).** Therefore, nothing in this Notice is intended to imply that an investigation was done.

Your fee deficiency submission under 37 CFR 1.28 is hereby **ACCEPTED**.

Telephone inquiries concerning this decision should be directed to the undersigned at (571) 272-3229.

The application file is being referred to Files Repository.

Retta Williams

Retta Williams
Petitions Examiner
Office of Petitions
Office of the Deputy Commissioner
for Patent Examination Policy

М. В. НАЗАРОВ, Ю. Н. ПРОХОРОВ

МЕТОДЫ ЦИФРОВОЙ ОБРАБОТКИ И ПЕРЕДАЧИ РЕЧЕВЫХ СИГНАЛОВ

МОСКВА
«РАДИО И СВЯЗЬ»
1985

CHECKLIST FOR PROCESSING NEW APPLICATIONS

SERIAL 09834276

INSTRUCTIONS:

1. Make a checkmark beside each item IF verified
2. If corrections are required, write notes to the examiner or supervisor on reversed side

1. FACE OF THE FILE

1. Printed and stamped serial number match bar code label.
2. Filing Date present.
3. Class/Subclass present
4. Applicant(s) name present.
5. Total no. of drawings present.
6. Total no. of claims present.
7. Total no. of ind. Claims present
8. Filing fee received present
9. Mailing address present
10. Title of invention present

2. CENTER OF THE FILE

A. DRAWINGS

1. None (go to B)
2. Serial No. present & correct on each sheet.
3. No. of sheets entered on line 3 of contents

B. SMALL ENTITY STATEMENT

1. None & not recorded on face of file (Go to C)
2. Statement present
3. Small entity recorded on face of file

C. DECLARATION OR OATH

1. Title matches face of file and specification
2. Declaration phrase present (I hereby declare all .....)
3. (Original and first inventor or inventors ...) Phrase present.
4. (Reviewed and understand the contents of the application including claims...) Phrase present.
5. (Acknowledge duty to disclose information in accordance with 1.56(a)...) Phrase present.
6. Residence, citizenship, post office Address of all applicants present
7. Signed by all applicants
8. Less than 3 months before filing date, Or less than 6 months after filing date.

D. CLAIMS (as filed)

1. Completed form 1360 and 875
2. Circle ind claims on the Index of
3. Draw line under the last claim number On the Index of Claims.

E. SPECIFICATION

1. Serial no. Pressent and correct
2. Specification in permanent ink.
3. Brief description of each drawing figure.
4. No missing or duplicate pages.
5. No holes punched in text.

F. ABSTRACT

1. None (go to G)
2. Serial no. Present ad correct
3. Abstract on separate page.
4. 25 lines or less.
5. One paragraph ONLY

G. PTO-1556

1. Present.

H. PRE-AMENDMENTS

1. None (go to I)
2. Enter on contents of filewrapper.
3. Instruction to cancel claims.
4. Claims canceled on Index of Claims.
5. Instruction to add claims.
6. Circle new independent claims on the Index of Claims.
7. Draw line under the new last claim number on Index of Claims.
8. Complete forms 1360 and 875.

I. PTO-948

1. Present.

3. RIGHT SIDE OF FILE

1. PALM File Data sheet present.
2. Transmittal letters pressent.
3. Forms 1360 and 875 present/entered
4. Miscellaneous Papers present/entered.
5. Petitions to Make Special present.
6. Drawing prints present (2 copies)

FEES

_____ 1 Correct filing fee paid.
_____ 2 Excess claims fees paid.
  _____ a. Excess total claims more than 20.
  _____ b. Excess independent claims more than 3.
  _____ c. First multiple dependent claim fee paid
_____ 3 Miscellaneous paper fee paid

FINAL STEPS

_____ 1 Sign and date center of filewrapper under flap
_____ 2 Docket to examiner

NOTES TO SUPERVISOR:

NOTES TO EXAMINER:

SIGNATURE OF PREPARER: Sara Wilcher **DATE:** 10-4-01

United States Patent & Trademark Office
Office of Initial Patent Examination – Scanning Division

SCANNED, # 14

Application deficiencies found during scanning:

□ Page(s)__________of______________________________ were not present for scanning. (Document title)

□ Page(s)__________of______________________________ were not present for scanning. (Document title)

Missing page 2 of Amendment.

□ *Scanned copy is best available.*

BEST COPY

Application or Docket Number
09/830276

SMALL ENTITY TYPE		OR	OTHER THAN SMALL ENTITY	
RATE	FEE		RATE	FEE
BASIC FEE	430	OR	BASIC FEE	
X$ 9=	261	OR	X$18=	
X40=		OR	X80=	
+135=		OR	+270=	
TOTAL	691	OR	TOTAL	

SMALL ENTITY		OR	OTHER THAN SMALL ENTITY	
RATE	ADDI-TIONAL FEE		RATE	ADDI-TIONAL FEE
X$ 9=		OR	X$18=	
X40=		OR	X80=	
+135=		OR	+270=	
TOTAL ADDIT. FEE		OR	TOTAL ADDIT. FEE	

RATE	ADDI-TIONAL FEE		RATE	ADDI-TIONAL FEE
X$ 9=		OR	X$18=	
X40=		OR	X80=	
+135=		OR	+270=	
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RATE	ADDI-TIONAL FEE		RATE	ADDI-TIONAL FEE
X$ 9=		OR	X$18=	
X40=		OR	X80=	
+135=		OR	+270=	
TOTAL ADDIT. FEE		OR	TOTAL ADDIT. FEE	

The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.

FORM PTO-875 (Rev. 8/00)

Patent and Trademark Office, U.S. DEPARTMENT OF COMMERCE

Form PTO 1130
(REV 2/94)

U.S. DEPARTMENT OF COMMERCE
Patent and Trademark Office

PACE DATA ENTRY CODING SHEET

1ST EXAMINER W. Alvarado	DATE 05-18-01
2ND EXAMINER	DATE

APPLICATION NUMBER	TYPE APPL	FILING DATE (MONTH DAY YEAR)	SPECIAL HANDLING	GROUP ART UNIT	CLASS	SHEETS OF DRAWING
09/830276	1	06 20 01	0	2641	704	004

TOTAL CLAIMS	INDEPENDENT CLAIMS	SMALL ENTITY?	FILING FEE	FOREIGN LICENSE	ATTORNEY DOCKET NUMBER
049	002	1	0756	Y	4082-0130P

CONTINUITY DATA

CONT CODE	STATUS CODE	PARENT APPLICATION SERIAL NUMBER	PCT APPLICATION SERIAL NUMBER	PARENT PATENT NUMBER	PARENT FILING DATE (MONTH DAY YEAR)
			PCT/ /		
			PCT/ /		
			PCT/ /		
			PCT/ /		
			PCT/ /		

PCT/FOREIGN APPLICATION DATA

FOREIGN PRIORITY CLAIMED	COUNTRY CODE	PCT/FOREIGN APPLICATION SERIAL NUMBER	FOREIGN FILING DATE (MONTH DAY YEAR)
Y	CAX	2,252,170	10 27 98

MULTIPLE DEPENDENT CLAIM FEE CALCULATION SHEET *(FOR USE WITH FORM PTO-875)*	SERIAL NO. 09/830276	FILING DATE APPLICANT(S)

CLAIMS

	AS FILED		AFTER 1st AMENDMENT		AFTER 2nd AMENDMENT	
	IND.	DEP.	IND.	DEP.	IND.	DEP.
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TOTAL DEP.	47	⬅		⬅		⬅
TOTAL CLAIMS	49					

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TOTAL DEP.		⬅		⬅		⬅
TOTAL CLAIMS						

* *MAY BE USED FOR ADDITIONAL CLAIMS OR ADMENDMENTS*

ORM PTO-1360 (REV. 3-78)

U.S.DEPARTMENT OF C[illegible]

Thomson Innovation Patent Export, 2016-02-05 12:00:43 -0600

Table of Contents

Family 1/1

102 record(s) per family, collapsed by 70 record(s)

Record 1/70 CA2252170A1 A METHOD AND DEVICE FOR HIGH QUALITY CODING OF WIDEBAND SPEECH AND AUDIO SIGNALS | METHODE ET DISPOSITIF POUR LE CODAGE DE HAUTE QUALITE DE LA PAROLE FONCTIONNANT SUR UNE BANDE LARGE ET DE SIGNAUX AUDIO

Publication Number: CA2252170A1 20000427

Title: A METHOD AND DEVICE FOR HIGH QUALITY CODING OF WIDEBAND SPEECH AND AUDIO SIGNALS | METHODE ET DISPOSITIF POUR LE CODAGE DE HAUTE QUALITE DE LA PAROLE FONCTIONNANT SUR UNE BANDE LARGE ET DE SIGNAUX AUDIO

Title - DWPI: Periodicity enhancing device of excitation signal, reduces energy of low frequency portion of innovative code vector in relation to periodicity factor related to wideband signal

Priority Number: CA2252170A

Priority Date: 1998-10-27

Application Number: CA2252170A

Application Date: 1998-10-27

Publication Date: 2000-04-27

IPC Class Table:

IPC	Section	Class	Subclass	Class Group	Subgroup
G01L001104	G	G01	G01L	G01L0011	G01L001104
G01L002102	G	G01	G01L	G01L0021	G01L002102
G10L001300	G	G10	G10L	G10L0013	G10L001300
G10L001912	G	G10	G10L	G10L0019	G10L001912
H03H001706	H	H03	H03H	H03H0017	H03H001706
H03M000730	H	H03	H03M	H03M0007	H03M000730
H03M000736	H	H03	H03M	H03M0007	H03M000736
H04B000162	H	H04	H04B	H04B0001	H04B000162
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H04Q000732	H	H04	H04Q	H04Q0007	H04Q000732

IPC Class Table - DWPI:

IPC - DWPI	Section - DWPI	Class - DWPI	Subclass - DWPI	Class Group - DWPI	Subgroup - DWPI
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G10L001300	G	G10	G10L	G10L0013	G10L001300
G10L001912	G	G10	G10L	G10L0019	G10L001912
H03H001706	H	H03	H03H	H03H0017	H03H001706
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H04B000726	H	H04	H04B	H04B0007	H04B000726
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H04W007408	H	H04	H04W	H04W0074	H04W007408
G10L002102	G	G10	G10L	G10L0021	G10L002102
G10L001914	G	G10	G10L	G10L0019	G10L001914

Assignee/Applicant: UNIVERSITE DE SHERBROOKE,SHERBROOKE,Q1,CA

Assignee - Current US:

JP F Terms:

JP FI Codes:

Assignee - Original: UNIVERSITE DE SHERBROOKE

Any CPC Table:

Type	Invention	Additional	Version	Office
Current	**G10L 19/26**	-	20130101	EP

ECLA: G10L001926

Abstract:

Language of Publication: EN

INPADOC Legal Status Table:

Gazette Date	Code	INPADOC Legal Status Impact
2001-10-10	FZDE	-
Description: DEAD		

Post-Issuance (US):

Reassignment (US) Table:

Maintenance Status (US):

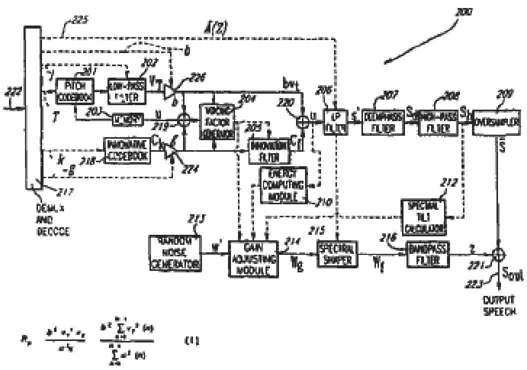
Litigation (US):

Opposition (EP):

License (EP):

EPO Procedural Status:

Front Page Drawing:



Record 2/70 WO2000025298A1 A METHOD AND DEVICE FOR ADAPTIVE BANDWIDTH PITCH SEARCH IN CODING WIDEBAND SIGNALS | PROCEDE ET DISPOSITIF DE RECHERCHE ADAPTATIVE DE LA HAUTEUR DE LARGEUR DE BANDE DANS LE CODAGE DE SIGNAUX A LARGE BANDE

Publication Number: WO2000025298A1 20000504

Title: A METHOD AND DEVICE FOR ADAPTIVE BANDWIDTH PITCH SEARCH IN CODING WIDEBAND SIGNALS | PROCEDE ET DISPOSITIF DE RECHERCHE ADAPTATIVE DE LA HAUTEUR DE LARGEUR DE BANDE DANS LE CODAGE DE SIGNAUX A LARGE BANDE
Title - DWPI: Pitch analysis device for digitally encoding wideband signal, chooses signal path having lowest calculated pitch prediction error
Priority Number: CA2252170A
Priority Date: 1998-10-27
Application Number: WO1999CA1008A
Application Date: 1999-10-27
Publication Date: 2000-05-04
IPC Class Table:

IPC	Section	Class	Subclass	Class Group	Subgroup
G01L001104	G	G01	G01L	G01L0011	G01L001104
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G10L001300	G	G10	G10L	G10L0013	G10L001300
G10L001912	G	G10	G10L	G10L0019	G10L001912
H03H001706	H	H03	H03H	H03H0017	H03H001706
H03M000730	H	H03	H03M	H03M0007	H03M000730
H03M000736	H	H03	H03M	H03M0007	H03M000736
H04B000162	H	H04	H04B	H04B0001	H04B000162
H04B000726	H	H04	H04B	H04B0007	H04B000726
H04B001404	H	H04	H04B	H04B0014	H04B001404
H04Q000722	H	H04	H04Q	H04Q0007	H04Q000722
H04Q000732	H	H04	H04Q	H04Q0007	H04Q000732

IPC Class Table - DWPI:

IPC - DWPI	Section - DWPI	Class - DWPI	Subclass - DWPI	Class Group - DWPI	Subgroup - DWPI
G01L001104	G	G01	G01L	G01L0011	G01L001104
G01L002102	G	G01	G01L	G01L0021	G01L002102

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G10L001904	G	G10	G10L	G10L0019	G10L001904
G10L001906	G	G10	G10L	G10L0019	G10L001906
G10L001912	G	G10	G10L	G10L0019	G10L001912
G10L001914	G	G10	G10L	G10L0019	G10L001914
G10L002102	G	G10	G10L	G10L0021	G10L002102
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H04B001404	H	H04	H04B	H04B0014	H04B001404
H04B000726	H	H04	H04B	H04B0007	H04B000726
H04Q000722	H	H04	H04Q	H04Q0007	H04Q000722
H04Q000732	H	H04	H04Q	H04Q0007	H04Q000732
A61K0031585	A	A61	A61K	A61K0031	A61K0031585

Assignee/Applicant: VOICEAGE CORPORATION,CA
Assignee - Current US:
JP F Terms:
JP FI Codes:
Assignee - Original: VOICEAGE CORPORATION
Any CPC Table:

Type	Invention	Additional	Version	Office
Current	**G10L 19/26**	-	20130101	EP

ECLA: G10L001926
Abstract:

An improved pitch search method and device for digitally encoding a wideband signal, in particular but not exclusively a speech signal, in view of transmitting, or storing, and synthesizing this wideband sound signal. The new method and device which achieve efficient modeling of the harmonic structure of the speech spectrum uses several forms of low pass filters applied to a pitch codevector, the one yielding higher prediction gain (i.e. the lowest pitch prediction error) is

selected and the associated pitch codebook parameters are forwarded.

L'invention concerne un procédé amélioré de recherche de hauteur et un dispositif de codage numérique d'un signal à large bande, en particulier mais pas exclusivement un signal vocal, en vue de transmettre ou de stocker, et de synthétiser ce signal sonore à large bande. Le procédé et le dispositif nouveaux, lesquels permettent une modélisation efficace de la structure harmonique du spectre de la parole, utilisent plusieurs formes de filtres passe-bas appliqués à un vecteur de code de hauteur, celui permettant d'obtenir le gain de prédiction le plus haut (c'est-à-dire l'erreur de prédiction de hauteur la plus faible) est sélectionné et les paramètres de code de hauteur associés sont retransmis.

Language of Publication: EN

INPADOC Legal Status Table:

Gazette Date	Code	INPADOC Legal Status Impact
2003-11-21	WWG	+
Description: WIPO INFORMATION: GRANT IN NATIONAL OFFICE KR 1020017005326		
2003-11-06	WWG	+
Description: WIPO INFORMATION: GRANT IN NATIONAL OFFICE AU 64569/99		
2003-08-06	WWG	+
Description: WIPO INFORMATION: GRANT IN NATIONAL OFFICE EP 1999952199		
2002-02-28	ENP	-
Description: ENTRY INTO THE NATIONAL PHASE IN: CA 2347743		
2001-11-09	WWP	+
Description: WIPO INFORMATION: PUBLISHED IN NATIONAL OFFICE KR 1020017005326		
2001-08-30	REG	-
Description: REFERENCE TO NATIONAL CODE DE 8642 IMPACT ABOLISHED FOR DE - I.E. PCT APPL. NOT ENT. GERMAN PHASE		
2001-08-22	WWP	+
Description: WIPO INFORMATION: PUBLISHED IN NATIONAL OFFICE EP 1999952199		
2001-06-20	WWE	+
Description: WIPO INFORMATION: ENTRY INTO NATIONAL PHASE US 09830114		

2001-04-27	WWE	+
Description: WIPO INFORMATION: ENTRY INTO NATIONAL PHASE KR 1020017005326		
2001-04-27	WWE	+
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Description: ENTRY INTO THE NATIONAL PHASE IN: JP 2000 578808 A		
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2001-04-25	WWE	+
Description: WIPO INFORMATION: ENTRY INTO NATIONAL PHASE ZA 200103367		
2001-04-25	WWE	+
Description: WIPO INFORMATION: ENTRY INTO NATIONAL PHASE ZA 2001/03367		
2001-04-24	WWE	+
Description: WIPO INFORMATION: ENTRY INTO NATIONAL PHASE AU 64569/99		
2001-04-18	ENP	-
Description: ENTRY INTO THE NATIONAL PHASE IN: CA 2347743 A		
2000-06-29	DFPE	-
Description: REQUEST FOR PRELIMINARY EXAMINATION FILED PRIOR TO EXPIRATION OF 19TH MONTH FROM PRIORITY DATE (PCT APPLICATION FILED BEFORE 20040101)		
2000-06-28	121	-
Description: EP: THE EPO HAS BEEN INFORMED BY WIPO THAT EP WAS DESIGNATED IN THIS APPLICATION		
2000-05-04	AL	+
Description: DESIGNATED COUNTRIES FOR REGIONAL PATENTS WO 0025298 A1 GH; GM; KE; LS; MW; SD; SL; SZ; TZ; UG; ZW; AM; AZ; BY; KG; KZ; MD; RU; TJ; TM; AT; BE; CH; CY; DE; DK; ES; FI; FR; GB; GR; IE; IT; LU; MC; NL; PT; SE; BF; BJ; CF; CG; CI; CM; GA; GN; GW; ML; MR; NE; SN; TD; TG		
2000-05-04	AK	+

Description: DESIGNATED STATES WO 0025298 A1 AE; AL; AM; AT; AU; AZ; BA; BB; BG; BR; BY; CA; CH; CN; CR; CU; CZ; DE; DK; DM; EE; ES; FI; GB; GD; GE; GH; GM; HR; HU; ID; IL; IN; IS; JP; KE; KG; KP; KR; KZ; LC; LK; LR; LS; LT; LU; LV; MA; MD; MG; MK; MN; MW; MX; NO; NZ; PL; PT; RO; RU; SD; SE; SG; SI; SK; SL; TJ; TM; TR; TT; TZ; UA; UG; US; UZ; VN; YU; ZA; ZW		
2000-01-13	ENP	-
Description: ENTRY INTO THE NATIONAL PHASE IN: AU 1999 64569 A		

Post-Issuance (US):
Reassignment (US) Table:
Maintenance Status (US):
Litigation (US):
Opposition (EP):
License (EP):
EPO Procedural Status:
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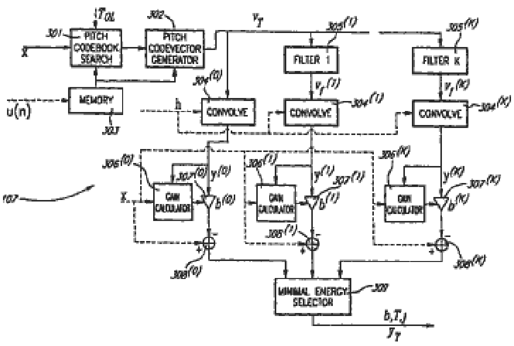

Record 3/70 WO2000025303A1 PERIODICITY ENHANCEMENT IN DECODING WIDEBAND SIGNALS | AMELIORATION DE LA PERIODICITE DANS LE DECODAGE DE SIGNAUX A LARGE BANDE

Publication Number: WO2000025303A1 20000504

Title:PERIODICITY ENHANCEMENT IN DECODING WIDEBAND SIGNALS | AMELIORATION DE LA PERIODICITE DANS LE DECODAGE DE SIGNAUX A LARGE BANDE
Title - DWPI: Periodicity enhancing device of excitation signal, reduces energy of low frequency portion of innovative code vector in relation to periodicity factor related to wideband signal
Priority Number: CA2252170A
Priority Date: 1998-10-27
Application Number: WO1999CA1009A
Application Date: 1999-10-27
Publication Date: 2000-05-04
IPC Class Table:

IPC	Section	Class	Subclass	Class Group	Subgroup
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H03H001706	H	H03	H03H	H03H0017	H03H001706
H03M000730	H	H03	H03M	H03M0007	H03M000730
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H04B000162	H	H04	H04B	H04B0001	H04B000162
H04B000726	H	H04	H04B	H04B0007	H04B000726
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H04Q000732	H	H04	H04Q	H04Q0007	H04Q000732

IPC Class Table - DWPI:

IPC - DWPI	Section - DWPI	Class - DWPI	Subclass - DWPI	Class Group - DWPI	Subgroup - DWPI
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H04W007408	H	H04	H04W	H04W0074	H04W007408
G10L002102	G	G10	G10L	G10L0021	G10L002102
G10L001914	G	G10	G10L	G10L0019	G10L001914

Assignee/Applicant: VOICEAGE CORPORATION,CA
Assignee - Current US:
JP F Terms:
JP FI Codes:
Assignee - Original: VOICEAGE CORPORATION
Any CPC Table:

Type	Invention	Additional	Version	Office
Current	**G10L 19/26**	-	20130101	EP

ECLA: G10L001926
Abstract:

The present invention relates to a method and device for enhancing periodicity of an excitation signal produced in relation to a pitch codevector and an innovative codevector for supplying a signal synthesis filter in view of producing a synthesized wideband signal. In this periodicity enhancing device and method, a factor generator is responsive to the adaptive and innovative codevectors for calculating a periodicity factor. An innovation filter subsequently processes the innovative codevector in relation to this periodicity factor to reduce energy of a low frequency portion of the innovative codevector and enhance periodicity of a low frequency portion of the

excitation signal. As an example, the innovation filter has a transfer function of the form: F(z)=- alpha (z)+1- alpha (z)<-1> where alpha is a periodicity factor, and the factor generator calculates the periodicity factor alpha using the relation: alpha = qR?p? bounded by alpha < q where q is an enhancement factor set for example to 0.25, and where R?p? is represented by formula (I) where v?T? is the pitch codevector, b is a pitch gain, N is a subframe length, and u is the excitation signal.

The present invention relates to a method and device for enhancing periodicity of an excitation signal produced in relation to a pitch codevector and an innovative codevector for supplying a signal synthesis filter in view of producing a synthesized wideband signal. In this periodicity enhancing device and method, a factor generator is responsive to the adaptive and innovative codevectors for calculating a periodicity factor. An innovation filter subsequently processes the innovative codevector in relation to this periodicity factor to reduce energy of a low frequency portion of the innovative codevector and enhance periodicity of a low frequency portion of the excitation signal. As an example, the innovation filter has a transfer function of the form: F(z)=-(z)+1-(z)-1 where is a periodicity factor, and the factor generator calculates the periodicity factor using the relation: = qR_p bounded by <q where q is an enhancement factor set for example to 0.25, and where R_p is represented by formula (I) where v_T is the pitch codevector, b is a pitch gain, N is a subframe length, and u is the excitation signal.

La présente invention concerne un procédé et un dispositif destinés à améliorer la périodicité d'un signal d'excitation produit par rapport à un vecteur de code de hauteur et un vecteur de code innovant permettant d'obtenir un filtre de synthèse de signal en vue de produire un signal synthétisé à large bande. Dans ce dispositif et ce procédé d'amélioration de la périodicité, un générateur de facteurs répond aux vecteurs de code adaptatifs et innovants pour calculer un facteur de périodicité. Un filtre d'innovation traite ensuite le vecteur de code innovant par rapport à ce facteur de périodicité pour réduire l'énergie d'une partie basse fréquence du vecteur de code innovant et améliorer la périodicité d'une partie basse fréquence du signal d'excitation. A titre d'exemple, le filtre d'innovation présente une fonction de transfert ayant la forme: F(z)= alpha (z)+1- alpha (z)<-1> dans laquelle alpha représente un facteur de périodicité, et le générateur de facteur calcule le facteur alpha de périodicité à l'aide de la relation: alpha = qR?p? limitée par alpha < q dans laquelle q représente un facteur d'amélioration fixé par exemple à 0,25, et dans laquelle Rp est représenté par la formule (I) où V?t? représente le vecteur de code de hauteur, b représente un gain de hauteur, N représente une longueur de sous-bloc et u représente le signal d'excitation.

La présente invention concerne un procédé et un dispositif destinés à améliorer la périodicité d'un signal d'excitation produit par rapport à un vecteur de code de hauteur et un vecteur de code innovant permettant d'obtenir un filtre de synthèse de signal en vue de produire un signal synthétisé à large bande. Dans ce dispositif et ce procédé d'amélioration de la périodicité, un générateur de facteurs répond aux vecteurs de code adaptatifs et innovants pour calculer un facteur de périodicité. Un filtre d'innovation traite ensuite le vecteur de code innovant par rapport à ce facteur de périodicité pour réduire l'énergie d'une partie basse fréquence du vecteur de code innovant et améliorer la périodicité d'une partie basse fréquence du signal d'excitation. A titre d'exemple, le filtre d'innovation présente une fonction de transfert ayant la forme: F(z)=(z)+1-(z)-1 dans laquelle représente un facteur de périodicité, et le générateur de facteur calcule le facteur de périodicité à l'aide de la relation: = qR_p limitée par <q dans laquelle q représente un facteur d'amélioration fixé par exemple à 0,25, et dans laquelle R_p est représenté par la formule (I) où V_t

représente le vecteur de code de hauteur, b représente un gain de hauteur, N représente une longueur de sous-bloc et u représente le signal d'excitation.

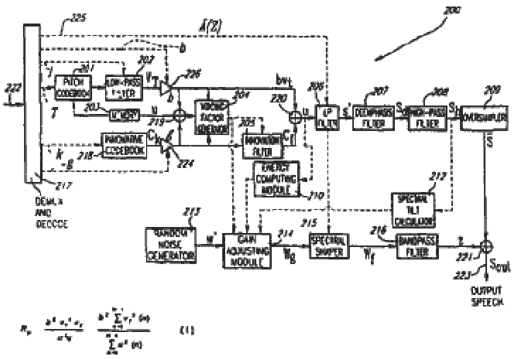
Language of Publication: EN

INPADOC Legal Status Table:

Gazette Date	Code	INPADOC Legal Status Impact
2003-07-30	WWG	+
Description: WIPO INFORMATION: GRANT IN NATIONAL OFFICE EP 1999952200		
2002-02-28	ENP	-
Description: ENTRY INTO THE NATIONAL PHASE IN: CA 2347667		
2001-08-30	REG	-
Description: REFERENCE TO NATIONAL CODE DE 8642 IMPACT ABOLISHED FOR DE - I.E. PCT APPL. NOT ENT. GERMAN PHASE		
2001-08-22	WWP	+
Description: WIPO INFORMATION: PUBLISHED IN NATIONAL OFFICE EP 1999952200		
2001-07-23	WWE	+
Description: WIPO INFORMATION: ENTRY INTO NATIONAL PHASE US 09830331		
2001-04-27	WWE	+
Description: WIPO INFORMATION: ENTRY INTO NATIONAL PHASE EP 1999952200		
2001-04-27	ENP	-
Description: ENTRY INTO THE NATIONAL PHASE IN: JP 2000 578810 A		
2001-04-18	ENP	-
Description: ENTRY INTO THE NATIONAL PHASE IN: CA 2347667 A		
2000-07-06	DFPE	-
Description: REQUEST FOR PRELIMINARY EXAMINATION FILED PRIOR TO EXPIRATION OF 19TH MONTH FROM PRIORITY DATE (PCT APPLICATION FILED BEFORE 20040101)		
2000-06-28	121	-
Description: EP: THE EPO HAS BEEN INFORMED BY WIPO THAT EP WAS DESIGNATED IN THIS APPLICATION		

2000-05-04	AL	+
Description: DESIGNATED COUNTRIES FOR REGIONAL PATENTS WO 0025303 A1 GH; GM; KE; LS; MW; SD; SL; SZ; TZ; UG; ZW; AM; AZ; BY; KG; KZ; MD; RU; TJ; TM; AT; BE; CH; CY; DE; DK; ES; FI; FR; GB; GR; IE; IT; LU; MC; NL; PT; SE; BF; BJ; CF; CG; CI; CM; GA; GN; GW; ML; MR; NE; SN; TD; TG		
2000-05-04	AK	+
Description: DESIGNATED STATES WO 0025303 A1 AE; AL; AM; AT; AU; AZ; BA; BB; BG; BR; BY; CA; CH; CN; CR; CU; CZ; DE; DK; DM; EE; ES; FI; GB; GD; GE; GH; GM; HR; HU; ID; IL; IN; IS; JP; KE; KG; KP; KR; KZ; LC; LK; LR; LS; LT; LU; LV; MA; MD; MG; MK; MN; MW; MX; NO; NZ; PL; PT; RO; RU; SD; SE; SG; SI; SK; SL; TJ; TM; TR; TT; TZ; UA; UG; US; UZ; VN; YU; ZA; ZW		
2000-01-13	ENP	-
Description: ENTRY INTO THE NATIONAL PHASE IN: AU 1999 64570 A		

Post-Issuance (US):
Reassignment (US) Table:
Maintenance Status (US):
Litigation (US):
Opposition (EP):
License (EP):
EPO Procedural Status:
Front Page Drawing:



Record 4/70 WO2000025304A1 PERCEPTUAL WEIGHTING DEVICE AND METHOD FOR EFFICIENT CODING OF WIDEBAND SIGNALS | DISPOSITIF ET PROCEDE DE PONDERATION PERCEPTIVE POUR LE CODAGE EFFICACE DE SIGNAUX A LARGE BANDE

Publication Number: WO2000025304A1 20000504

Title: PERCEPTUAL WEIGHTING DEVICE AND METHOD FOR EFFICIENT CODING OF WIDEBAND SIGNALS | DISPOSITIF ET PROCEDE DE PONDERATION PERCEPTIVE POUR LE CODAGE EFFICACE DE SIGNAUX A LARGE BANDE
Title - DWPI: Perceptual weighting device in digital wideband speech-audio encoder, filters preemphasized signal in relation to synthesis filter coefficient, to produce perceptually weighted signal
Priority Number: CA2252170A
Priority Date: 1998-10-27
Application Number: WO1999CA1010A
Application Date: 1999-10-27
Publication Date: 2000-05-04
IPC Class Table:

IPC	Section	Class	Subclass	Class Group	Subgroup
G01L001104	G	G01	G01L	G01L0011	G01L001104
G01L002102	G	G01	G01L	G01L0021	G01L002102
G10L001300	G	G10	G10L	G10L0013	G10L001300
G10L001912	G	G10	G10L	G10L0019	G10L001912
H03H001706	H	H03	H03H	H03H0017	H03H001706
H03M000730	H	H03	H03M	H03M0007	H03M000730
H03M000736	H	H03	H03M	H03M0007	H03M000736
H04B000162	H	H04	H04B	H04B0001	H04B000162
H04B000726	H	H04	H04B	H04B0007	H04B000726
H04B001404	H	H04	H04B	H04B0014	H04B001404
H04Q000722	H	H04	H04Q	H04Q0007	H04Q000722
H04Q000732	H	H04	H04Q	H04Q0007	H04Q000732

IPC Class Table - DWPI:

IPC - DWPI	Section - DWPI	Class - DWPI	Subclass - DWPI	Class Group - DWPI	Subgroup - DWPI
G01L001104	G	G01	G01L	G01L0011	G01L001104
G01L002102	G	G01	G01L	G01L0021	G01L002102

G10L001104	G	G10	G10L	G10L0011	G10L001104
G10L001300	G	G10	G10L	G10L0013	G10L001300
G10L001900	G	G10	G10L	G10L0019	G10L001900
G10L001904	G	G10	G10L	G10L0019	G10L001904
G10L001906	G	G10	G10L	G10L0019	G10L001906
G10L001912	G	G10	G10L	G10L0019	G10L001912
G10L001914	G	G10	G10L	G10L0019	G10L001914
G10L002102	G	G10	G10L	G10L0021	G10L002102
H03H001706	H	H03	H03H	H03H0017	H03H001706
H03M000730	H	H03	H03M	H03M0007	H03M000730
H03M000736	H	H03	H03M	H03M0007	H03M000736
H04B000162	H	H04	H04B	H04B0001	H04B000162
H04B001404	H	H04	H04B	H04B0014	H04B001404
H04B000726	H	H04	H04B	H04B0007	H04B000726
H04Q000722	H	H04	H04Q	H04Q0007	H04Q000722
H04Q000732	H	H04	H04Q	H04Q0007	H04Q000732

Assignee/Applicant: VOICAGE CORPORATION,CA
Assignee - Current US:
JP F Terms:
JP FI Codes:
Assignee - Original: VOICAGE CORPORATION
Any CPC Table:

Type	Invention	Additional	Version	Office
Current	**G10L 19/26**	-	20130101	EP

ECLA: G10L001926
Abstract:

A perceptual weighting device for producing a perceptually weighted signal in response to a wideband signal comprises a signal preemphasis filter, a synthesis filter claculator, and a perceptual weighting filter. The signal preemphasis filter enhances high frequency content of the wideband signal to thereby produce a preemphasised signal. The signal preemphasis filter has a transfer function of the form: P(z)=1 - mu z<-1> wherein mu is a preemphasis factor having a value located between 0 and 1. The synthesis filter calculator is responsive to the preemphasised signal for producing synthesis filter coefficients. Finally, the perceptual weighting filter processes

the preemphasised signal in relation to the synthesis filter coefficients to produce the perceptually weighted signal. The perceptual weighting filter has a transfer function, with fixed denominator, of the form: W(z) A (z/ gamma 1) / (1- gamma 2z<-1>) where 0< gamma 2< gamma 1 </=1 and gamma 2 and gamma 1 are weighting control values, whereby weighting of the wideband signal in a format region is substantially decoupled from a spectral tilt of this wideband signal.

A perceptual weighting device for producing a perceptually weighted signal in response to a wideband signal comprises a signal preemphasis filter, a synthesis filter claculator, and a perceptual weighting filter. The signal preemphasis filter enhances high frequency content of the wideband signal to thereby produce a preemphasised signal. The signal preemphasis filter has a transfer function of the form: P(z)=1-z-1 wherein is a preemphasis factor having a value located between 0 and 1. The synthesis filter calculator is responsive to the preemphasised signal for producing synthesis filter coefficients. Finally, the perceptual weighting filter processes the preemphasised signal in relation to the synthesis filter coefficients to produce the perceptually weighted signal. The perceptual weighting filter has a transfer function, with fixed denominator, of the form: W(z) A (z/$_1$) / (1-$_2$z-1) where 0<$_2$<$_1$ 1 and $_2$ and $_1$ are weighting control values, whereby weighting of the wideband signal in a format region is substantially decoupled from a spectral tilt of this wideband signal.

Un dispositif de pondération perceptive destiné à produire un signal pondéré perceptivement en réponse à un signal à large bande comprend un filtre de préaccentuation de signal, un calculateur de filtre de synthèse, et un filtre de pondération perceptive. Le filtre de préaccentuation du signal augmente le contenu de haute fréquence du signal à large bande pour produire ainsi un signal préaccentué. Ce filtre de préaccentuation du signal présente une fonction de transfert ayant la forme: P(z) = 1- mu z<-1>, dans laquelle mu est un facteur de préaccentuation ayant une valeur située entre 0 et 1. Le calculateur du filtre de synthèse répond au signal préaccentué afin de produire des coefficients du filtre de synthèse. Enfin, le filtre de pondération perceptive traite le signal préaccentué par rapport aux coefficients du filtre de synthèse pour produire le signal à pondération perceptive. Le filtre à pondération perceptive a une fonction de transfert, avec un dénominateur fixe, ayant la forme: W(z) = A(z)/ gamma 1) / (1 gamma 2z<-1>) dans laquelle 0 < gamma 2 < gamma 1 </= 1 et gamma 2 ainsi que gamma 1 sont des valeurs de régulation de pondération, de manière que la pondération du signal à large bande dans une région de formant est sensiblement découplée d'une inclinaison spectrale de ce signal à large bande.

Un dispositif de pondération perceptive destiné à produire un signal pondéré perceptivement en réponse à un signal à large bande comprend un filtre de préaccentuation de signal, un calculateur de filtre de synthèse, et un filtre de pondération perceptive. Le filtre de préaccentuation du signal augmente le contenu de haute fréquence du signal à large bande pour produire ainsi un signal préaccentué. Ce filtre de préaccentuation du signal présente une fonction de transfert ayant la forme: P(z) = 1-z-1, dans laquelle est un facteur de préaccentuation ayant une valeur située entre 0 et 1. Le calculateur du filtre de synthèse répond au signal préaccentué afin de produire des coefficients du filtre de synthèse. Enfin, le filtre de pondération perceptive traite le signal préaccentué par rapport aux coefficients du filtre de synthèse pour produire le signal à pondération perceptive. Le filtre à pondération perceptive a une fonction de transfert, avec un dénominateur fixe, ayant la forme: W(z) = A(z)/$_1$) / (1 $_2$z-1) dans laquelle 0 < $_2$< $_1$ 1 et $_2$ ainsi que $_1$ sont des valeurs de régulation de pondération, de manière que la pondération du signal à large bande dans une région de formant est sensiblement découplée d'une inclinaison spectrale de ce signal à large bande.

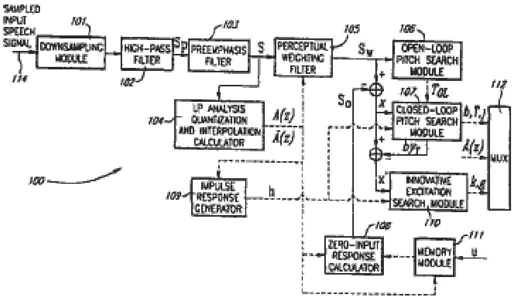
Language of Publication: EN
INPADOC Legal Status Table:

Gazette Date	Code	INPADOC Legal Status Impact
2003-12-17	WWG	+
Description: WIPO INFORMATION: GRANT IN NATIONAL OFFICE EP 1999952201		
2003-11-25	WWG	+
Description: WIPO INFORMATION: GRANT IN NATIONAL OFFICE KR 1020017005325		
2003-01-16	WWG	+
Description: WIPO INFORMATION: GRANT IN NATIONAL OFFICE AU 64571/99		
2002-02-28	ENP	-
Description: ENTRY INTO THE NATIONAL PHASE IN: CA 2347668		
2001-11-09	WWP	+
Description: WIPO INFORMATION: PUBLISHED IN NATIONAL OFFICE KR 1020017005325		
2001-08-30	REG	-
Description: REFERENCE TO NATIONAL CODE DE 8642 IMPACT ABOLISHED FOR DE - I.E. PCT APPL. NOT ENT. GERMAN PHASE		
2001-08-22	WWP	+
Description: WIPO INFORMATION: PUBLISHED IN NATIONAL OFFICE EP 1999952201		
2001-06-20	WWE	+
Description: WIPO INFORMATION: ENTRY INTO NATIONAL PHASE US 09830276		
2001-04-27	WWE	+
Description: WIPO INFORMATION: ENTRY INTO NATIONAL PHASE KR 1020017005325		
2001-04-27	WWE	+
Description: WIPO INFORMATION: ENTRY INTO NATIONAL PHASE EP 1999952201		
2001-04-27	ENP	-
Description: ENTRY INTO THE NATIONAL PHASE IN: JP 2000 578811 A		

2001-04-25	WWE	+
Description: WIPO INFORMATION: ENTRY INTO NATIONAL PHASE ZA 200103366		
2001-04-25	WWE	+
Description: WIPO INFORMATION: ENTRY INTO NATIONAL PHASE MX PA/a/2001/004137		
2001-04-25	WWE	+
Description: WIPO INFORMATION: ENTRY INTO NATIONAL PHASE ZA 2001/03366		
2001-04-24	WWE	+
Description: WIPO INFORMATION: ENTRY INTO NATIONAL PHASE AU 64571/99		
2001-04-18	WWE	+
Description: WIPO INFORMATION: ENTRY INTO NATIONAL PHASE NZ 511163		
2001-04-18	ENP	-
Description: ENTRY INTO THE NATIONAL PHASE IN: CA 2347668 A		
2000-06-29	DFPE	-
Description: REQUEST FOR PRELIMINARY EXAMINATION FILED PRIOR TO EXPIRATION OF 19TH MONTH FROM PRIORITY DATE (PCT APPLICATION FILED BEFORE 20040101)		
2000-06-28	121	-
Description: EP: THE EPO HAS BEEN INFORMED BY WIPO THAT EP WAS DESIGNATED IN THIS APPLICATION		
2000-05-04	AL	+
Description: DESIGNATED COUNTRIES FOR REGIONAL PATENTS WO 0025304 A1 GH; GM; KE; LS; MW; SD; SL; SZ; TZ; UG; ZW; AM; AZ; BY; KG; KZ; MD; RU; TJ; TM; AT; BE; CH; CY; DE; DK; ES; FI; FR; GB; GR; IE; IT; LU; MC; NL; PT; SE; BF; BJ; CF; CG; CI; CM; GA; GN; GW; ML; MR; NE; SN; TD; TG		
2000-05-04	AK	+
Description: DESIGNATED STATES WO 0025304 A1 AE; AL; AM; AT; AU; AZ; BA; BB; BG; BR; BY; CA; CH; CN; CR; CU; CZ; DE; DK; DM; EE; ES; FI; GB; GD; GE; GH; GM; HR; HU; ID; IL; IN; IS; JP; KE; KG; KP; KR; KZ; LC; LK; LR; LS; LT; LU; LV; MA; MD; MG; MK; MN; MW; MX; NO; NZ; PL; PT; RO; RU; SD; SE; SG; SI; SK; SL; TJ; TM; TR; TT; TZ; UA; UG; US; UZ; VN; YU; ZA; ZW		
2000-01-13	ENP	-

Description: ENTRY INTO THE NATIONAL PHASE IN: AU 1999 64571 A	

Post-Issuance (US):
Reassignment (US) Table:
Maintenance Status (US):
Litigation (US):
Opposition (EP):
License (EP):
EPO Procedural Status:
Front Page Drawing:



Record 5/70 WO2000025305A1 HIGH FREQUENCY CONTENT RECOVERING METHOD AND DEVICE FOR OVER-SAMPLED SYNTHESIZED WIDEBAND SIGNAL | PROCEDE DE RECUPERATION DU CONTENU A HAUTE FREQUENCE ET DISPOSITIF POUR SIGNAL A LARGE BANDE SYNTHETISE SUR-ECHANTILLONNE

Publication Number: WO2000025305A1 20000504

Title: HIGH FREQUENCY CONTENT RECOVERING METHOD AND DEVICE FOR OVER-SAMPLED SYNTHESIZED WIDEBAND SIGNAL | PROCEDE DE RECUPERATION DU CONTENU A HAUTE FREQUENCE ET DISPOSITIF POUR SIGNAL A LARGE BANDE SYNTHETISE SUR-ECHANTILLONNE
Title - DWPI: High frequency content recovery device for use in audio video teleconferencing, performs summation of spectrally shaped noise sequence in oversampled synthesized signal version to produce full spectrum synthesized wide band signal
Priority Number: CA2252170A
Priority Date: 1998-10-27
Application Number: WO1999CA990A
Application Date: 1999-10-27
Publication Date: 2000-05-04
IPC Class Table:

IPC	Section	Class	Subclass	Class Group	Subgroup
G01L001104	G	G01	G01L	G01L0011	G01L001104
G01L002102	G	G01	G01L	G01L0021	G01L002102
G10L001300	G	G10	G10L	G10L0013	G10L001300
G10L001912	G	G10	G10L	G10L0019	G10L001912
H03H001706	H	H03	H03H	H03H0017	H03H001706
H03M000730	H	H03	H03M	H03M0007	H03M000730
H03M000736	H	H03	H03M	H03M0007	H03M000736
H04B000162	H	H04	H04B	H04B0001	H04B000162
H04B000726	H	H04	H04B	H04B0007	H04B000726
H04B001404	H	H04	H04B	H04B0014	H04B001404
H04Q000722	H	H04	H04Q	H04Q0007	H04Q000722
H04Q000732	H	H04	H04Q	H04Q0007	H04Q000732

IPC Class Table - DWPI:

IPC - DWPI	Section - DWPI	Class - DWPI	Subclass - DWPI	Class Group - DWPI	Subgroup - DWPI

G10L001100	G	G10	G10L	G10L0011	G10L001100
G10L001300	G	G10	G10L	G10L0013	G10L001300
G10L001900	G	G10	G10L	G10L0019	G10L001900
G10L002100	G	G10	G10L	G10L0021	G10L002100
H03H001706	H	H03	H03H	H03H0017	H03H001706
H03M000730	H	H03	H03M	H03M0007	H03M000730
H03M000736	H	H03	H03M	H03M0007	H03M000736
H04B000162	H	H04	H04B	H04B0001	H04B000162
H04B001404	H	H04	H04B	H04B0014	H04B001404
H04B000726	H	H04	H04B	H04B0007	H04B000726
H04L002700	H	H04	H04L	H04L0027	H04L002700
G10L001104	G	G10	G10L	G10L0011	G10L001104
G10L001902	G	G10	G10L	G10L0019	G10L001902
G10L001904	G	G10	G10L	G10L0019	G10L001904
G10L001906	G	G10	G10L	G10L0019	G10L001906
G10L001912	G	G10	G10L	G10L0019	G10L001912
G10L002102	G	G10	G10L	G10L0021	G10L002102
G10L	G	G10	G10L	G10L	G10L

Assignee/Applicant: VOICEAGE CORPORATION,CA
Assignee - Current US:
JP F Terms:
JP FI Codes:
Assignee - Original: VOICEAGE CORPORATION
Any CPC Table:

Type	Invention	Additional	Version	Office
Current	**G10L 19/26**	-	20130101	EP

ECLA: G10L001926
Abstract:

In a method and device for recovering the high frequency content of a wideband signal previously down-sampled during encoding, and for injecting, during decoding, this high frequency content in an over-sampled synthesized version of the wideband signal to produce a full-spectrum synthesized wideband signal, a white noise generator produces a white noise sequence. Serially

interconnected gain adjustment unit, spectral shaper and band-pass filter spectrally shapes the white noise sequence in relation to a set of shaping parameters representative of the down-sampled wideband signal such as a voicing factor, an energy scaling factor, a tilt scaling factor, and linear prediction filter coefficients. A signal injection circuit finally injects the spectrally-shaped white noise sequence in the over-sampled synthesized signal version to thereby produce the full-spectrum synthesized wideband signal.

Dans un procédé et un dispositif pour la récupération du contenu à haute fréquence d'un signal à large bande préalablement sous-échantillonné pendant le codage, et pour l'injection, pendant le décodage, de ce contenu à haute fréquence dans une version synthétisée suréchantillonée du signal à large bande, de manière qu'un signal à large bande synthétisé en spectre continu soit produit, un générateur de bruits blancs produit une séquence de bruits blancs. Une unité d'ajustement de gain un circuit de mise en forme spectrale et un filtre passe-bande, interconnectés en série, mettent en forme la séquence de bruits blancs par rapport à un ensemble de paramètres de mise en forme représentatifs du signal à large bande sous-échantillonné, tel qu'un facteur de verbalisation, un facteur de mise à l'échelle d'énergie, un facteur de mise à l'échelle de basculement et des coefficients de filtre de prédiction linéaire. Un circuit d'injection de signal injecte finalement la séquence de bruits blancs mise en forme spectralement dans la version de signal synthétisé suréchantillonné de sorte que le signal à large bande synthétisé en spectre continu soit produit.

Language of Publication: EN

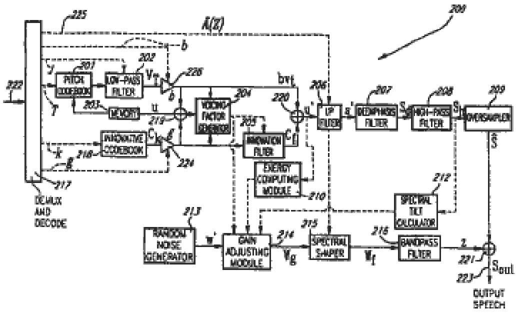
INPADOC Legal Status Table:

Gazette Date	Code	INPADOC Legal Status Impact
2003-11-25	WWG	+
Description: WIPO INFORMATION: GRANT IN NATIONAL OFFICE KR 1020017005324		
2003-08-06	WWG	+
Description: WIPO INFORMATION: GRANT IN NATIONAL OFFICE EP 1999952183		
2002-02-28	ENP	-
Description: ENTRY INTO THE NATIONAL PHASE IN: CA 2347735		
2001-10-19	WWP	+
Description: WIPO INFORMATION: PUBLISHED IN NATIONAL OFFICE KR 1020017005324		
2001-08-30	REG	-
Description: REFERENCE TO NATIONAL CODE DE 8642 IMPACT ABOLISHED FOR DE - I.E. PCT APPL. NOT ENT. GERMAN PHASE		
2001-08-22	WWP	+
Description: WIPO INFORMATION: PUBLISHED IN NATIONAL OFFICE EP 1999952183		

2001-07-23	WWE	+
Description: WIPO INFORMATION: ENTRY INTO NATIONAL PHASE US 09830332		
2001-05-01	WWE	+
Description: WIPO INFORMATION: ENTRY INTO NATIONAL PHASE EP 1999952183		
2001-04-27	WWE	+
Description: WIPO INFORMATION: ENTRY INTO NATIONAL PHASE KR 1020017005324		
2001-04-27	ENP	-
Description: ENTRY INTO THE NATIONAL PHASE IN: JP 2000 578812 A		
2001-04-18	ENP	-
Description: ENTRY INTO THE NATIONAL PHASE IN: CA 2347735 A		
2000-07-06	DFPE	-
Description: REQUEST FOR PRELIMINARY EXAMINATION FILED PRIOR TO EXPIRATION OF 19TH MONTH FROM PRIORITY DATE (PCT APPLICATION FILED BEFORE 20040101)		
2000-06-28	121	-
Description: EP: THE EPO HAS BEEN INFORMED BY WIPO THAT EP WAS DESIGNATED IN THIS APPLICATION		
2000-05-04	AL	+
Description: DESIGNATED COUNTRIES FOR REGIONAL PATENTS WO 0025305 A1 GH; GM; KE; LS; MW; SD; SL; SZ; TZ; UG; ZW; AM; AZ; BY; KG; KZ; MD; RU; TJ; TM; AT; BE; CH; CY; DE; DK; ES; FI; FR; GB; GR; IE; IT; LU; MC; NL; PT; SE; BF; BJ; CF; CG; CI; CM; GA; GN; GW; ML; MR; NE; SN; TD; TG		
2000-05-04	AK	+
Description: DESIGNATED STATES WO 0025305 A1 AE; AL; AM; AT; AU; AZ; BA; BB; BG; BR; BY; CA; CH; CN; CR; CU; CZ; DE; DK; DM; EE; ES; FI; GB; GD; GE; GH; GM; HR; HU; ID; IL; IN; IS; JP; KE; KG; KP; KR; KZ; LC; LK; LR; LS; LT; LU; LV; MA; MD; MG; MK; MN; MW; MX; NO; NZ; PL; PT; RO; RU; SD; SE; SG; SI; SK; SL; TJ; TM; TR; TT; TZ; UA; UG; US; UZ; VN; YU; ZA; ZW		
2000-01-13	ENP	-
Description: ENTRY INTO THE NATIONAL PHASE IN: AU 1999 64555 A		

Post-Issuance (US):

Reassignment (US) Table:
Maintenance Status (US):
Litigation (US):
Opposition (EP):
License (EP):
EPO Procedural Status:
Front Page Drawing:



Record 6/70 AU199964555A High frequency content recovering method and device for over-sampled synthesizedwideband signal

Publication Number: AU199964555A 20000515

Title: High frequency content recovering method and device for over-sampled synthesizedwideband signal
Title - DWPI: High frequency content recovery device for use in audio video teleconferencing, performs summation of spectrally shaped noise sequence in oversampled synthesized signal version to produce full spectrum synthesized wide band signal
Priority Number: CA2252170A | WO1999CA990A
Priority Date: 1998-10-27 | 1999-10-27
Application Number: AU199964555D
Application Date: 1999-10-27
Publication Date: 2000-05-15
IPC Class Table:

IPC	Section	Class	Subclass	Class Group	Subgroup
G01L001104	G	G01	G01L	G01L0011	G01L001104
G01L002102	G	G01	G01L	G01L0021	G01L002102
G10L001300	G	G10	G10L	G10L0013	G10L001300
G10L001912	G	G10	G10L	G10L0019	G10L001912
H03H001706	H	H03	H03H	H03H0017	H03H001706
H03M000730	H	H03	H03M	H03M0007	H03M000730
H03M000736	H	H03	H03M	H03M0007	H03M000736
H04B000162	H	H04	H04B	H04B0001	H04B000162
H04B000726	H	H04	H04B	H04B0007	H04B000726
H04B001404	H	H04	H04B	H04B0014	H04B001404
H04Q000722	H	H04	H04Q	H04Q0007	H04Q000722
H04Q000732	H	H04	H04Q	H04Q0007	H04Q000732

IPC Class Table - DWPI:

IPC - DWPI	Section - DWPI	Class - DWPI	Subclass - DWPI	Class Group - DWPI	Subgroup - DWPI
G10L001100	G	G10	G10L	G10L0011	G10L001100
G10L001300	G	G10	G10L	G10L0013	G10L001300
G10L001900	G	G10	G10L	G10L0019	G10L001900

G10L002100	G	G10	G10L	G10L0021	G10L002100
H03H001706	H	H03	H03H	H03H0017	H03H001706
H03M000730	H	H03	H03M	H03M0007	H03M000730
H03M000736	H	H03	H03M	H03M0007	H03M000736
H04B000162	H	H04	H04B	H04B0001	H04B000162
H04B001404	H	H04	H04B	H04B0014	H04B001404
H04B000726	H	H04	H04B	H04B0007	H04B000726
H04L002700	H	H04	H04L	H04L0027	H04L002700
G10L001104	G	G10	G10L	G10L0011	G10L001104
G10L001902	G	G10	G10L	G10L0019	G10L001902
G10L001904	G	G10	G10L	G10L0019	G10L001904
G10L001906	G	G10	G10L	G10L0019	G10L001906
G10L001912	G	G10	G10L	G10L0019	G10L001912
G10L002102	G	G10	G10L	G10L0021	G10L002102
G10L	G	G10	G10L	G10L	G10L

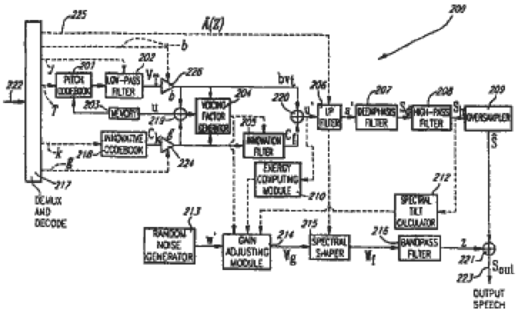
Assignee/Applicant: VOICEAGE CORP
Assignee - Current US:
JP F Terms:
JP FI Codes:
Assignee - Original:
Any CPC Table:

Type	Invention	Additional	Version	Office
Current	**G10L 19/26**	-	20130101	EP

ECLA: G10L001926
Abstract:
Language of Publication: EN
INPADOC Legal Status Table:

Gazette Date	Code	INPADOC Legal Status Impact
2001-07-26	MK6	-
Description: APPLICATION LAPSED SECTION 142(2)(F)/REG. 8.3(3) - PCT APPLIC. NOT ENTERING NATIONAL PHASE		

Post-Issuance (US):
Reassignment (US) Table:
Maintenance Status (US):
Litigation (US):
Opposition (EP):
License (EP):
EPO Procedural Status:
Front Page Drawing:



Record 7/70 AU199964570A Periodicity enhancement in decoding wideband signals

Publication Number: AU199964570A 20000515

Title: Periodicity enhancement in decoding wideband signals
Title - DWPI: Periodicity enhancing device of excitation signal, reduces energy of low frequency portion of innovative code vector in relation to periodicity factor related to wideband signal
Priority Number: CA2252170A | WO1999CA1009A
Priority Date: 1998-10-27 | 1999-10-27
Application Number: AU199964570D
Application Date: 1999-10-27
Publication Date: 2000-05-15
IPC Class Table:

IPC	Section	Class	Subclass	Class Group	Subgroup
G01L001104	G	G01	G01L	G01L0011	G01L001104
G01L002102	G	G01	G01L	G01L0021	G01L002102
G10L001300	G	G10	G10L	G10L0013	G10L001300
G10L001912	G	G10	G10L	G10L0019	G10L001912
H03H001706	H	H03	H03H	H03H0017	H03H001706
H03M000730	H	H03	H03M	H03M0007	H03M000730
H03M000736	H	H03	H03M	H03M0007	H03M000736
H04B000162	H	H04	H04B	H04B0001	H04B000162
H04B000726	H	H04	H04B	H04B0007	H04B000726
H04B001404	H	H04	H04B	H04B0014	H04B001404
H04Q000722	H	H04	H04Q	H04Q0007	H04Q000722
H04Q000732	H	H04	H04Q	H04Q0007	H04Q000732

IPC Class Table - DWPI:

IPC - DWPI	Section - DWPI	Class - DWPI	Subclass - DWPI	Class Group - DWPI	Subgroup - DWPI
G01L001104	G	G01	G01L	G01L0011	G01L001104
G01L002102	G	G01	G01L	G01L0021	G01L002102
G10L001300	G	G10	G10L	G10L0013	G10L001300
G10L001912	G	G10	G10L	G10L0019	G10L001912
H03H001706	H	H03	H03H	H03H0017	H03H001706

H03M000730	H	H03	H03M	H03M0007	H03M000730
H03M000736	H	H03	H03M	H03M0007	H03M000736
H04B000162	H	H04	H04B	H04B0001	H04B000162
H04B001404	H	H04	H04B	H04B0014	H04B001404
H04B000726	H	H04	H04B	H04B0007	H04B000726
H04J000316	H	H04	H04J	H04J0003	H04J000316
H04J000324	H	H04	H04J	H04J0003	H04J000324
H04Q000722	H	H04	H04Q	H04Q0007	H04Q000722
H04Q000732	H	H04	H04Q	H04Q0007	H04Q000732
H04W007204	H	H04	H04W	H04W0072	H04W007204
H04W007212	H	H04	H04W	H04W0072	H04W007212
H04W007408	H	H04	H04W	H04W0074	H04W007408
G10L002102	G	G10	G10L	G10L0021	G10L002102
G10L001914	G	G10	G10L	G10L0019	G10L001914

Assignee/Applicant: VOICEAGE CORP
Assignee - Current US:
JP F Terms:
JP FI Codes:
Assignee - Original:
Any CPC Table:

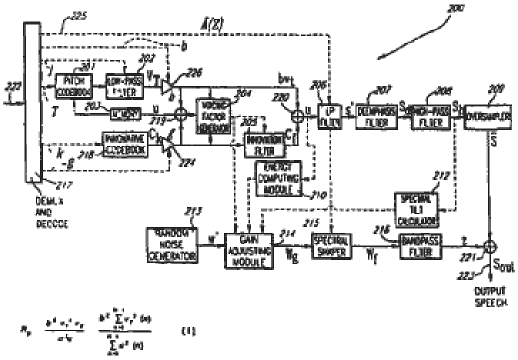
Type	Invention	Additional	Version	Office
Current	**G10L 19/26**	-	20130101	EP

ECLA: G10L001926
Abstract:
Language of Publication: EN
INPADOC Legal Status Table:

Gazette Date	Code	INPADOC Legal Status Impact
2001-07-26	MK6	-
Description: APPLICATION LAPSED SECTION 142(2)(F)/REG. 8.3(3) - PCT APPLIC. NOT ENTERING NATIONAL PHASE		

Post-Issuance (US):
Reassignment (US) Table:

Maintenance Status (US):
Litigation (US):
Opposition (EP):
License (EP):
EPO Procedural Status:
Front Page Drawing:



Record 8/70 NO200405257A Fremgangsmate og innretning for a gjenvinne hoyfrekvensinnhold av oversamplet, syntetisert bredbandssignal

Publication Number: NO200405257A 20010627

Title: Fremgangsmate og innretning for a gjenvinne hoyfrekvensinnhold av oversamplet, syntetisert bredbandssignal
Title - DWPI: High frequency content recovery device for use in audio video teleconferencing, performs summation of spectrally shaped noise sequence in oversampled synthesized signal version to produce full spectrum synthesized wide band signal
Priority Number: CA2252170A | WO1999CA990A
Priority Date: 1998-10-27 | 1999-10-27
Application Number: NO20045257A
Application Date: 2004-12-01
Publication Date: 2001-06-27
IPC Class Table:

IPC	Section	Class	Subclass	Class Group	Subgroup
G01L001104	G	G01	G01L	G01L0011	G01L001104
G01L002102	G	G01	G01L	G01L0021	G01L002102
G10L001300	G	G10	G10L	G10L0013	G10L001300
G10L001912	G	G10	G10L	G10L0019	G10L001912
H03H001706	H	H03	H03H	H03H0017	H03H001706
H03M000730	H	H03	H03M	H03M0007	H03M000730
H03M000736	H	H03	H03M	H03M0007	H03M000736
H04B000162	H	H04	H04B	H04B0001	H04B000162
H04B000726	H	H04	H04B	H04B0007	H04B000726
H04B001404	H	H04	H04B	H04B0014	H04B001404
H04Q000722	H	H04	H04Q	H04Q0007	H04Q000722
H04Q000732	H	H04	H04Q	H04Q0007	H04Q000732

IPC Class Table - DWPI:

IPC - DWPI	Section - DWPI	Class - DWPI	Subclass - DWPI	Class Group - DWPI	Subgroup - DWPI
G10L001100	G	G10	G10L	G10L0011	G10L001100
G10L001300	G	G10	G10L	G10L0013	G10L001300
G10L001900	G	G10	G10L	G10L0019	G10L001900

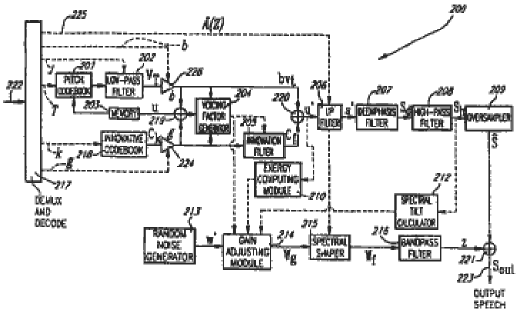
G10L002100	G	G10	G10L	G10L0021	G10L002100
H03H001706	H	H03	H03H	H03H0017	H03H001706
H03M000730	H	H03	H03M	H03M0007	H03M000730
H03M000736	H	H03	H03M	H03M0007	H03M000736
H04B000162	H	H04	H04B	H04B0001	H04B000162
H04B001404	H	H04	H04B	H04B0014	H04B001404
H04B000726	H	H04	H04B	H04B0007	H04B000726
H04L002700	H	H04	H04L	H04L0027	H04L002700
G10L001104	G	G10	G10L	G10L0011	G10L001104
G10L001902	G	G10	G10L	G10L0019	G10L001902
G10L001904	G	G10	G10L	G10L0019	G10L001904
G10L001906	G	G10	G10L	G10L0019	G10L001906
G10L001912	G	G10	G10L	G10L0019	G10L001912
G10L002102	G	G10	G10L	G10L0021	G10L002102
G10L	G	G10	G10L	G10L	G10L

Assignee/Applicant: VOICEAGE CORP
Assignee - Current US:
JP F Terms:
JP FI Codes:
Assignee - Original:
Any CPC Table:

Type	Invention	Additional	Version	Office
Current	**G10L 19/26**	-	20130101	EP

ECLA: G10L001926
Abstract:
Language of Publication: NO
INPADOC Legal Status Table:
Post-Issuance (US):
Reassignment (US) Table:
Maintenance Status (US):
Litigation (US):
Opposition (EP):
License (EP):
EPO Procedural Status:

Front Page Drawing:



Record 9/70 ZA200103366A Perceptual weighting device and method for efficient coding of wideband signals.

Publication Number: ZA200103366A 20020527

Title: Perceptual weighting device and method for efficient coding of wideband signals.
Title - DWPI: Periodicity enhancing device of excitation signal, reduces energy of low frequency portion of innovative code vector in relation to periodicity factor related to wideband signal
Priority Number: CA2252170A
Priority Date: 1998-10-27
Application Number: ZA20013366A
Application Date: 2001-04-25
Publication Date: 2002-05-27
IPC Class Table:

IPC	Section	Class	Subclass	Class Group	Subgroup
G01L001104	G	G01	G01L	G01L0011	G01L001104
G01L002102	G	G01	G01L	G01L0021	G01L002102
G10L001300	G	G10	G10L	G10L0013	G10L001300
G10L001912	G	G10	G10L	G10L0019	G10L001912
H03H001706	H	H03	H03H	H03H0017	H03H001706
H03M000730	H	H03	H03M	H03M0007	H03M000730
H03M000736	H	H03	H03M	H03M0007	H03M000736
H04B000162	H	H04	H04B	H04B0001	H04B000162
H04B000726	H	H04	H04B	H04B0007	H04B000726
H04B001404	H	H04	H04B	H04B0014	H04B001404
H04Q000722	H	H04	H04Q	H04Q0007	H04Q000722
H04Q000732	H	H04	H04Q	H04Q0007	H04Q000732

IPC Class Table - DWPI:

IPC - DWPI	Section - DWPI	Class - DWPI	Subclass - DWPI	Class Group - DWPI	Subgroup - DWPI
G01L001104	G	G01	G01L	G01L0011	G01L001104
G01L002102	G	G01	G01L	G01L0021	G01L002102
G10L001300	G	G10	G10L	G10L0013	G10L001300
G10L001912	G	G10	G10L	G10L0019	G10L001912

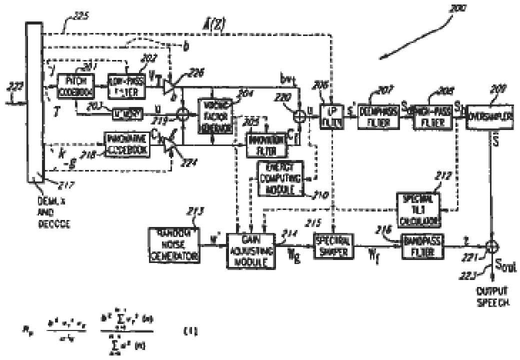
H03H001706	H	H03	H03H	H03H0017	H03H001706
H03M000730	H	H03	H03M	H03M0007	H03M000730
H03M000736	H	H03	H03M	H03M0007	H03M000736
H04B000162	H	H04	H04B	H04B0001	H04B000162
H04B001404	H	H04	H04B	H04B0014	H04B001404
H04B000726	H	H04	H04B	H04B0007	H04B000726
H04J000316	H	H04	H04J	H04J0003	H04J000316
H04J000324	H	H04	H04J	H04J0003	H04J000324
H04Q000722	H	H04	H04Q	H04Q0007	H04Q000722
H04Q000732	H	H04	H04Q	H04Q0007	H04Q000732
H04W007204	H	H04	H04W	H04W0072	H04W007204
H04W007212	H	H04	H04W	H04W0072	H04W007212
H04W007408	H	H04	H04W	H04W0074	H04W007408
G10L002102	G	G10	G10L	G10L0021	G10L002102
G10L001914	G	G10	G10L	G10L0019	G10L001914

Assignee/Applicant: VOICEAGE CORP
Assignee - Current US:
JP F Terms:
JP FI Codes:
Assignee - Original:
Any CPC Table:

Type	Invention	Additional	Version	Office
Current	**G10L 19/26**	-	20130101	EP

ECLA: G10L001926
Abstract:
Language of Publication: EN
INPADOC Legal Status Table:
Post-Issuance (US):
Reassignment (US) Table:
Maintenance Status (US):
Litigation (US):
Opposition (EP):
License (EP):
EPO Procedural Status:

Front Page Drawing:



Record 10/70 ZA200103367A A method and device for adaptive bandwidth pitch search in coding wideband signals.

Publication Number: ZA200103367A 20020527

Title: A method and device for adaptive bandwidth pitch search in coding wideband signals.
Title - DWPI: Periodicity enhancing device of excitation signal, reduces energy of low frequency portion of innovative code vector in relation to periodicity factor related to wideband signal
Priority Number: CA2252170A
Priority Date: 1998-10-27
Application Number: ZA20013367A
Application Date: 2001-04-25
Publication Date: 2002-05-27
IPC Class Table:

IPC	Section	Class	Subclass	Class Group	Subgroup
G01L001104	G	G01	G01L	G01L0011	G01L001104
G01L002102	G	G01	G01L	G01L0021	G01L002102
G10L001300	G	G10	G10L	G10L0013	G10L001300
G10L001912	G	G10	G10L	G10L0019	G10L001912
H03H001706	H	H03	H03H	H03H0017	H03H001706
H03M000730	H	H03	H03M	H03M0007	H03M000730
H03M000736	H	H03	H03M	H03M0007	H03M000736
H04B000162	H	H04	H04B	H04B0001	H04B000162
H04B000726	H	H04	H04B	H04B0007	H04B000726
H04B001404	H	H04	H04B	H04B0014	H04B001404
H04Q000722	H	H04	H04Q	H04Q0007	H04Q000722
H04Q000732	H	H04	H04Q	H04Q0007	H04Q000732

IPC Class Table - DWPI:

IPC - DWPI	Section - DWPI	Class - DWPI	Subclass - DWPI	Class Group - DWPI	Subgroup - DWPI
G01L001104	G	G01	G01L	G01L0011	G01L001104
G01L002102	G	G01	G01L	G01L0021	G01L002102
G10L001300	G	G10	G10L	G10L0013	G10L001300
G10L001912	G	G10	G10L	G10L0019	G10L001912

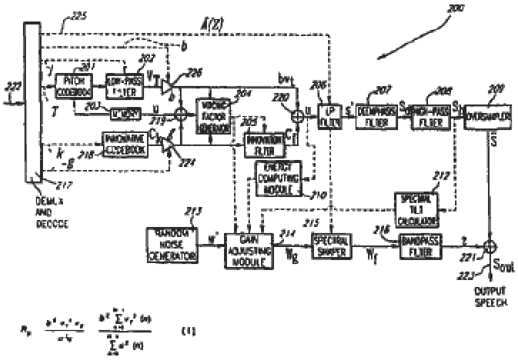
H03H001706	H	H03	H03H	H03H0017	H03H001706
H03M000730	H	H03	H03M	H03M0007	H03M000730
H03M000736	H	H03	H03M	H03M0007	H03M000736
H04B000162	H	H04	H04B	H04B0001	H04B000162
H04B001404	H	H04	H04B	H04B0014	H04B001404
H04B000726	H	H04	H04B	H04B0007	H04B000726
H04J000316	H	H04	H04J	H04J0003	H04J000316
H04J000324	H	H04	H04J	H04J0003	H04J000324
H04Q000722	H	H04	H04Q	H04Q0007	H04Q000722
H04Q000732	H	H04	H04Q	H04Q0007	H04Q000732
H04W007204	H	H04	H04W	H04W0072	H04W007204
H04W007212	H	H04	H04W	H04W0072	H04W007212
H04W007408	H	H04	H04W	H04W0074	H04W007408
G10L002102	G	G10	G10L	G10L0021	G10L002102
G10L001914	G	G10	G10L	G10L0019	G10L001914

Assignee/Applicant: VOICEAGE CORP
Assignee - Current US:
JP F Terms:
JP FI Codes:
Assignee - Original:
Any CPC Table:

Type	Invention	Additional	Version	Office
Current	**G10L 19/26**	-	20130101	EP

ECLA: G10L001926
Abstract:
Language of Publication: EN
INPADOC Legal Status Table:
Post-Issuance (US):
Reassignment (US) Table:
Maintenance Status (US):
Litigation (US):
Opposition (EP):
License (EP):
EPO Procedural Status:

Front Page Drawing:



Record 11/70 MX2001004137A DISPOSITIVO DE PONDERACION PERCEPTIBLE Y METODO PARA LA CODIFICACION EFICIENTE DE SENALES DE BANDA ANCHA. | PERCEPTUAL WEIGHTING DEVICE AND METHOD FOR EFFICIENT CODING OF WIDEBAND SIGNALS.

Publication Number: MX2001004137A 20020604

Title: DISPOSITIVO DE PONDERACION PERCEPTIBLE Y METODO PARA LA CODIFICACION EFICIENTE DE SENALES DE BANDA ANCHA. | PERCEPTUAL WEIGHTING DEVICE AND METHOD FOR EFFICIENT CODING OF WIDEBAND SIGNALS.
Title - DWPI: Perceptual weighting device in digital wideband speech-audio encoder, filters preemphasized signal in relation to synthesis filter coefficient, to produce perceptually weighted signal
Priority Number: CA2252170A | WO1999CA1010A
Priority Date: 1998-10-27 | 1999-10-27
Application Number: MX2001PA4137A
Application Date: 2001-04-25
Publication Date: 2002-06-04
IPC Class Table:

IPC	Section	Class	Subclass	Class Group	Subgroup
G01L001104	G	G01	G01L	G01L0011	G01L001104
G01L002102	G	G01	G01L	G01L0021	G01L002102
G10L001300	G	G10	G10L	G10L0013	G10L001300
G10L001912	G	G10	G10L	G10L0019	G10L001912
H03H001706	H	H03	H03H	H03H0017	H03H001706
H03M000730	H	H03	H03M	H03M0007	H03M000730
H03M000736	H	H03	H03M	H03M0007	H03M000736
H04B000162	H	H04	H04B	H04B0001	H04B000162
H04B000726	H	H04	H04B	H04B0007	H04B000726
H04B001404	H	H04	H04B	H04B0014	H04B001404
H04Q000722	H	H04	H04Q	H04Q0007	H04Q000722
H04Q000732	H	H04	H04Q	H04Q0007	H04Q000732

IPC Class Table - DWPI:

IPC - DWPI	Section - DWPI	Class - DWPI	Subclass - DWPI	Class Group - DWPI	Subgroup - DWPI
G01L001104	G	G01	G01L	G01L0011	G01L001104
G01L002102	G	G01	G01L	G01L0021	G01L002102

G10L001104	G	G10	G10L	G10L0011	G10L001104
G10L001300	G	G10	G10L	G10L0013	G10L001300
G10L001900	G	G10	G10L	G10L0019	G10L001900
G10L001904	G	G10	G10L	G10L0019	G10L001904
G10L001906	G	G10	G10L	G10L0019	G10L001906
G10L001912	G	G10	G10L	G10L0019	G10L001912
G10L001914	G	G10	G10L	G10L0019	G10L001914
G10L002102	G	G10	G10L	G10L0021	G10L002102
H03H001706	H	H03	H03H	H03H0017	H03H001706
H03M000730	H	H03	H03M	H03M0007	H03M000730
H03M000736	H	H03	H03M	H03M0007	H03M000736
H04B000162	H	H04	H04B	H04B0001	H04B000162
H04B001404	H	H04	H04B	H04B0014	H04B001404
H04B000726	H	H04	H04B	H04B0007	H04B000726
H04Q000722	H	H04	H04Q	H04Q0007	H04Q000722
H04Q000732	H	H04	H04Q	H04Q0007	H04Q000732

Assignee/Applicant: VOICEAGE CORPORATION,CA
Assignee - Current US:
JP F Terms:
JP FI Codes:
Assignee - Original: VOICEAGE CORPORATION
Any CPC Table:

Type	Invention	Additional	Version	Office
Current	**G10L 19/26**	-	20130101	EP

ECLA: G10L001926
Abstract:

Un dispositivo de ponderacion perceptible para producir una senal perceptiblemente ponderada en respuesta a una senal de banda ancha que comprende un filtro de pre-enfasis de senales, una calculadora del filtro de sintesis y un filtro de ponderacion perceptible. El filtro de pre-enfasis de senales permite el contenido de alta frecuencia de la senal de banda ancha para producir una senal pre-enfatizada. El filtro de pre-enfasis de senales tiene una funcion de transferencia de la forma: P(z) = 1 - ?z-1 en donde ? es un factor de pre-enfasis que tiene un valor localizado entre 0 y 1. La calculadora del filtro de pre-enfasis es responsable de la senal pre-enfatizada para

producir los coeficientes del filtro de sintesis. Finalmente, el filtro de ponderacion perceptible procesa la senal pre-enfatizada en relacion con los coeficientes del filtro de sintesis para producir la senal perceptiblemente ponderada. El filtro de ponderacion perceptible tiene una funcion de transferencia con denominador fijada de la forma: W(z) A (z/lamda)/ (-lamda2z-1) en donde 0 < lamda2< lamda1 ? 1 e lamda2 e lamda1 son valores de control de ponderacion, por lo cual la ponderacion de la senal de banda ancha en una region de formato esta sustancialmente desacoplada de una inclinacion espectral de esta senal de banda ancha.

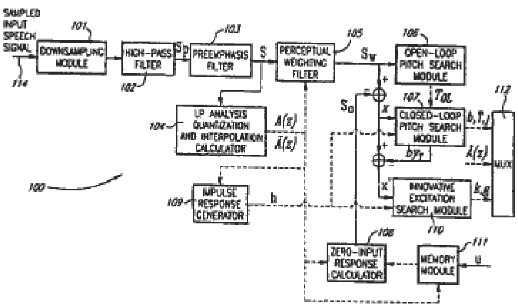
A perceptual weighting device for producing a perceptually weighted signal in response to a wideband signal comprises a signal preemphasis filter, a synthesis filter claculator, and a perceptual weighting filter. The signal preemphasis filter enhances high frequency content of the wideband signal to thereby produce a preemphasised signal. The signal preemphasis filter has a transfer function of the form: P(z)=1 - muz-1 wherein mu is a preemphasis factor having a value located between 0 and 1. The synthesis filter calculator is responsive to the preemphasised signal for producing synthesis filter coefficients. Finally, the perceptual weighting filter processes the preemphasised signal in relation to the synthesis filter coefficients to produce the perceptually weighted signal. The perceptual weighting filter has a transfer function, with fixed denominator, of the form: W(z) A (z/gamma1) / (1-gamma2z-1) where 0<gamma2<gamma1 <=1 and gamma2 and gamma1 are weighting control values, whereby weighting of the wideband signal in a format region is substantially decoupled from a spectral tilt of this wideband signal.

Language of Publication: ES

INPADOC Legal Status Table:

Gazette Date	Code	INPADOC Legal Status Impact
2005-12-09	FG	+
Description: GRANT OR REGISTRATION		

Post-Issuance (US):
Reassignment (US) Table:
Maintenance Status (US):
Litigation (US):
Opposition (EP):
License (EP):
EPO Procedural Status:
Front Page Drawing:



Record 12/70 AU752229B2 Perceptual weighting device and method for efficient coding of wideband signals

Publication Number: AU752229B2 20020912
AU199964571A 20000515

Title: Perceptual weighting device and method for efficient coding of wideband signals
Title - DWPI: Perceptual weighting device in digital wideband speech-audio encoder, filters preemphasized signal in relation to synthesis filter coefficient, to produce perceptually weighted signal
Priority Number: CA2252170A | WO1999CA1010A
Priority Date: 1998-10-27 | 1999-10-27
Application Number: AU199964571A
Application Date: 1999-10-27
Publication Date: 2002-09-12
IPC Class Table:

IPC	Section	Class	Subclass	Class Group	Subgroup
G01L001104	G	G01	G01L	G01L0011	G01L001104
G01L002102	G	G01	G01L	G01L0021	G01L002102
G10L001300	G	G10	G10L	G10L0013	G10L001300
G10L001912	G	G10	G10L	G10L0019	G10L001912
H03H001706	H	H03	H03H	H03H0017	H03H001706
H03M000730	H	H03	H03M	H03M0007	H03M000730
H03M000736	H	H03	H03M	H03M0007	H03M000736
H04B000162	H	H04	H04B	H04B0001	H04B000162
H04B000726	H	H04	H04B	H04B0007	H04B000726
H04B001404	H	H04	H04B	H04B0014	H04B001404
H04Q000722	H	H04	H04Q	H04Q0007	H04Q000722
H04Q000732	H	H04	H04Q	H04Q0007	H04Q000732

IPC Class Table - DWPI:

IPC - DWPI	Section - DWPI	Class - DWPI	Subclass - DWPI	Class Group - DWPI	Subgroup - DWPI
G01L001104	G	G01	G01L	G01L0011	G01L001104
G01L002102	G	G01	G01L	G01L0021	G01L002102
G10L001104	G	G10	G10L	G10L0011	G10L001104

G10L001300	G	G10	G10L	G10L0013	G10L001300
G10L001900	G	G10	G10L	G10L0019	G10L001900
G10L001904	G	G10	G10L	G10L0019	G10L001904
G10L001906	G	G10	G10L	G10L0019	G10L001906
G10L001912	G	G10	G10L	G10L0019	G10L001912
G10L001914	G	G10	G10L	G10L0019	G10L001914
G10L002102	G	G10	G10L	G10L0021	G10L002102
H03H001706	H	H03	H03H	H03H0017	H03H001706
H03M000730	H	H03	H03M	H03M0007	H03M000730
H03M000736	H	H03	H03M	H03M0007	H03M000736
H04B000162	H	H04	H04B	H04B0001	H04B000162
H04B001404	H	H04	H04B	H04B0014	H04B001404
H04B000726	H	H04	H04B	H04B0007	H04B000726
H04Q000722	H	H04	H04Q	H04Q0007	H04Q000722
H04Q000732	H	H04	H04Q	H04Q0007	H04Q000732

Assignee/Applicant: Voiceage Corporation
Assignee - Current US:
JP F Terms:
JP FI Codes:
Assignee - Original: Voiceage Corporation
Any CPC Table:

Type	Invention	Additional	Version	Office
Current	**G10L 19/26**	-	20130101	EP

ECLA: G10L001926
Abstract:

A perceptual weighting device for producing a perceptually weighted signal in response to a wideband signal comprises a signal preemphasis filter, a synthesis filter claculator, and a perceptual weighting filter. The signal preemphasis filter enhances high frequency content of the wideband signal to thereby produce a preemphasised signal. The signal preemphasis filter has a transfer function of the form: P(z)=l #z-1 wherein p is a preemphasis factor having a value located between 0 and 1. The synthesis filter calculator is responsive to the preemphasised signal for producing synthesis filter coefficients. Finally, the perceptual weighting filter processes the preemphasised signal in relation to the synthesis filter coefficients to produce the perceptually

weighted signal. The perceptual weighting filter has a transfer function, with fixed denominator, of the form: W(z) A (Z71) (1-72z') where 0<72<71 <l and 72 and -y are weighting control values, whereby weighting of the wideband signal in a format region is substantially decoupled from a spectral tilt of this wideband signal.

A perceptual weighting device for producing a perceptually weighted signal in response to a wideband signal comprises a signal preemphasis filter, a synthesis filter claculator, and a perceptual weighting filter. The signal preemphasis filter enhances high frequency content of the wideband signal to thereby produce a preemphasised signal. The signal preemphasis filter has a transfer function of the form: P(z)=1 - mu z<-1> wherein mu is a preemphasis factor having a value located between 0 and 1. The synthesis filter calculator is responsive to the preemphasised signal for producing synthesis filter coefficients. Finally, the perceptual weighting filter processes the preemphasised signal in relation to the synthesis filter coefficients to produce the perceptually weighted signal. The perceptual weighting filter has a transfer function, with fixed denominator, of the form: W(z) A (z/ gamma 1) / (1- gamma 2z<-1>) where 0< gamma 2< gamma 1 </=1 and gamma 2 and gamma 1 are weighting control values, whereby weighting of the wideband signal in a format region is substantially decoupled from a spectral tilt of this wideband signal.

Un dispositif de pondération perceptive destiné à produire un signal pondéré perceptivement en réponse à un signal à large bande comprend un filtre de préaccentuation de signal, un calculateur de filtre de synthèse, et un filtre de pondération perceptive. Le filtre de préaccentuation du signal augmente le contenu de haute fréquence du signal à large bande pour produire ainsi un signal préaccentué. Ce filtre de préaccentuation du signal présente une fonction de transfert ayant la forme: P(z) = 1-z-1, dans laquelle est un facteur de préaccentuation ayant une valeur située entre 0 et 1. Le calculateur du filtre de synthèse répond au signal préaccentué afin de produire des coefficients du filtre de synthèse. Enfin, le filtre de pondération perceptive traite le signal préaccentué par rapport aux coefficients du filtre de synthèse pour produire le signal à pondération perceptive. Le filtre à pondération perceptive a une fonction de transfert, avec un dénominateur fixe, ayant la forme: W(z) = A(z)/$_1$) / (1 $_2$z-1) dans laquelle 0 < $_2$< $_1$ 1 et $_2$ ainsi que $_1$ sont des valeurs de régulation de pondération, de manière que la pondération du signal à large bande dans une région de formant est sensiblement découplée d'une inclinaison spectrale de ce signal à large bande.

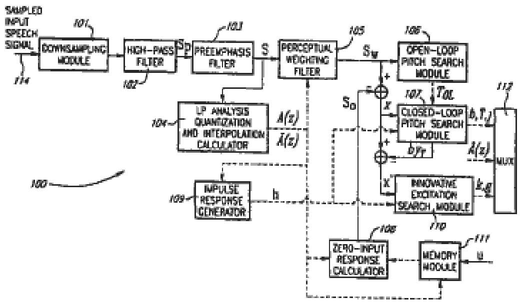
Un dispositif de pondération perceptive destiné à produire un signal pondéré perceptivement en réponse à un signal à large bande comprend un filtre de préaccentuation de signal, un calculateur de filtre de synthèse, et un filtre de pondération perceptive. Le filtre de préaccentuation du signal augmente le contenu de haute fréquence du signal à large bande pour produire ainsi un signal préaccentué. Ce filtre de préaccentuation du signal présente une fonction de transfert ayant la forme: P(z) = 1- mu z<-1>, dans laquelle mu est un facteur de préaccentuation ayant une valeur située entre 0 et 1. Le calculateur du filtre de synthèse répond au signal préaccentué afin de produire des coefficients du filtre de synthèse. Enfin, le filtre de pondération perceptive traite le signal préaccentué par rapport aux coefficients du filtre de synthèse pour produire le signal à pondération perceptive. Le filtre à pondération perceptive a une fonction de transfert, avec un dénominateur fixe, ayant la forme: W(z) = A(z)/ gamma 1) / (1 gamma 2z<-1>) dans laquelle 0 < gamma 2 < gamma 1 </= 1 et gamma 2 ainsi que gamma 1 sont des valeurs de régulation de pondération, de manière que la pondération du signal à large bande dans une région de formant est sensiblement découplée d'une inclinaison spectrale de ce signal à large bande.

Language of Publication: EN

INPADOC Legal Status Table:

Gazette Date	Code	INPADOC Legal Status Impact
2003-01-30	FGA	+
Description: LETTERS PATENT SEALED OR GRANTED (STANDARD PATENT)		

Post-Issuance (US):
Reassignment (US) Table:
Maintenance Status (US):
Litigation (US):
Opposition (EP):
License (EP):
EPO Procedural Status:
Front Page Drawing:



Record 13/70 MX2001004181A UN METODO Y DISPOSITIVO PARA LA BUSQUEDA DE CAMPO DEL ANCHO DE BANDA DE ADAPTACION EN LA CODIFICACION DE SE°ALES DE BANDA ANCHA. | A METHOD AND DEVICE FOR ADAPTIVE BANDWIDTH PITCH SEARCH IN CODING WIDEBAND SIGNALS.

Publication Number: MX2001004181A 20030606

Title: UN METODO Y DISPOSITIVO PARA LA BUSQUEDA DE CAMPO DEL ANCHO DE BANDA DE ADAPTACION EN LA CODIFICACION DE SE°ALES DE BANDA ANCHA. | A METHOD AND DEVICE FOR ADAPTIVE BANDWIDTH PITCH SEARCH IN CODING WIDEBAND SIGNALS.
Title - DWPI: Pitch analysis device for digitally encoding wideband signal, chooses signal path having lowest calculated pitch prediction error
Priority Number: CA2252170A | WO1999CA1008A
Priority Date: 1998-10-27 | 1999-10-27
Application Number: MX2001PA4181A
Application Date: 2001-04-26
Publication Date: 2003-06-06
IPC Class Table:

IPC	Section	Class	Subclass	Class Group	Subgroup
G01L001104	G	G01	G01L	G01L0011	G01L001104
G01L002102	G	G01	G01L	G01L0021	G01L002102
G10L001300	G	G10	G10L	G10L0013	G10L001300
G10L001912	G	G10	G10L	G10L0019	G10L001912
H03H001706	H	H03	H03H	H03H0017	H03H001706
H03M000730	H	H03	H03M	H03M0007	H03M000730
H03M000736	H	H03	H03M	H03M0007	H03M000736
H04B000162	H	H04	H04B	H04B0001	H04B000162
H04B000726	H	H04	H04B	H04B0007	H04B000726
H04B001404	H	H04	H04B	H04B0014	H04B001404
H04Q000722	H	H04	H04Q	H04Q0007	H04Q000722
H04Q000732	H	H04	H04Q	H04Q0007	H04Q000732

IPC Class Table - DWPI:

IPC - DWPI	Section - DWPI	Class - DWPI	Subclass - DWPI	Class Group - DWPI	Subgroup - DWPI
G01L001104	G	G01	G01L	G01L0011	G01L001104

G01L002102	G	G01	G01L	G01L0021	G01L002102
G10L001104	G	G10	G10L	G10L0011	G10L001104
G10L001300	G	G10	G10L	G10L0013	G10L001300
G10L001900	G	G10	G10L	G10L0019	G10L001900
G10L001904	G	G10	G10L	G10L0019	G10L001904
G10L001906	G	G10	G10L	G10L0019	G10L001906
G10L001912	G	G10	G10L	G10L0019	G10L001912
G10L001914	G	G10	G10L	G10L0019	G10L001914
G10L002102	G	G10	G10L	G10L0021	G10L002102
H03H001706	H	H03	H03H	H03H0017	H03H001706
H03M000730	H	H03	H03M	H03M0007	H03M000730
H03M000736	H	H03	H03M	H03M0007	H03M000736
H04B000162	H	H04	H04B	H04B0001	H04B000162
H04B001404	H	H04	H04B	H04B0014	H04B001404
H04B000726	H	H04	H04B	H04B0007	H04B000726
H04Q000722	H	H04	H04Q	H04Q0007	H04Q000722
H04Q000732	H	H04	H04Q	H04Q0007	H04Q000732
A61K0031585	A	A61	A61K	A61K0031	A61K0031585

Assignee/Applicant: VOICEAGE CORPORATION,CA
Assignee - Current US:
JP F Terms:
JP FI Codes:
Assignee - Original: VOICEAGE CORPORATION
Any CPC Table:

Type	Invention	Additional	Version	Office
Current	**G10L 19/26**	-	20130101	EP

ECLA: G10L001926
Abstract:

Un dispositivo y metodo de busqueda de campo mejorado para codificar digitalmente una señal de banda ancha, en particular pero no exclusivamente una señal de voz, con el proposito de transmitir o almacenar y sintetizar esta señal de voz de banda ancha. El nuevo metodo y dispositivo que logran un modelo eficiente de la estructura armonica del espectro de voz usa

varias formas de filtros de paso descendente aplicados a un vector de codigos de campo, se selecciona la ganancia mas alta del rendimiento de prediccion y se reenvian los parametros del codigo de cifrado y descifrado en campo asociados.

An improved pitch search method and device for digitally encoding a wideband signal, in particular but not exclusively a speech signal, in view of transmitting, or storing, and synthesizing this wideband sound signal. The new method and device which achieve efficient modeling of the harmonic structure of the speech spectrum uses several forms of low pass filters applied to a pitch codevector, the one yielding higher prediction gain (i.e. the lowest pitch prediction error) is selected and the associated pitch codebook parameters are forwarded.

Language of Publication: ES

INPADOC Legal Status Table:

Gazette Date	Code	INPADOC Legal Status Impact
2006-03-17	FG	+
Description: GRANT OR REGISTRATION		

Post-Issuance (US):

Reassignment (US) Table:

Maintenance Status (US):

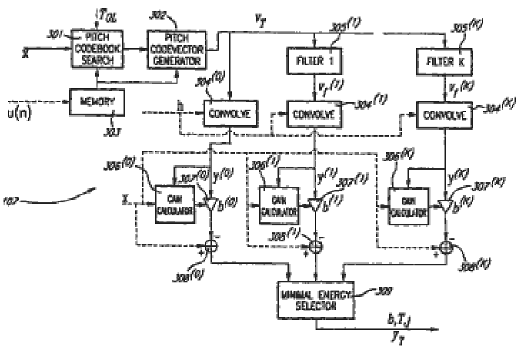
Litigation (US):

Opposition (EP):

License (EP):

EPO Procedural Status:

Front Page Drawing:



Record 14/70 AU763471B2 A method and device for adaptive bandwidth pitch search in coding wideband signals

Publication Number: AU763471B2 20030724
AU199964569A 20000515

Title: A method and device for adaptive bandwidth pitch search in coding wideband signals
Title - DWPI: Pitch analysis device for digitally encoding wideband signal, chooses signal path having lowest calculated pitch prediction error
Priority Number: CA2252170A | WO1999CA1008A
Priority Date: 1998-10-27 | 1999-10-27
Application Number: AU199964569A
Application Date: 1999-10-27
Publication Date: 2003-07-24
IPC Class Table:

IPC	Section	Class	Subclass	Class Group	Subgroup
G01L001104	G	G01	G01L	G01L0011	G01L001104
G01L002102	G	G01	G01L	G01L0021	G01L002102
G10L001300	G	G10	G10L	G10L0013	G10L001300
G10L001912	G	G10	G10L	G10L0019	G10L001912
H03H001706	H	H03	H03H	H03H0017	H03H001706
H03M000730	H	H03	H03M	H03M0007	H03M000730
H03M000736	H	H03	H03M	H03M0007	H03M000736
H04B000162	H	H04	H04B	H04B0001	H04B000162
H04B000726	H	H04	H04B	H04B0007	H04B000726
H04B001404	H	H04	H04B	H04B0014	H04B001404
H04Q000722	H	H04	H04Q	H04Q0007	H04Q000722
H04Q000732	H	H04	H04Q	H04Q0007	H04Q000732

IPC Class Table - DWPI:

IPC - DWPI	Section - DWPI	Class - DWPI	Subclass - DWPI	Class Group - DWPI	Subgroup - DWPI
G01L001104	G	G01	G01L	G01L0011	G01L001104
G01L002102	G	G01	G01L	G01L0021	G01L002102
G10L001104	G	G10	G10L	G10L0011	G10L001104

G10L001300	G	G10	G10L	G10L0013	G10L001300
G10L001900	G	G10	G10L	G10L0019	G10L001900
G10L001904	G	G10	G10L	G10L0019	G10L001904
G10L001906	G	G10	G10L	G10L0019	G10L001906
G10L001912	G	G10	G10L	G10L0019	G10L001912
G10L001914	G	G10	G10L	G10L0019	G10L001914
G10L002102	G	G10	G10L	G10L0021	G10L002102
H03H001706	H	H03	H03H	H03H0017	H03H001706
H03M000730	H	H03	H03M	H03M0007	H03M000730
H03M000736	H	H03	H03M	H03M0007	H03M000736
H04B000162	H	H04	H04B	H04B0001	H04B000162
H04B001404	H	H04	H04B	H04B0014	H04B001404
H04B000726	H	H04	H04B	H04B0007	H04B000726
H04Q000722	H	H04	H04Q	H04Q0007	H04Q000722
H04Q000732	H	H04	H04Q	H04Q0007	H04Q000732
A61K0031585	A	A61	A61K	A61K0031	A61K0031585

Assignee/Applicant: Voiceage Corporation
Assignee - Current US:
JP F Terms:
JP FI Codes:
Assignee - Original: Voiceage Corporation
Any CPC Table:

Type	Invention	Additional	Version	Office
Current	**G10L 19/26**	-	20130101	EP

ECLA: G10L001926
Abstract:

An improved pitch search method and device for digitally encoding a wideband signal, in particular but not exclusively a speech signal, in view of transmitting, or storing, and synthesizing this wideband sound signal. The new method and device which achieve efficientmodeling of the harmonic structure of the speech spectrum uses several forms of low pass filters applied to a pitch codevector, the one yielding higher prediction gain the lowest pitch prediction error) is selected and the associated pitch codebook parameters are forwarded.

An improved pitch search method and device for digitally encoding a wideband signal, in particular but not exclusively a speech signal, in view of transmitting, or storing, and synthesizing this wideband sound signal. The new method and device which achieve efficient modeling of the harmonic structure of the speech spectrum uses several forms of low pass filters applied to a pitch codevector, the one yielding higher prediction gain (i.e. the lowest pitch prediction error) is selected and the associated pitch codebook parameters are forwarded.

L'invention concerne un procédé amélioré de recherche de hauteur et un dispositif de codage numérique d'un signal à large bande, en particulier mais pas exclusivement un signal vocal, en vue de transmettre ou de stocker, et de synthétiser ce signal sonore à large bande. Le procédé et le dispositif nouveaux, lesquels permettent une modélisation efficace de la structure harmonique du spectre de la parole, utilisent plusieurs formes de filtres passe-bas appliqués à un vecteur de code de hauteur, celui permettant d'obtenir le gain de prédiction le plus haut (c'est-à-dire l'erreur de prédiction de hauteur la plus faible) est sélectionné et les paramètres de code de hauteur associés sont retransmis.

Language of Publication: EN

INPADOC Legal Status Table:

Gazette Date	Code	INPADOC Legal Status Impact
2003-11-20	FGA	+
Description: LETTERS PATENT SEALED OR GRANTED (STANDARD PATENT)		

Post-Issuance (US):

Reassignment (US) Table:

Maintenance Status (US):

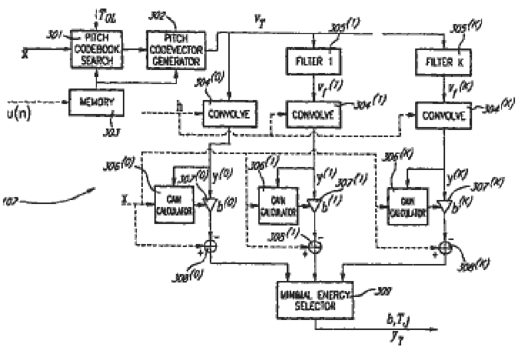
Litigation (US):

Opposition (EP):

License (EP):

EPO Procedural Status:

Front Page Drawing:



Record 15/70 NZ511163A Perceptual weighting device and method for efficient coding of wideband signals

Publication Number: NZ511163A 20030725

Title: Perceptual weighting device and method for efficient coding of wideband signals
Title - DWPI: Perceptual weighting device in digital wideband speech-audio encoder, filters preemphasized signal in relation to synthesis filter coefficient, to produce perceptually weighted signal
Priority Number: CA2252170A | WO1999CA1010A
Priority Date: 1998-10-27 | 1999-10-27
Application Number: NZ511163A
Application Date: 1999-10-27
Publication Date: 2003-07-25
IPC Class Table:

IPC	Section	Class	Subclass	Class Group	Subgroup
G01L001104	G	G01	G01L	G01L0011	G01L001104
G01L002102	G	G01	G01L	G01L0021	G01L002102
G10L001300	G	G10	G10L	G10L0013	G10L001300
G10L001912	G	G10	G10L	G10L0019	G10L001912
H03H001706	H	H03	H03H	H03H0017	H03H001706
H03M000730	H	H03	H03M	H03M0007	H03M000730
H03M000736	H	H03	H03M	H03M0007	H03M000736
H04B000162	H	H04	H04B	H04B0001	H04B000162
H04B000726	H	H04	H04B	H04B0007	H04B000726
H04B001404	H	H04	H04B	H04B0014	H04B001404
H04Q000722	H	H04	H04Q	H04Q0007	H04Q000722
H04Q000732	H	H04	H04Q	H04Q0007	H04Q000732

IPC Class Table - DWPI:

IPC - DWPI	Section - DWPI	Class - DWPI	Subclass - DWPI	Class Group - DWPI	Subgroup - DWPI
G01L001104	G	G01	G01L	G01L0011	G01L001104
G01L002102	G	G01	G01L	G01L0021	G01L002102
G10L001104	G	G10	G10L	G10L0011	G10L001104

G10L001300	G	G10	G10L	G10L0013	G10L001300
G10L001900	G	G10	G10L	G10L0019	G10L001900
G10L001904	G	G10	G10L	G10L0019	G10L001904
G10L001906	G	G10	G10L	G10L0019	G10L001906
G10L001912	G	G10	G10L	G10L0019	G10L001912
G10L001914	G	G10	G10L	G10L0019	G10L001914
G10L002102	G	G10	G10L	G10L0021	G10L002102
H03H001706	H	H03	H03H	H03H0017	H03H001706
H03M000730	H	H03	H03M	H03M0007	H03M000730
H03M000736	H	H03	H03M	H03M0007	H03M000736
H04B000162	H	H04	H04B	H04B0001	H04B000162
H04B001404	H	H04	H04B	H04B0014	H04B001404
H04B000726	H	H04	H04B	H04B0007	H04B000726
H04Q000722	H	H04	H04Q	H04Q0007	H04Q000722
H04Q000732	H	H04	H04Q	H04Q0007	H04Q000732

Assignee/Applicant: VOICEAGE CORP
Assignee - Current US:
JP F Terms:
JP FI Codes:
Assignee - Original:
Any CPC Table:

Type	Invention	Additional	Version	Office
Current	**G10L 19/26**	-	20130101	EP

ECLA: G10L001926
Abstract:

A perceptual weighting device for producing a perceptually weighted signal in response to a wideband signal comprises a signal pre-emphasis filter, a synthesis filter calculator and a perceptual weighting filter. The signal pre-emphasis filter enhances high frequency content of the wideband signal to thereby produce a pre-emphasised signal. The signal pre-emphasis filter has a transfer function of the form P(z) = 1 - z-1 wherein is a pre-emphasis factor having value between 0 and 1. The synthesis filter calculator is responsive to the pre-emphasised signal for producing synthesis filter coefficients. Finally, the perceptual weighting filter has a transfer function, with a fixed denominator, of the form W(z) = A (z/ 1) / (1- 2z-1) where 0 < 2 < 1 d"1 and 2 and 1 are

weighting control values.

Language of Publication: EN

INPADOC Legal Status Table:

Gazette Date	Code	INPADOC Legal Status Impact
2012-10-26	RENW	+
Description: RENEWAL (RENEWAL FEES ACCEPTED)		
2009-11-27	RENW	+
Description: RENEWAL (RENEWAL FEES ACCEPTED)		
2006-11-30	RENW	+
Description: RENEWAL (RENEWAL FEES ACCEPTED)		
2004-02-27	RENW	+
Description: RENEWAL (RENEWAL FEES ACCEPTED)		
2003-11-28	PSEA	+
Description: PATENT SEALED		

Post-Issuance (US):

Reassignment (US) Table:

Maintenance Status (US):

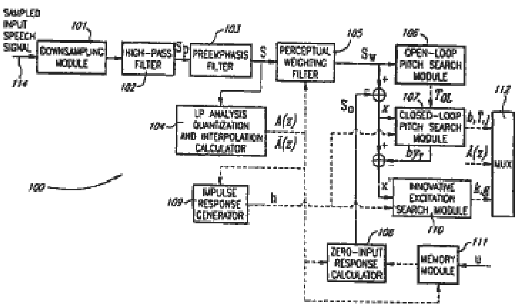
Litigation (US):

Opposition (EP):

License (EP):

EPO Procedural Status:

Front Page Drawing:



Record 16/70 EP1125285B1 PERIODICITY ENHANCEMENT IN DECODING WIDEBAND SIGNALS | VERBESSERUNG DER PERIODIZITÄT EINES BREITBANDSIGNALS | AMELIORATION DE LA PERIODICITE DANS LE DECODAGE DE SIGNAUX A LARGE BANDE

Publication Number: EP1125285B1 20030730
EP1125285A1 20010822

Title: PERIODICITY ENHANCEMENT IN DECODING WIDEBAND SIGNALS | VERBESSERUNG DER PERIODIZITÄT EINES BREITBANDSIGNALS | AMELIORATION DE LA PERIODICITE DANS LE DECODAGE DE SIGNAUX A LARGE BANDE
Title - DWPI: Periodicity enhancing device of excitation signal, reduces energy of low frequency portion of innovative code vector in relation to periodicity factor related to wideband signal
Priority Number: CA2252170A | WO1999CA1009A
Priority Date: 1998-10-27 | 1999-10-27
Application Number: EP1999952200A
Application Date: 1999-10-27
Publication Date: 2003-07-30
IPC Class Table:

IPC	Section	Class	Subclass	Class Group	Subgroup
G01L001104	G	G01	G01L	G01L0011	G01L001104
G01L002102	G	G01	G01L	G01L0021	G01L002102
G10L001300	G	G10	G10L	G10L0013	G10L001300
G10L001912	G	G10	G10L	G10L0019	G10L001912
H03H001706	H	H03	H03H	H03H0017	H03H001706
H03M000730	H	H03	H03M	H03M0007	H03M000730
H03M000736	H	H03	H03M	H03M0007	H03M000736
H04B000162	H	H04	H04B	H04B0001	H04B000162
H04B000726	H	H04	H04B	H04B0007	H04B000726
H04B001404	H	H04	H04B	H04B0014	H04B001404
H04Q000722	H	H04	H04Q	H04Q0007	H04Q000722
H04Q000732	H	H04	H04Q	H04Q0007	H04Q000732

IPC Class Table - DWPI:

IPC - DWPI	Section - DWPI	Class - DWPI	Subclass - DWPI	Class Group - DWPI	Subgroup - DWPI
G01L001104	G	G01	G01L	G01L0011	G01L001104
G01L002102	G	G01	G01L	G01L0021	G01L002102

G10L001300	G	G10	G10L	G10L0013	G10L001300
G10L001912	G	G10	G10L	G10L0019	G10L001912
H03H001706	H	H03	H03H	H03H0017	H03H001706
H03M000730	H	H03	H03M	H03M0007	H03M000730
H03M000736	H	H03	H03M	H03M0007	H03M000736
H04B000162	H	H04	H04B	H04B0001	H04B000162
H04B001404	H	H04	H04B	H04B0014	H04B001404
H04B000726	H	H04	H04B	H04B0007	H04B000726
H04J000316	H	H04	H04J	H04J0003	H04J000316
H04J000324	H	H04	H04J	H04J0003	H04J000324
H04Q000722	H	H04	H04Q	H04Q0007	H04Q000722
H04Q000732	H	H04	H04Q	H04Q0007	H04Q000732
H04W007204	H	H04	H04W	H04W0072	H04W007204
H04W007212	H	H04	H04W	H04W0072	H04W007212
H04W007408	H	H04	H04W	H04W0074	H04W007408
G10L002102	G	G10	G10L	G10L0021	G10L002102
G10L001914	G	G10	G10L	G10L0019	G10L001914

Assignee/Applicant: Voiceage Corporation,Ville Mont Royal, Quebec H3R 2H6,CA,03014250
Assignee - Current US:
JP F Terms:
JP FI Codes:
Assignee - Original: Voiceage Corporation
Any CPC Table:

Type	Invention	Additional	Version	Office
Current	**G10L 19/26**	-	20130101	EP

ECLA: G10L001926
Abstract:

The present invention relates to a method and device for enhancing periodicity of an excitation signal produced in relation to a pitch codevector and an innovative codevector for supplying a signal synthesis filter in view of producing a synthesized wideband signal. In this periodicity enhancing device and method, a factor generator is responsive to the adaptive and innovative codevectors for calculating a periodicity factor. An innovation filter subsequently processes the

innovative codevector in relation to this periodicity factor to reduce energy of a low frequency portion of the innovative codevector and enhance periodicity of a low frequency portion of the excitation signal. As an example, the innovation filter has a transfer function of the form: F(z)=-(z)+1-(z)-1 where is a periodicity factor, and the factor generator calculates the periodicity factor using the relation: = qR_p bounded by < q where q is an enhancement factor set for example to 0.25, and where R_p is represented by formula (I) where v_T is the pitch codevector, b is a pitch gain, N is a subframe length, and u is the excitation signal.

The present invention relates to a method and device for enhancing periodicity of an excitation signal produced in relation to a pitch codevector and an innovative codevector for supplying a signal synthesis filter in view of producing a synthesized wideband signal. In this periodicity enhancing device and method, a factor generator is responsive to the adaptive and innovative codevectors for calculating a periodicity factor. An innovation filter subsequently processes the innovative codevector in relation to this periodicity factor to reduce energy of a low frequency portion of the innovative codevector and enhance periodicity of a low frequency portion of the excitation signal. As an example, the innovation filter has a transfer function of the form: F(z)=-alpha (z)+1- alpha (z)<-1> where alpha is a periodicity factor, and the factor generator calculates the periodicity factor alpha using the relation: alpha = qR?p? bounded by alpha < q where q is an enhancement factor set for example to 0.25, and where R?p? is represented by formula (I) where v?T? is the pitch codevector, b is a pitch gain, N is a subframe length, and u is the excitation signal.

La présente invention concerne un procédé et un dispositif destinés à améliorer la périodicité d'un signal d'excitation produit par rapport à un vecteur de code de hauteur et un vecteur de code innovant permettant d'obtenir un filtre de synthèse de signal en vue de produire un signal synthétisé à large bande. Dans ce dispositif et ce procédé d'amélioration de la périodicité, un générateur de facteurs répond aux vecteurs de code adaptatifs et innovants pour calculer un facteur de périodicité. Un filtre d'innovation traite ensuite le vecteur de code innovant par rapport à ce facteur de périodicité pour réduire l'énergie d'une partie basse fréquence du vecteur de code innovant et améliorer la périodicité d'une partie basse fréquence du signal d'excitation. A titre d'exemple, le filtre d'innovation présente une fonction de transfert ayant la forme: F(z)=(z)+1-(z)-1 dans laquelle représente un facteur de périodicité, et le générateur de facteur calcule le facteur de périodicité à l'aide de la relation: = qR_p limitée par < q dans laquelle q représente un facteur d'amélioration fixé par exemple à 0,25, et dans laquelle R_p est représenté par la formule (I) où V_t représente le vecteur de code de hauteur, b représente un gain de hauteur, N représente une longueur de sous-bloc et u représente le signal d'excitation.

La présente invention concerne un procédé et un dispositif destinés à améliorer la périodicité d'un signal d'excitation produit par rapport à un vecteur de code de hauteur et un vecteur de code innovant permettant d'obtenir un filtre de synthèse de signal en vue de produire un signal synthétisé à large bande. Dans ce dispositif et ce procédé d'amélioration de la périodicité, un générateur de facteurs répond aux vecteurs de code adaptatifs et innovants pour calculer un facteur de périodicité. Un filtre d'innovation traite ensuite le vecteur de code innovant par rapport à ce facteur de périodicité pour réduire l'énergie d'une partie basse fréquence du vecteur de code innovant et améliorer la périodicité d'une partie basse fréquence du signal d'excitation. A titre d'exemple, le filtre d'innovation présente une fonction de transfert ayant la forme: F(z)= alpha (z)+1- alpha (z)<-1> dans laquelle alpha représente un facteur de périodicité, et le générateur de facteur calcule le facteur alpha de périodicité à l'aide de la relation: alpha = qR?p? limitée par alpha < q dans laquelle q représente un facteur d'amélioration fixé par exemple à 0,25, et dans laquelle Rp est représenté par la formule (I) où V?t? représente le vecteur de code de hauteur, b représente un gain de hauteur, N représente une longueur de sous-bloc et u représente le signal d'excitation.

Language of Publication: EN

INPADOC Legal Status Table:

Gazette Date	Code	INPADOC Legal Status Impact
2015-12-31	PGFP	+
Description: POSTGRANT: ANNUAL FEES PAID TO NATIONAL OFFICE DK		
2015-11-30	PGFP	+
Description: POSTGRANT: ANNUAL FEES PAID TO NATIONAL OFFICE LU		
2015-11-02	REG	-
Description: REFERENCE TO A NATIONAL CODE FR PLFP FEE PAYMENT		
2015-04-30	PGFP	+
Description: POSTGRANT: ANNUAL FEES PAID TO NATIONAL OFFICE BE		
2015-03-31	PGFP	+
Description: POSTGRANT: ANNUAL FEES PAID TO NATIONAL OFFICE IT		
2015-02-27	PGFP	+
Description: POSTGRANT: ANNUAL FEES PAID TO NATIONAL OFFICE PT		
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Description: POSTGRANT: ANNUAL FEES PAID TO NATIONAL OFFICE CY		
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Description: POSTGRANT: ANNUAL FEES PAID TO NATIONAL OFFICE NL		
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2015-01-30	PGFP	+
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Description: POSTGRANT: ANNUAL FEES PAID TO NATIONAL OFFICE DE		
2015-01-29	REG	-
Description: REFERENCE TO A NATIONAL CODE DE DE 69910058 R039 REVOCATION ACTION FILED 2014-12-05		
2014-12-31	PGFP	+
Description: POSTGRANT: ANNUAL FEES PAID TO NATIONAL OFFICE DK		
2014-12-05	REG	-
Description: REFERENCE TO A NATIONAL CODE DE DE 69910058 R008 CASE PENDING AT FEDERAL PATENTS COURT (FPC)		
2014-12-05	REG	-
Description: REFERENCE TO A NATIONAL CODE DE DE 69910058 R039 REVOCATION ACTION FILED		

2014-11-28	PGFP	+
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2014-10-31	PGFP	+
Description: POSTGRANT: ANNUAL FEES PAID TO NATIONAL OFFICE MC		
2014-08-07	REG	-
Description: REFERENCE TO A NATIONAL CODE DE DE 69910058 R081 CHANGE OF APPLICANT/PATENTEE SAINT LAWRENCE COMMUNICATIONS GMBH, DE FORMER OWNER: VOICEAGE CORP., VILLE MONT-ROYAL, QUEBEC, CA 2014-07-01		
2014-08-07	REG	-
Description: REFERENCE TO A NATIONAL CODE DE DE 69910058 R082 CHANGE OF REPRESENTATIVE 2014-07-01		
2014-07-01	REG	-
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Description: POSTGRANT: ANNUAL FEES PAID TO NATIONAL OFFICE BE		
2011-03-15	REG	-
Description: REFERENCE TO A NATIONAL CODE CH PFA NAME/FIRM CHANGED VOICEAGE CORPORATION VOICEAGE CORPORATION#SUITE 200, 750, CHEMIN LUCERNE#VILLE MONT-ROYAL, QUEBEC H3R 2H6 (CA) -TRANSFERTO- VOICEAGE CORPORATION#SUITE 200, 750, CHEMIN LUCERNE#VILLE MONT-ROYAL, QUEBEC H3R 2H6 (CA)		
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Description: POSTGRANT: ANNUAL FEES PAID TO NATIONAL OFFICE MC		

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Description: POSTGRANT: ANNUAL FEES PAID TO NATIONAL OFFICE GB		
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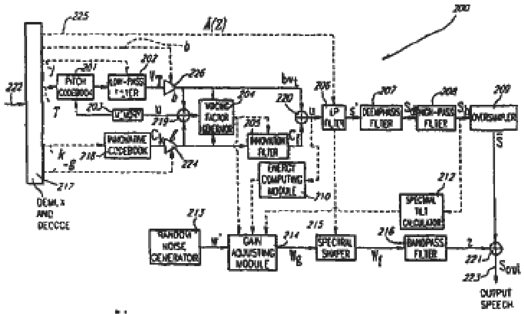
2004-05-01	REG	-
Description: REFERENCE TO A NATIONAL CODE ES FG2A DEFINITIVE PROTECTION		
2003-11-14	REG	-
Description: REFERENCE TO A NATIONAL CODE CH NV NEW AGENT		

2003-11-11	REG	-
Description: REFERENCE TO A NATIONAL CODE SE TRGR TRANSLATION OF GRANTED EP PATENT		
2003-11-10	REG	-
Description: REFERENCE TO A NATIONAL CODE DK T3 TRANSLATION OF EP PATENT		
2003-09-04	REF	-
Description: CORRESPONDS TO: DE 69910058 P		
2003-09-03	REG	-
Description: REFERENCE TO A NATIONAL CODE IE FG4D EUROPEAN PATENTS GRANTED DESIGNATING IRELAND		
2003-07-31	REG	-
Description: REFERENCE TO A NATIONAL CODE CH EP ENTRY IN THE NATIONAL PHASE		
2003-07-30	REG	-
Description: REFERENCE TO A NATIONAL CODE GB FG4D EUROPEAN PATENT GRANTED		
2003-07-30	AK	+
Description: DESIGNATED CONTRACTING STATES: AT; BE; CH; CY; DE; DK; ES; FI; FR; GB; GR; IE; IT; LI; LU; MC; NL; PT; SE		
2001-08-22	AK	+
Description: DESIGNATED CONTRACTING STATES: EP 1125285 A1 AT; BE; CH; CY; DE; DK; ES; FI; FR; GB; GR; IE; IT; LI; LU; MC; NL; PT; SE		
2001-08-22	17P	+
Description: REQUEST FOR EXAMINATION FILED 2001-04-27		

Post-Issuance (US):
Reassignment (US) Table:
Maintenance Status (US):
Litigation (US):
Opposition (EP):
License (EP):
EPO Procedural Status: EX-RQ 2001-04-27 2001 Request for examination
Front Page Drawing:



$$R_p = \frac{b^2 v_T^t v_T}{u^t u} = \frac{b^2 \sum_{n=0}^{N-1} v_T^2(n)}{\sum_{n=0}^{N-1} u^2(n)} \qquad (1)$$

Record 17/70 EP1125276B1 A METHOD AND DEVICE FOR ADAPTIVE BANDWIDTH PITCH SEARCH IN CODING WIDEBAND SIGNALS | VERFAHREN UND VORRICHTUNG ZUR ADAPTIVEN BANDBREITENABHÄNGIGEN GRUNDFREQUENZSUCHE FÜR DIE KODIERUNG BREITBANDIGER SIGNALE | PROCEDE ET DISPOSITIF DE RECHERCHE ADAPTATIVE DE FREQUENCE FONDAMENTALE DEPENDANTE DE LA LARGEUR DE BANDE DANS LE CODAGE DE SIGNAUX A LARGE BANDE

Publication Number: EP1125276B1 20030806
EP1125276A1 20010822

Title: A METHOD AND DEVICE FOR ADAPTIVE BANDWIDTH PITCH SEARCH IN CODING WIDEBAND SIGNALS | VERFAHREN UND VORRICHTUNG ZUR ADAPTIVEN BANDBREITENABHÄNGIGEN GRUNDFREQUENZSUCHE FÜR DIE KODIERUNG BREITBANDIGER SIGNALE | PROCEDE ET DISPOSITIF DE RECHERCHE ADAPTATIVE DE FREQUENCE FONDAMENTALE DEPENDANTE DE LA LARGEUR DE BANDE DANS LE CODAGE DE SIGNAUX A LARGE BANDE
Title - DWPI: Pitch analysis device for digitally encoding wideband signal, chooses signal path having lowest calculated pitch prediction error
Priority Number: CA2252170A | WO1999CA1008A
Priority Date: 1998-10-27 | 1999-10-27
Application Number: EP1999952199A
Application Date: 1999-10-27
Publication Date: 2003-08-06
IPC Class Table:

IPC	Section	Class	Subclass	Class Group	Subgroup
G01L001104	G	G01	G01L	G01L0011	G01L001104
G01L002102	G	G01	G01L	G01L0021	G01L002102
G10L001300	G	G10	G10L	G10L0013	G10L001300
G10L001912	G	G10	G10L	G10L0019	G10L001912
H03H001706	H	H03	H03H	H03H0017	H03H001706
H03M000730	H	H03	H03M	H03M0007	H03M000730
H03M000736	H	H03	H03M	H03M0007	H03M000736
H04B000162	H	H04	H04B	H04B0001	H04B000162
H04B000726	H	H04	H04B	H04B0007	H04B000726
H04B001404	H	H04	H04B	H04B0014	H04B001404
H04Q000722	H	H04	H04Q	H04Q0007	H04Q000722
H04Q000732	H	H04	H04Q	H04Q0007	H04Q000732

IPC Class Table - DWPI:

IPC - DWPI	Section - DWPI	Class - DWPI	Subclass - DWPI	Class Group - DWPI	Subgroup - DWPI
G01L001104	G	G01	G01L	G01L0011	G01L001104
G01L002102	G	G01	G01L	G01L0021	G01L002102
G10L001104	G	G10	G10L	G10L0011	G10L001104
G10L001300	G	G10	G10L	G10L0013	G10L001300
G10L001900	G	G10	G10L	G10L0019	G10L001900
G10L001904	G	G10	G10L	G10L0019	G10L001904
G10L001906	G	G10	G10L	G10L0019	G10L001906
G10L001912	G	G10	G10L	G10L0019	G10L001912
G10L001914	G	G10	G10L	G10L0019	G10L001914
G10L002102	G	G10	G10L	G10L0021	G10L002102
H03H001706	H	H03	H03H	H03H0017	H03H001706
H03M000730	H	H03	H03M	H03M0007	H03M000730
H03M000736	H	H03	H03M	H03M0007	H03M000736
H04B000162	H	H04	H04B	H04B0001	H04B000162
H04B001404	H	H04	H04B	H04B0014	H04B001404
H04B000726	H	H04	H04B	H04B0007	H04B000726
H04Q000722	H	H04	H04Q	H04Q0007	H04Q000722
H04Q000732	H	H04	H04Q	H04Q0007	H04Q000732
A61K0031585	A	A61	A61K	A61K0031	A61K0031585

Assignee/Applicant: Voiceage Corporation,Ville Mont Royal, Quebec H3R 2H6,CA,03014250
Assignee - Current US:
JP F Terms:
JP FI Codes:
Assignee - Original: Voiceage Corporation
Any CPC Table:

Type	Invention	Additional	Version	Office
Current	**G10L 19/26**	-	20130101	EP

ECLA: G10L001926
Abstract:

An improved pitch search method and device for digitally encoding a wideband signal, in particular but not exclusively a speech signal, in view of transmitting, or storing, and synthesizing this wideband sound signal. The new method and device which achieve efficient modeling of the harmonic structure of the speech spectrum uses several forms of low pass filters applied to a pitch codevector, the one yielding higher prediction gain (i.e. the lowest pitch prediction error) is selected and the associated pitch codebook parameters are forwarded.

L'invention concerne un procédé amélioré de recherche de hauteur et un dispositif de codage numérique d'un signal à large bande, en particulier mais pas exclusivement un signal vocal, en vue de transmettre ou de stocker, et de synthétiser ce signal sonore à large bande. Le procédé et le dispositif nouveaux, lesquels permettent une modélisation efficace de la structure harmonique du spectre de la parole, utilisent plusieurs formes de filtres passe-bas appliqués à un vecteur de code de hauteur, celui permettant d'obtenir le gain de prédiction le plus haut (c'est-à-dire l'erreur de prédiction de hauteur la plus faible) est sélectionné et les paramètres de code de hauteur associés sont retransmis.

Language of Publication: EN

INPADOC Legal Status Table:

Gazette Date	Code	INPADOC Legal Status Impact
2015-12-31	PGFP	+
Description: POSTGRANT: ANNUAL FEES PAID TO NATIONAL OFFICE DK		
2015-11-30	PGFP	+
Description: POSTGRANT: ANNUAL FEES PAID TO NATIONAL OFFICE LU		
2015-11-02	REG	-
Description: REFERENCE TO A NATIONAL CODE FR PLFP FEE PAYMENT		
2015-04-30	PGFP	+
Description: POSTGRANT: ANNUAL FEES PAID TO NATIONAL OFFICE BE		
2015-03-31	PGFP	+
Description: POSTGRANT: ANNUAL FEES PAID TO NATIONAL OFFICE IT		
2015-02-27	PGFP	+
Description: POSTGRANT: ANNUAL FEES PAID TO NATIONAL OFFICE AT		
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Description: POSTGRANT: ANNUAL FEES PAID TO NATIONAL OFFICE CY		

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Description: POSTGRANT: ANNUAL FEES PAID TO NATIONAL OFFICE PT		
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Description: POSTGRANT: ANNUAL FEES PAID TO NATIONAL OFFICE GB		
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Description: POSTGRANT: ANNUAL FEES PAID TO NATIONAL OFFICE FR		
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Description: POSTGRANT: ANNUAL FEES PAID TO NATIONAL OFFICE GR		
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2015-01-08	REG	-
Description: REFERENCE TO A NATIONAL CODE DE DE 69910239 R039 REVOCATION ACTION FILED 2014-11-06		

2014-12-31	PGFP	+
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2014-11-06	REG	-
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2014-08-28	REG	-
Description: REFERENCE TO A NATIONAL CODE DE DE 69910239 R081 CHANGE OF APPLICANT/PATENTEE SAINT LAWRENCE COMMUNICATIONS GMBH, DE FORMER OWNER: VOICEAGE CORP., VILLE MONT-ROYAL, QUEBEC, CA 2014-07-01		
2014-08-28	REG	-
Description: REFERENCE TO A NATIONAL CODE DE DE 69910239 R082 CHANGE OF REPRESENTATIVE 2014-07-01		
2014-07-21	REG	-
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2011-03-15	REG	-
Description: REFERENCE TO A NATIONAL CODE CH PFA NAME/FIRM CHANGED VOICEAGE CORPORATION VOICEAGE CORPORATION#SUITE 200, 750, CHEMIN LUCERNE#VILLE MONT-ROYAL, QUEBEC H3R 2H6 (CA) -TRANSFERTO- VOICEAGE CORPORATION#SUITE 200, 750, CHEMIN LUCERNE#VILLE MONT-ROYAL, QUEBEC H3R 2H6 (CA)		
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2003-09-11	REF	-
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Description: DESIGNATED CONTRACTING STATES: AT; BE; CH; CY; DE; DK; ES; FI; FR; GB; GR; IE; IT; LI; LU; MC; NL; PT; SE		
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Description: DESIGNATED CONTRACTING STATES: EP 1125276 A1 AT; BE; CH; CY; DE; DK; ES; FI; FR; GB; GR; IE; IT; LI; LU; MC; NL; PT; SE		
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Post-Issuance (US):
Reassignment (US) Table:
Maintenance Status (US):
Litigation (US):
Opposition (EP):
License (EP):
EPO Procedural Status: EX-RQ 2001-04-27 2001 Request for examination
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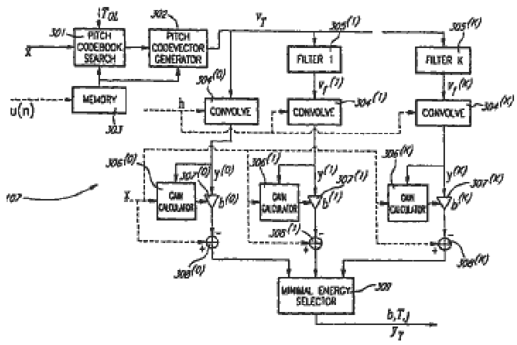

Record 18/70 EP1125284B1 HIGH FREQUENCY CONTENT RECOVERING METHOD AND DEVICE FOR OVER-SAMPLED SYNTHESIZED WIDEBAND SIGNAL | VORRICHTUNG UND VERFAHREN ZUR WIEDERHERSTELLUNG DES HOCHFREQUENZANTEILS EINES ÜBERABGETASTETEN SYNTHETISIERTEN BREITBANDSIGNALS | PROCEDE DE RECUPERATION DU CONTENU A HAUTE FREQUENCE ET DISPOSITIF POUR SIGNAL A LARGE BANDE SYNTHETISE SUR-ECHANTILLONNE

Publication Number: EP1125284B1 20030806
EP1125284A1 20010822

Title: HIGH FREQUENCY CONTENT RECOVERING METHOD AND DEVICE FOR OVER-SAMPLED SYNTHESIZED WIDEBAND SIGNAL | VORRICHTUNG UND VERFAHREN ZUR WIEDERHERSTELLUNG DES HOCHFREQUENZANTEILS EINES ÜBERABGETASTETEN SYNTHETISIERTEN BREITBANDSIGNALS | PROCEDE DE RECUPERATION DU CONTENU A HAUTE FREQUENCE ET DISPOSITIF POUR SIGNAL A LARGE BANDE SYNTHETISE SUR-ECHANTILLONNE
Title - DWPI: High frequency content recovery device for use in audio video teleconferencing, performs summation of spectrally shaped noise sequence in oversampled synthesized signal version to produce full spectrum synthesized wide band signal
Priority Number: CA2252170A | WO1999CA990A
Priority Date: 1998-10-27 | 1999-10-27
Application Number: EP1999952183A
Application Date: 1999-10-27
Publication Date: 2003-08-06
IPC Class Table:

IPC	Section	Class	Subclass	Class Group	Subgroup
G01L001104	G	G01	G01L	G01L0011	G01L001104
G01L002102	G	G01	G01L	G01L0021	G01L002102
G10L001300	G	G10	G10L	G10L0013	G10L001300
G10L001912	G	G10	G10L	G10L0019	G10L001912
H03H001706	H	H03	H03H	H03H0017	H03H001706
H03M000730	H	H03	H03M	H03M0007	H03M000730
H03M000736	H	H03	H03M	H03M0007	H03M000736
H04B000162	H	H04	H04B	H04B0001	H04B000162
H04B000726	H	H04	H04B	H04B0007	H04B000726
H04B001404	H	H04	H04B	H04B0014	H04B001404
H04Q000722	H	H04	H04Q	H04Q0007	H04Q000722
H04Q000732	H	H04	H04Q	H04Q0007	H04Q000732

IPC Class Table - DWPI:

IPC - DWPI	Section - DWPI	Class - DWPI	Subclass - DWPI	Class Group - DWPI	Subgroup - DWPI
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G10L001900	G	G10	G10L	G10L0019	G10L001900
G10L002100	G	G10	G10L	G10L0021	G10L002100
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H03M000736	H	H03	H03M	H03M0007	H03M000736
H04B000162	H	H04	H04B	H04B0001	H04B000162
H04B001404	H	H04	H04B	H04B0014	H04B001404
H04B000726	H	H04	H04B	H04B0007	H04B000726
H04L002700	H	H04	H04L	H04L0027	H04L002700
G10L001104	G	G10	G10L	G10L0011	G10L001104
G10L001902	G	G10	G10L	G10L0019	G10L001902
G10L001904	G	G10	G10L	G10L0019	G10L001904
G10L001906	G	G10	G10L	G10L0019	G10L001906
G10L001912	G	G10	G10L	G10L0019	G10L001912
G10L002102	G	G10	G10L	G10L0021	G10L002102
G10L	G	G10	G10L	G10L	G10L

Assignee/Applicant: Voiceage Corporation,Ville Mont Royal, Quebec H3R 2H6,CA,03014250
Assignee - Current US:
JP F Terms:
JP FI Codes:
Assignee - Original: Voiceage Corporation
Any CPC Table:

Type	Invention	Additional	Version	Office
Current	**G10L 19/26**	-	20130101	EP

ECLA: G10L001926
Abstract:

In a method and device for recovering the high frequency content of a wideband signal previously down-sampled during encoding, and for injecting, during decoding, this high frequency content in an over-sampled synthesized version of the wideband signal to produce a full-spectrum synthesized wideband signal, a white noise generator produces a white noise sequence. Serially interconnected gain adjustment unit, spectral shaper and band-pass filter spectrally shapes the white noise sequence in relation to a set of shaping parameters representative of the down-sampled wideband signal such as a voicing factor, an energy scaling factor, a tilt scaling factor, and linear prediction filter coefficients. A signal injection circuit finally injects the spectrally-shaped white noise sequence in the over-sampled synthesized signal version to thereby produce the full-spectrum synthesized wideband signal.

Dans un procédé et un dispositif pour la récupération du contenu à haute fréquence d'un signal à large bande préalablement sous-échantillonné pendant le codage, et pour l'injection, pendant le décodage, de ce contenu à haute fréquence dans une version synthétisée suréchantillonée du signal à large bande, de manière qu'un signal à large bande synthétisé en spectre continu soit produit, un générateur de bruits blancs produit une séquence de bruits blancs. Une unité d'ajustement de gain un circuit de mise en forme spectrale et un filtre passe-bande, interconnectés en série, mettent en forme la séquence de bruits blancs par rapport à un ensemble de paramètres de mise en forme représentatifs du signal à large bande sous-échantillonné, tel qu'un facteur de verbalisation, un facteur de mise à l'échelle d'énergie, un facteur de mise à l'échelle de basculement et des coefficients de filtre de prédiction linéaire. Un circuit d'injection de signal injecte finalement la séquence de bruits blancs mise en forme spectralement dans la version de signal synthétisé suréchantillonné de sorte que le signal à large bande synthétisé en spectre continu soit produit.

Language of Publication: EN

INPADOC Legal Status Table:

Gazette Date	Code	INPADOC Legal Status Impact
2015-12-31	PGFP	+
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2015-11-30	PGFP	+
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2014-08-07	REG	-
Description: REFERENCE TO A NATIONAL CODE DE DE 69910240 R081 CHANGE OF APPLICANT/PATENTEE SAINT LAWRENCE COMMUNICATIONS GMBH, DE FORMER OWNER: VOICEAGE CORP., VILLE MONT-ROYAL, QUEBEC, CA 2014-07-01		
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Description: REFERENCE TO A NATIONAL CODE CH NV NEW AGENT		
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2003-08-15	REG	-
Description: REFERENCE TO A NATIONAL CODE CH EP ENTRY IN THE NATIONAL PHASE		
2003-08-06	REG	-
Description: REFERENCE TO A NATIONAL CODE GB FG4D EUROPEAN PATENT GRANTED		

2003-08-06	AK	+
Description: DESIGNATED CONTRACTING STATES: AT; BE; CH; CY; DE; DK; ES; FI; FR; GB; GR; IE; IT; LI; LU; MC; NL; PT; SE		
2001-08-22	AK	+
Description: DESIGNATED CONTRACTING STATES: EP 1125284 A1 AT; BE; CH; CY; DE; DK; ES; FI; FR; GB; GR; IE; IT; LI; LU; MC; NL; PT; SE		
2001-08-22	17P	+
Description: REQUEST FOR EXAMINATION FILED 2001-05-01		

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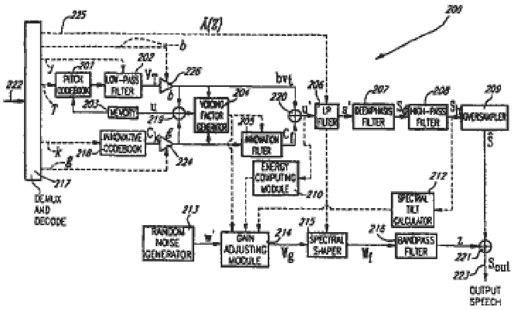
EPO Procedural Status: EX-RQ 2001-05-01 2001 Request for examination
Front Page Drawing:



Record 19/70 AT246389T VERBESSERUNG DER PERIODIZITÄT EINES BREITBANDSIGNALS

Publication Number: AT246389T 20030815

Title: VERBESSERUNG DER PERIODIZITÄT EINES BREITBANDSIGNALS
Title - DWPI:
Priority Number: CA2252170A | WO1999CA1009A
Priority Date: 1998-10-27 | 1999-10-27
Application Number: AT1999952200T
Application Date: 1999-10-27
Publication Date: 2003-08-15
IPC Class Table:

IPC	Section	Class	Subclass	Class Group	Subgroup
G01L001104	G	G01	G01L	G01L0011	G01L001104
G01L002102	G	G01	G01L	G01L0021	G01L002102
G10L001300	G	G10	G10L	G10L0013	G10L001300
G10L001912	G	G10	G10L	G10L0019	G10L001912
H03H001706	H	H03	H03H	H03H0017	H03H001706
H03M000730	H	H03	H03M	H03M0007	H03M000730
H03M000736	H	H03	H03M	H03M0007	H03M000736
H04B000162	H	H04	H04B	H04B0001	H04B000162
H04B000726	H	H04	H04B	H04B0007	H04B000726
H04B001404	H	H04	H04B	H04B0014	H04B001404
H04Q000722	H	H04	H04Q	H04Q0007	H04Q000722
H04Q000732	H	H04	H04Q	H04Q0007	H04Q000732

IPC Class Table - DWPI:
Assignee/Applicant: VOICEAGE CORP
Assignee - Current US:
JP F Terms:
JP FI Codes:
Assignee - Original:
Any CPC Table:

Type	Invention	Additional	Version	Office
Current	**G10L 19/26**	-	20130101	EP

ECLA: G10L001926

Abstract:
Language of Publication: XX
INPADOC Legal Status Table:

Gazette Date	Code	INPADOC Legal Status Impact
2004-03-15	UEP	+
Description: PUBLICATION OF TRANSLATION OF EUROPEAN PATENT SPECIFICATION EP 1125285		

Post-Issuance (US):
Reassignment (US) Table:
Maintenance Status (US):
Litigation (US):
Opposition (EP):
License (EP):
EPO Procedural Status:
Front Page Drawing:

(No drawing/image available)

Record 20/70 AT246834T VERFAHREN UND VORRICHTUNG ZUR ADAPTIVEN BANDBREITENABHÄNGIGEN GRUNDFREQUENZSUCHE FÜR DIE KODIERUNG BREITBANDIGER SIGNALE

Publication Number: AT246834T 20030815

Title: VERFAHREN UND VORRICHTUNG ZUR ADAPTIVEN BANDBREITENABHÄNGIGEN GRUNDFREQUENZSUCHE FÜR DIE KODIERUNG BREITBANDIGER SIGNALE
Title - DWPI:
Priority Number: CA2252170A | WO1999CA1008A
Priority Date: 1998-10-27 | 1999-10-27
Application Number: AT1999952199T
Application Date: 1999-10-27
Publication Date: 2003-08-15
IPC Class Table:

IPC	Section	Class	Subclass	Class Group	Subgroup
G01L001104	G	G01	G01L	G01L0011	G01L001104
G01L002102	G	G01	G01L	G01L0021	G01L002102
G10L001300	G	G10	G10L	G10L0013	G10L001300
G10L001912	G	G10	G10L	G10L0019	G10L001912
H03H001706	H	H03	H03H	H03H0017	H03H001706
H03M000730	H	H03	H03M	H03M0007	H03M000730
H03M000736	H	H03	H03M	H03M0007	H03M000736
H04B000162	H	H04	H04B	H04B0001	H04B000162
H04B000726	H	H04	H04B	H04B0007	H04B000726
H04B001404	H	H04	H04B	H04B0014	H04B001404
H04Q000722	H	H04	H04Q	H04Q0007	H04Q000722
H04Q000732	H	H04	H04Q	H04Q0007	H04Q000732

IPC Class Table - DWPI:
Assignee/Applicant: VOICEAGE CORP
Assignee - Current US:
JP F Terms:
JP FI Codes:
Assignee - Original:
Any CPC Table:

Type	Invention	Additional	Version	Office

Current	**G10L 19/26**	-	20130101	EP

ECLA: G10L001926
Abstract:
Language of Publication: XX
INPADOC Legal Status Table:

Gazette Date	Code	INPADOC Legal Status Impact
2004-04-15	UEP	+
Description: PUBLICATION OF TRANSLATION OF EUROPEAN PATENT SPECIFICATION EP 1125276		

Post-Issuance (US):
Reassignment (US) Table:
Maintenance Status (US):
Litigation (US):
Opposition (EP):
License (EP):
EPO Procedural Status:
Front Page Drawing:

(No drawing/image available)

Record 21/70 AT246836T VORRICHTUNG UND VERFAHREN ZUR WIEDERHERSTELLUNG DES HOCHFREQUENZANTEILS EINES ÜBERABGETASTETEN SYNTHETISIERTEN BREITBANDSIGNALS

Publication Number: AT246836T 20030815

Title: VORRICHTUNG UND VERFAHREN ZUR WIEDERHERSTELLUNG DES HOCHFREQUENZANTEILS EINES ÜBERABGETASTETEN SYNTHETISIERTEN BREITBANDSIGNALS
Title - DWPI:
Priority Number: CA2252170A | WO1999CA990A
Priority Date: 1998-10-27 | 1999-10-27
Application Number: AT1999952183T
Application Date: 1999-10-27
Publication Date: 2003-08-15
IPC Class Table:

IPC	Section	Class	Subclass	Class Group	Subgroup
G01L001104	G	G01	G01L	G01L0011	G01L001104
G01L002102	G	G01	G01L	G01L0021	G01L002102
G10L001300	G	G10	G10L	G10L0013	G10L001300
G10L001912	G	G10	G10L	G10L0019	G10L001912
H03H001706	H	H03	H03H	H03H0017	H03H001706
H03M000730	H	H03	H03M	H03M0007	H03M000730
H03M000736	H	H03	H03M	H03M0007	H03M000736
H04B000162	H	H04	H04B	H04B0001	H04B000162
H04B000726	H	H04	H04B	H04B0007	H04B000726
H04B001404	H	H04	H04B	H04B0014	H04B001404
H04Q000722	H	H04	H04Q	H04Q0007	H04Q000722
H04Q000732	H	H04	H04Q	H04Q0007	H04Q000732

IPC Class Table - DWPI:
Assignee/Applicant: VOICEAGE CORP
Assignee - Current US:
JP F Terms:
JP FI Codes:
Assignee - Original:
Any CPC Table:

Type	Invention	Additional	Version	Office

Current	**G10L 19/26**	-	20130101	EP

ECLA: G10L001926

Abstract:

Language of Publication: XX

INPADOC Legal Status Table:

Gazette Date	Code	INPADOC Legal Status Impact
2004-08-15	UEP	+
Description: PUBLICATION OF TRANSLATION OF EUROPEAN PATENT SPECIFICATION EP 1125284		

Post-Issuance (US):

Reassignment (US) Table:

Maintenance Status (US):

Litigation (US):

Opposition (EP):

License (EP):

EPO Procedural Status:

Front Page Drawing:

(No drawing/image available)

Record 22/70 CN1127055C Perceptual weighting device and method for efficient coding of wideband sound signals and cellular communication system | Processing for the effective encoding sense weighting device and method for manufacturing the same, and cellular communication system is the device for broadband audio signal

Publication Number: CN1127055C 20031105
CN1328682A 20011226

Title: Perceptual weighting device and method for efficient coding of wideband sound signals and cellular communication system | Processing for the effective encoding sense weighting device and method for manufacturing the same, and cellular communication system is the device for broadband audio signal
Title - DWPI: Periodicity enhancing device of excitation signal, reduces energy of low frequency portion of innovative code vector in relation to periodicity factor related to wideband signal
Priority Number: CA2252170A
Priority Date: 1998-10-27
Application Number: CN1999813602A
Application Date: 1999-10-27
Publication Date: 2003-11-05
IPC Class Table:

IPC	Section	Class	Subclass	Class Group	Subgroup
G01L001104	G	G01	G01L	G01L0011	G01L001104
G01L002102	G	G01	G01L	G01L0021	G01L002102
G10L001300	G	G10	G10L	G10L0013	G10L001300
G10L001912	G	G10	G10L	G10L0019	G10L001912
H03H001706	H	H03	H03H	H03H0017	H03H001706
H03M000730	H	H03	H03M	H03M0007	H03M000730
H03M000736	H	H03	H03M	H03M0007	H03M000736
H04B000162	H	H04	H04B	H04B0001	H04B000162
H04B000726	H	H04	H04B	H04B0007	H04B000726
H04B001404	H	H04	H04B	H04B0014	H04B001404
H04Q000722	H	H04	H04Q	H04Q0007	H04Q000722
H04Q000732	H	H04	H04Q	H04Q0007	H04Q000732

IPC Class Table - DWPI:

IPC - DWPI	Section - DWPI	Class - DWPI	Subclass - DWPI	Class Group - DWPI	Subgroup - DWPI

G01L001104	G	G01	G01L	G01L0011	G01L001104
G01L002102	G	G01	G01L	G01L0021	G01L002102
G10L001300	G	G10	G10L	G10L0013	G10L001300
G10L001912	G	G10	G10L	G10L0019	G10L001912
H03H001706	H	H03	H03H	H03H0017	H03H001706
H03M000730	H	H03	H03M	H03M0007	H03M000730
H03M000736	H	H03	H03M	H03M0007	H03M000736
H04B000162	H	H04	H04B	H04B0001	H04B000162
H04B001404	H	H04	H04B	H04B0014	H04B001404
H04B000726	H	H04	H04B	H04B0007	H04B000726
H04J000316	H	H04	H04J	H04J0003	H04J000316
H04J000324	H	H04	H04J	H04J0003	H04J000324
H04Q000722	H	H04	H04Q	H04Q0007	H04Q000722
H04Q000732	H	H04	H04Q	H04Q0007	H04Q000732
H04W007204	H	H04	H04W	H04W0072	H04W007204
H04W007212	H	H04	H04W	H04W0072	H04W007212
H04W007408	H	H04	H04W	H04W0074	H04W007408
G10L002102	G	G10	G10L	G10L0021	G10L002102
G10L001914	G	G10	G10L	G10L0019	G10L001914

Assignee/Applicant: VOICEAGE CORP,CA
Assignee - Current US:
JP F Terms:
JP FI Codes:
Assignee - Original: VOICEAGE CORP
Any CPC Table:

Type	Invention	Additional	Version	Office
Current	**G10L 19/26**	-	20130101	EP

ECLA: G10L001926
Abstract:

A perceptual weighting device for producing a perceptually weighted signal in response to a wideband signal comprises a signal preemphasis filter, a synthesis filter claculator, and a

perceptual weighting filter. The signal preemphasis filter enhances high frequency content of the wideband signal to thereby produce a preemphasised signal. The signal preemphasis filter has a transfer function of the form: P(z)=1-z-1 wherein is a preemphasis factor having a value located between 0 and 1. The synthesis filter calculator is responsive to the preemphasised signal for producing synthesis filter coefficients. Finally, the perceptual weighting filter processes the preemphasised signal in relation to the synthesis filter coefficients to produce the perceptually weighted signal. The perceptual weighting filter has a transfer function, with fixed denominator, of the form: W(z) A (z/$_1$) / (1-$_2$z-1) where 0<$_2$<$_1$ 1 and $_2$ and $_1$ are weighting control values, whereby weighting of the wideband signal in a format region is substantially decoupled from a spectral tilt of this wideband signal.

A perceptual weighting device for producing a perceptually weighted signal in response to a wideband signal comprises a signal preemphasis filter, a synthesis filter claculator, and a perceptual weighting filter. The signal preemphasis filter enhances high frequency content of the wideband signal to thereby produce a preemphasised signal. The signal preemphasis filter has a transfer function of the form: P(z)=1 - mu z<-1> wherein mu is a preemphasis factor having a value located between 0 and 1. The synthesis filter calculator is responsive to the preemphasised signal for producing synthesis filter coefficients. Finally, the perceptual weighting filter processes the preemphasised signal in relation to the synthesis filter coefficients to produce the perceptually weighted signal. The perceptual weighting filter has a transfer function, with fixed denominator, of the form: W(z) A (z/ gamma 1) / (1- gamma 2z<-1>) where 0< gamma 2< gamma 1 </=1 and gamma 2 and gamma 1 are weighting control values, whereby weighting of the wideband signal in a format region is substantially decoupled from a spectral tilt of this wideband signal.

Used for in response to a wideband signal to generate a sense weighting of signal of sense weighting device, comprising a signal preemphasis filter, a synthesis filter calculator, and a sense weighting filter. This signal preemphasis filter enhanced high frequency component of the wideband signal, so as to generate a weighting signal. This signal emphasis in the form of a transfer function of the filter is P (z) =1- z

Un dispositif de pondération perceptive destiné à produire un signal pondéré perceptivement en réponse à un signal à large bande comprend un filtre de préaccentuation de signal, un calculateur de filtre de synthèse, et un filtre de pondération perceptive. Le filtre de préaccentuation du signal augmente le contenu de haute fréquence du signal à large bande pour produire ainsi un signal préaccentué. Ce filtre de préaccentuation du signal présente une fonction de transfert ayant la forme: P(z) = 1-z-1, dans laquelle est un facteur de préaccentuation ayant une valeur située entre 0 et 1. Le calculateur du filtre de synthèse répond au signal préaccentué afin de produire des coefficients du filtre de synthèse. Enfin, le filtre de pondération perceptive traite le signal préaccentué par rapport aux coefficients du filtre de synthèse pour produire le signal à pondération perceptive. Le filtre à pondération perceptive a une fonction de transfert, avec un dénominateur fixe, ayant la forme: W(z) = A(z)/$_1$) / (1 $_2$z-1) dans laquelle 0 < $_2$< $_1$ 1 et $_2$ ainsi que $_1$ sont des valeurs de régulation de pondération, de manière que la pondération du signal à large bande dans une région de formant est sensiblement découplée d'une inclinaison spectrale de ce signal à large bande.

Un dispositif de pondération perceptive destiné à produire un signal pondéré perceptivement en réponse à un signal à large bande comprend un filtre de préaccentuation de signal, un calculateur de filtre de synthèse, et un filtre de pondération perceptive. Le filtre de préaccentuation du signal augmente le contenu de haute fréquence du signal à large bande pour produire ainsi un signal préaccentué. Ce filtre de préaccentuation du signal présente une fonction de transfert ayant la forme: P(z) = 1- mu z<-1>, dans laquelle mu est un facteur de préaccentuation ayant une valeur située entre 0 et 1. Le calculateur du filtre de synthèse répond au signal préaccentué afin de produire des coefficients du filtre de synthèse. Enfin, le filtre de pondération perceptive traite le signal préaccentué par rapport aux coefficients du filtre de synthèse pour produire le signal à pondération perceptive. Le filtre à pondération perceptive a une fonction de transfert, avec un dénominateur fixe, ayant la forme: W(z) = A(z)/ gamma 1) / (1 gamma 2z<-1>) dans laquelle 0 < gamma 2 < gamma 1 </= 1 et gamma 2 ainsi que gamma 1 sont des valeurs de régulation de pondération, de manière que la pondération du signal à large bande dans une région de formant est sensiblement découplée d'une inclinaison spectrale de ce signal à large bande.

Language of Publication: ZH

INPADOC Legal Status Table:

Gazette Date	Code	INPADOC Legal Status Impact
2003-11-05	C14	+
Description: GRANTED		
2001-12-26	C10	-
Description: REQUEST OF EXAMINATION AS TO SUBSTANCE		
2001-12-26	C06	+
Description: PUBLICATION		

Post-Issuance (US):

Reassignment (US) Table:

Maintenance Status (US):

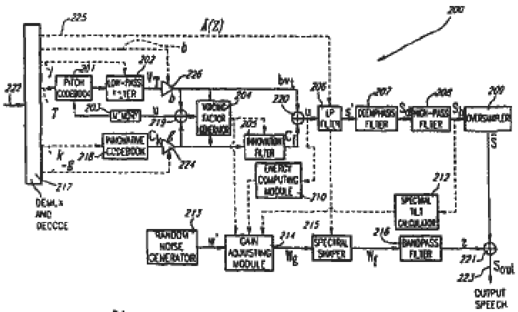
Litigation (US):

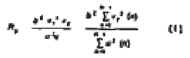
Opposition (EP):

License (EP):

EPO Procedural Status:

Front Page Drawing:





Record 23/70 DK1125285T3 Forbedring af periodiciteten ved dekodning af bredbåndssignaler

Publication Number: DK1125285T3 20031110

Title: Forbedring af periodiciteten ved dekodning af bredbåndssignaler
Title - DWPI:
Priority Number: CA2252170A | WO1999CA1009A
Priority Date: 1998-10-27 | 1999-10-27
Application Number: DK1999952200T
Application Date: 1999-10-27
Publication Date: 2003-11-10
IPC Class Table:

IPC	Section	Class	Subclass	Class Group	Subgroup
G01L001104	G	G01	G01L	G01L0011	G01L001104
G01L002102	G	G01	G01L	G01L0021	G01L002102
G10L001300	G	G10	G10L	G10L0013	G10L001300
G10L001912	G	G10	G10L	G10L0019	G10L001912
H03H001706	H	H03	H03H	H03H0017	H03H001706
H03M000730	H	H03	H03M	H03M0007	H03M000730
H03M000736	H	H03	H03M	H03M0007	H03M000736
H04B000162	H	H04	H04B	H04B0001	H04B000162
H04B000726	H	H04	H04B	H04B0007	H04B000726
H04B001404	H	H04	H04B	H04B0014	H04B001404
H04Q000722	H	H04	H04Q	H04Q0007	H04Q000722
H04Q000732	H	H04	H04Q	H04Q0007	H04Q000732

IPC Class Table - DWPI:
Assignee/Applicant: VOICEAGE CORP
Assignee - Current US:
JP F Terms:
JP FI Codes:
Assignee - Original:
Any CPC Table:

Type	Invention	Additional	Version	Office
Current	**G10L 19/26**	-	20130101	EP

ECLA: G10L001926

Abstract:
Language of Publication: DA
INPADOC Legal Status Table:
Post-Issuance (US):
Reassignment (US) Table:
Maintenance Status (US):
Litigation (US):
Opposition (EP):
License (EP):
EPO Procedural Status:
Front Page Drawing:

(No drawing/image available)

Record 24/70 DK1125276T3 Fremgangsmåde og indretning til adaptiv båndbreddeafhængig tonhøjdesøgning ved kodning af bredbåndssignaler

Publication Number: DK1125276T3 20031117

Title: Fremgangsmåde og indretning til adaptiv båndbreddeafhængig tonhøjdesøgning ved kodning af bredbåndssignaler
Title - DWPI:
Priority Number: CA2252170A | WO1999CA1008A
Priority Date: 1998-10-27 | 1999-10-27
Application Number: DK1999952199T
Application Date: 1999-10-27
Publication Date: 2003-11-17
IPC Class Table:

IPC	Section	Class	Subclass	Class Group	Subgroup
G01L001104	G	G01	G01L	G01L0011	G01L001104
G01L002102	G	G01	G01L	G01L0021	G01L002102
G10L001300	G	G10	G10L	G10L0013	G10L001300
G10L001912	G	G10	G10L	G10L0019	G10L001912
H03H001706	H	H03	H03H	H03H0017	H03H001706
H03M000730	H	H03	H03M	H03M0007	H03M000730
H03M000736	H	H03	H03M	H03M0007	H03M000736
H04B000162	H	H04	H04B	H04B0001	H04B000162
H04B000726	H	H04	H04B	H04B0007	H04B000726
H04B001404	H	H04	H04B	H04B0014	H04B001404
H04Q000722	H	H04	H04Q	H04Q0007	H04Q000722
H04Q000732	H	H04	H04Q	H04Q0007	H04Q000732

IPC Class Table - DWPI:
Assignee/Applicant: VOICEAGE CORP
Assignee - Current US:
JP F Terms:
JP FI Codes:
Assignee - Original:
Any CPC Table:

Type	Invention	Additional	Version	Office
Current	**G10L 19/26**	-	20130101	EP

ECLA: G10L001926
Abstract:
Language of Publication: DA
INPADOC Legal Status Table:
Post-Issuance (US):
Reassignment (US) Table:
Maintenance Status (US):
Litigation (US):
Opposition (EP):
License (EP):
EPO Procedural Status:
Front Page Drawing:

(No drawing/image available)

Record 25/70 RU2217718C2 METHOD AND DEVICE FOR ADAPTIVE BROADBAND SEARCH FOR FUNDAMENTAL TONE WHILE ENCODING BROADBAND SIGNALS

Publication Number: RU2217718C2 20031127

Title: METHOD AND DEVICE FOR ADAPTIVE BROADBAND SEARCH FOR FUNDAMENTAL TONE WHILE ENCODING BROADBAND SIGNALS
Title - DWPI: Pitch analysis device for digitally encoding wideband signal, chooses signal path having lowest calculated pitch prediction error
Priority Number: CA2252170A
Priority Date: 1998-10-27
Application Number: RU2001114193A
Application Date: 1999-10-27
Publication Date: 2003-11-27
IPC Class Table:

IPC	Section	Class	Subclass	Class Group	Subgroup
G01L001104	G	G01	G01L	G01L0011	G01L001104
G01L002102	G	G01	G01L	G01L0021	G01L002102
G10L001300	G	G10	G10L	G10L0013	G10L001300
G10L001912	G	G10	G10L	G10L0019	G10L001912
H03H001706	H	H03	H03H	H03H0017	H03H001706
H03M000730	H	H03	H03M	H03M0007	H03M000730
H03M000736	H	H03	H03M	H03M0007	H03M000736
H04B000162	H	H04	H04B	H04B0001	H04B000162
H04B000726	H	H04	H04B	H04B0007	H04B000726
H04B001404	H	H04	H04B	H04B0014	H04B001404
H04Q000722	H	H04	H04Q	H04Q0007	H04Q000722
H04Q000732	H	H04	H04Q	H04Q0007	H04Q000732

IPC Class Table - DWPI:

IPC - DWPI	Section - DWPI	Class - DWPI	Subclass - DWPI	Class Group - DWPI	Subgroup - DWPI
G01L001104	G	G01	G01L	G01L0011	G01L001104
G01L002102	G	G01	G01L	G01L0021	G01L002102
G10L001104	G	G10	G10L	G10L0011	G10L001104

G10L001300	G	G10	G10L	G10L0013	G10L001300
G10L001900	G	G10	G10L	G10L0019	G10L001900
G10L001904	G	G10	G10L	G10L0019	G10L001904
G10L001906	G	G10	G10L	G10L0019	G10L001906
G10L001912	G	G10	G10L	G10L0019	G10L001912
G10L001914	G	G10	G10L	G10L0019	G10L001914
G10L002102	G	G10	G10L	G10L0021	G10L002102
H03H001706	H	H03	H03H	H03H0017	H03H001706
H03M000730	H	H03	H03M	H03M0007	H03M000730
H03M000736	H	H03	H03M	H03M0007	H03M000736
H04B000162	H	H04	H04B	H04B0001	H04B000162
H04B001404	H	H04	H04B	H04B0014	H04B001404
H04B000726	H	H04	H04B	H04B0007	H04B000726
H04Q000722	H	H04	H04Q	H04Q0007	H04Q000722
H04Q000732	H	H04	H04Q	H04Q0007	H04Q000732
A61K0031585	A	A61	A61K	A61K0031	A61K0031585

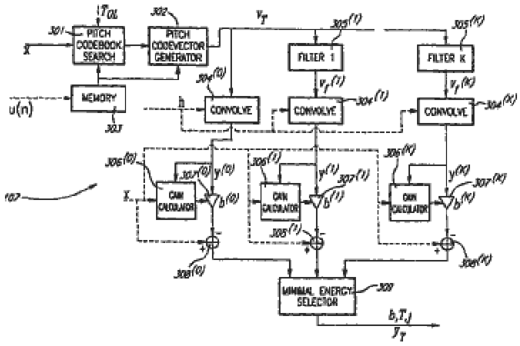
Assignee/Applicant:
Assignee - Current US:
JP F Terms:
JP FI Codes:
Assignee - Original:
Any CPC Table:

Type	Invention	Additional	Version	Office
Current	**G10L 19/26**	-	20130101	EP

ECLA: G10L001926
Abstract:

FIELD: radio engineering, digital encoding of broadband signal. SUBSTANCE: method and device which ensure efficient modeling of harmonic structure of speech spectrum use several types of low-pass filters as applied to code vector of fundamental tone. Tone giving highest amplifying factor of prediction, that is, least error of prediction of fundamental tone, is chosen and corresponding parameters of code dictionary of fundamental tone are selected. EFFECT: enhanced quality of reconstructed signal. 63 cl, 4 dwg
Language of Publication: RU

INPADOC Legal Status Table:
Post-Issuance (US):
Reassignment (US) Table:
Maintenance Status (US):
Litigation (US):
Opposition (EP):
License (EP):
EPO Procedural Status:
Front Page Drawing:



Record 26/70 DK1125284T3 Fremgangsmåde til gendannelse af højfrekvent indhold og indretning til oversamplet syntetiseret bredbåndssignal

Publication Number: DK1125284T3 20031201

Title: Fremgangsmåde til gendannelse af højfrekvent indhold og indretning til oversamplet syntetiseret bredbåndssignal
Title - DWPI:
Priority Number: CA2252170A | WO1999CA990A
Priority Date: 1998-10-27 | 1999-10-27
Application Number: DK1999952183T
Application Date: 1999-10-27
Publication Date: 2003-12-01
IPC Class Table:

IPC	Section	Class	Subclass	Class Group	Subgroup
G01L001104	G	G01	G01L	G01L0011	G01L001104
G01L002102	G	G01	G01L	G01L0021	G01L002102
G10L001300	G	G10	G10L	G10L0013	G10L001300
G10L001912	G	G10	G10L	G10L0019	G10L001912
H03H001706	H	H03	H03H	H03H0017	H03H001706
H03M000730	H	H03	H03M	H03M0007	H03M000730
H03M000736	H	H03	H03M	H03M0007	H03M000736
H04B000162	H	H04	H04B	H04B0001	H04B000162
H04B000726	H	H04	H04B	H04B0007	H04B000726
H04B001404	H	H04	H04B	H04B0014	H04B001404
H04Q000722	H	H04	H04Q	H04Q0007	H04Q000722
H04Q000732	H	H04	H04Q	H04Q0007	H04Q000732

IPC Class Table - DWPI:
Assignee/Applicant: VOICEAGE CORP
Assignee - Current US:
JP F Terms:
JP FI Codes:
Assignee - Original:
Any CPC Table:

Type	Invention	Additional	Version	Office
Current	**G10L 19/26**	-	20130101	EP

ECLA: G10L001926
Abstract:
Language of Publication: DA
INPADOC Legal Status Table:
Post-Issuance (US):
Reassignment (US) Table:
Maintenance Status (US):
Litigation (US):
Opposition (EP):
License (EP):
EPO Procedural Status:
Front Page Drawing:

(No drawing/image available)

Record 27/70 EP1125286B1 PERCEPTUAL WEIGHTING DEVICE AND METHOD FOR EFFICIENT CODING OF WIDEBAND SIGNALS | VORRICHTUNG ZUR RAUSCHMASKIERUNG UND VERFAHREN ZUR EFFIZIENTEN KODIERUNG VON BREITBANDSIGNALEN | DISPOSITIF ET PROCEDE DE PONDERATION PERCEPTIVE POUR LE CODAGE EFFICACE DE SIGNAUX A LARGE BANDE

Publication Number: EP1125286B1 20031217
EP1125286A1 20010822

Title: PERCEPTUAL WEIGHTING DEVICE AND METHOD FOR EFFICIENT CODING OF WIDEBAND SIGNALS | VORRICHTUNG ZUR RAUSCHMASKIERUNG UND VERFAHREN ZUR EFFIZIENTEN KODIERUNG VON BREITBANDSIGNALEN | DISPOSITIF ET PROCEDE DE PONDERATION PERCEPTIVE POUR LE CODAGE EFFICACE DE SIGNAUX A LARGE BANDE
Title - DWPI: Perceptual weighting device in digital wideband speech-audio encoder, filters preemphasized signal in relation to synthesis filter coefficient, to produce perceptually weighted signal
Priority Number: CA2252170A | WO1999CA1010A
Priority Date: 1998-10-27 | 1999-10-27
Application Number: EP1999952201A
Application Date: 1999-10-27
Publication Date: 2003-12-17
IPC Class Table:

IPC	Section	Class	Subclass	Class Group	Subgroup
G01L001104	G	G01	G01L	G01L0011	G01L001104
G01L002102	G	G01	G01L	G01L0021	G01L002102
G10L001300	G	G10	G10L	G10L0013	G10L001300
G10L001912	G	G10	G10L	G10L0019	G10L001912
H03H001706	H	H03	H03H	H03H0017	H03H001706
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H04B000162	H	H04	H04B	H04B0001	H04B000162
H04B000726	H	H04	H04B	H04B0007	H04B000726
H04B001404	H	H04	H04B	H04B0014	H04B001404
H04Q000722	H	H04	H04Q	H04Q0007	H04Q000722
H04Q000732	H	H04	H04Q	H04Q0007	H04Q000732

IPC Class Table - DWPI:

IPC - DWPI	Section - DWPI	Class - DWPI	Subclass - DWPI	Class Group -	Subgroup - DWPI

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G01L001104	G	G01	G01L	G01L0011	G01L001104
G01L002102	G	G01	G01L	G01L0021	G01L002102
G10L001104	G	G10	G10L	G10L0011	G10L001104
G10L001300	G	G10	G10L	G10L0013	G10L001300
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G10L001904	G	G10	G10L	G10L0019	G10L001904
G10L001906	G	G10	G10L	G10L0019	G10L001906
G10L001912	G	G10	G10L	G10L0019	G10L001912
G10L001914	G	G10	G10L	G10L0019	G10L001914
G10L002102	G	G10	G10L	G10L0021	G10L002102
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H04Q000722	H	H04	H04Q	H04Q0007	H04Q000722
H04Q000732	H	H04	H04Q	H04Q0007	H04Q000732

Assignee/Applicant: Voiceage Corporation,Ville Mont Royal, Quebec H3R 2H6,CA,03014251
Assignee - Current US:
JP F Terms:
JP FI Codes:
Assignee - Original: Voiceage Corporation
Any CPC Table:

Type	Invention	Additional	Version	Office
Current	**G10L 19/26**	-	20130101	EP

ECLA: G10L001926
Abstract:

A perceptual weighting device for producing a perceptually weighted signal in response to a wideband signal comprises a signal preemphasis filter, a synthesis filter claculator, and a

perceptual weighting filter. The signal preemphasis filter enhances high frequency content of the wideband signal to thereby produce a preemphasised signal. The signal preemphasis filter has a transfer function of the form: P(z)=1-z-1 wherein is a preemphasis factor having a value located between 0 and 1. The synthesis filter calculator is responsive to the preemphasised signal for producing synthesis filter coefficients. Finally, the perceptual weighting filter processes the preemphasised signal in relation to the synthesis filter coefficients to produce the perceptually weighted signal. The perceptual weighting filter has a transfer function, with fixed denominator, of the form: W(z) A (z/$_1$) / (1-$_2$z-1) where 0<$_2$<$_1$ 1 and $_2$ and $_1$ are weighting control values, whereby weighting of the wideband signal in a format region is substantially decoupled from a spectral tilt of this wideband signal.

A perceptual weighting device for producing a perceptually weighted signal in response to a wideband signal comprises a signal preemphasis filter, a synthesis filter claculator, and a perceptual weighting filter. The signal preemphasis filter enhances high frequency content of the wideband signal to thereby produce a preemphasised signal. The signal preemphasis filter has a transfer function of the form: P(z)=1 - mu z<-1> wherein mu is a preemphasis factor having a value located between 0 and 1. The synthesis filter calculator is responsive to the preemphasised signal for producing synthesis filter coefficients. Finally, the perceptual weighting filter processes the preemphasised signal in relation to the synthesis filter coefficients to produce the perceptually weighted signal. The perceptual weighting filter has a transfer function, with fixed denominator, of the form: W(z) A (z/ gamma 1) / (1- gamma 2z<-1>) where 0< gamma 2< gamma 1 </=1 and gamma 2 and gamma 1 are weighting control values, whereby weighting of the wideband signal in a format region is substantially decoupled from a spectral tilt of this wideband signal.

Un dispositif de pondération perceptive destiné à produire un signal pondéré perceptivement en réponse à un signal à large bande comprend un filtre de préaccentuation de signal, un calculateur de filtre de synthèse, et un filtre de pondération perceptive. Le filtre de préaccentuation du signal augmente le contenu de haute fréquence du signal à large bande pour produire ainsi un signal préaccentué. Ce filtre de préaccentuation du signal présente une fonction de transfert ayant la forme: P(z) = 1-z-1, dans laquelle est un facteur de préaccentuation ayant une valeur située entre 0 et 1. Le calculateur du filtre de synthèse répond au signal préaccentué afin de produire des coefficients du filtre de synthèse. Enfin, le filtre de pondération perceptive traite le signal préaccentué par rapport aux coefficients du filtre de synthèse pour produire le signal à pondération perceptive. Le filtre à pondération perceptive a une fonction de transfert, avec un dénominateur fixe, ayant la forme: W(z) = A(z)/$_1$) / (1 $_2$z-1) dans laquelle 0 < $_2$< $_1$ 1 et $_2$ ainsi que $_1$ sont des valeurs de régulation de pondération, de manière que la pondération du signal à large bande dans une région de formant est sensiblement découplée d'une inclinaison spectrale de ce signal à large bande.

Un dispositif de pondération perceptive destiné à produire un signal pondéré perceptivement en réponse à un signal à large bande comprend un filtre de préaccentuation de signal, un calculateur de filtre de synthèse, et un filtre de pondération perceptive. Le filtre de préaccentuation du signal augmente le contenu de haute fréquence du signal à large bande pour produire ainsi un signal préaccentué. Ce filtre de préaccentuation du signal présente une fonction de transfert ayant la forme: P(z) = 1- mu z<-1>, dans laquelle mu est un facteur de préaccentuation ayant une valeur située entre 0 et 1. Le calculateur du filtre de synthèse répond au signal préaccentué afin de produire des coefficients du filtre de synthèse. Enfin, le filtre de pondération perceptive traite le signal préaccentué par rapport aux coefficients du filtre de synthèse pour produire le signal à pondération perceptive. Le filtre à pondération perceptive a une fonction de transfert, avec un dénominateur fixe, ayant la forme: W(z) = A(z)/ gamma 1) / (1 gamma 2z<-1>) dans laquelle 0 < gamma 2 < gamma 1 </= 1 et gamma 2 ainsi que gamma 1 sont des valeurs de régulation de pondération, de manière que la pondération du signal à large bande dans une région de formant est sensiblement découplée d'une inclinaison spectrale de ce signal à large bande.

Language of Publication: EN

INPADOC Legal Status Table:

Gazette Date	Code	INPADOC Legal Status Impact
2015-12-31	PGFP	+
Description: POSTGRANT: ANNUAL FEES PAID TO NATIONAL OFFICE DK		
2015-11-30	PGFP	+
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2015-11-02	REG	-
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2015-04-30	PGFP	+
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2015-03-31	PGFP	+
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2015-02-05	REG	-
Description: REFERENCE TO A NATIONAL CODE DE DE 69913724 R039 REVOCATION ACTION FILED 2014-12-		

08		
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Description: REFERENCE TO A NATIONAL CODE DE DE 69913724 R008 CASE PENDING AT FEDERAL PATENTS COURT (FPC)		
2014-12-08	REG	-

Description: REFERENCE TO A NATIONAL CODE DE DE 69913724 R039 REVOCATION ACTION FILED		
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2014-10-31	PGFP	+
Description: POSTGRANT: ANNUAL FEES PAID TO NATIONAL OFFICE MC		
2014-08-07	REG	-
Description: REFERENCE TO A NATIONAL CODE DE DE 69913724 R081 CHANGE OF APPLICANT/PATENTEE SAINT LAWRENCE COMMUNICATIONS GMBH, DE FORMER OWNER: VOICEAGE CORP., VILLE MONT-ROYAL, QUEBEC, CA 2014-07-01		
2014-08-07	REG	-
Description: REFERENCE TO A NATIONAL CODE DE DE 69913724 R082 CHANGE OF REPRESENTATIVE 2014-07-01		
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2011-03-15	REG	-
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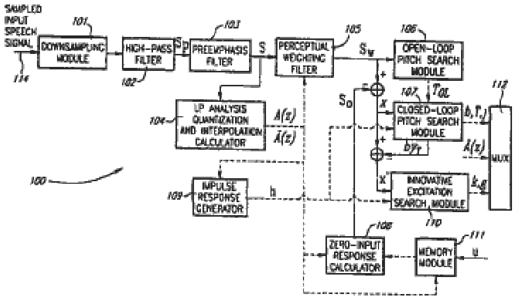
Description: POSTGRANT: ANNUAL FEES PAID TO NATIONAL OFFICE GB		
2008-04-30	PGFP	+
Description: POSTGRANT: ANNUAL FEES PAID TO NATIONAL OFFICE BE		
2008-03-31	PGFP	+
Description: POSTGRANT: ANNUAL FEES PAID TO NATIONAL OFFICE BE		
2008-03-31	PGFP	+
Description: POSTGRANT: ANNUAL FEES PAID TO NATIONAL OFFICE SE		
2004-12-08	26N	+
Description: NO OPPOSITION FILED 2004-09-20		
2004-09-10	ET	+
Description: FR: TRANSLATION FILED		
2004-07-16	REG	-
Description: REFERENCE TO A NATIONAL CODE ES FG2A DEFINITIVE PROTECTION		
2004-05-31	REG	-

Description: REFERENCE TO A NATIONAL CODE PT SC4A TRANSLATION IS AVAILABLE AVAILABILITY OF NATIONAL TRANSLATION 2004-03-16		
2004-04-19	REG	-
Description: REFERENCE TO A NATIONAL CODE DK T3 TRANSLATION OF EP PATENT		
2004-04-06	REG	-
Description: REFERENCE TO A NATIONAL CODE SE TRGR TRANSLATION OF GRANTED EP PATENT		
2004-03-15	REG	-
Description: REFERENCE TO A NATIONAL CODE CH NV NEW AGENT		
2004-01-29	REF	-
Description: CORRESPONDS TO: DE 69913724 P		
2004-01-28	REG	-
Description: REFERENCE TO A NATIONAL CODE IE FG4D EUROPEAN PATENTS GRANTED DESIGNATING IRELAND		
2003-12-31	REG	-
Description: REFERENCE TO A NATIONAL CODE CH EP ENTRY IN THE NATIONAL PHASE		
2003-12-17	REG	-
Description: REFERENCE TO A NATIONAL CODE GB FG4D EUROPEAN PATENT GRANTED		
2003-12-17	AK	+
Description: DESIGNATED CONTRACTING STATES: EP 1125286 B1 AT; BE; CH; CY; DE; DK; ES; FI; FR; GB; GR; IE; IT; LI; LU; MC; NL; PT; SE		
2002-04-03	RAP1	-
Description: TRANSFER OF RIGHTS OF AN EP APPLICATION VOICEAGE CORPORATION		
2001-08-22	AK	+
Description: DESIGNATED CONTRACTING STATES: EP 1125286 A1 AT; BE; CH; CY; DE; DK; ES; FI; FR; GB; GR; IE; IT; LI; LU; MC; NL; PT; SE		
2001-08-22	17P	+
Description: REQUEST FOR EXAMINATION FILED 2001-04-27		

Post-Issuance (US):
Reassignment (US) Table:
Maintenance Status (US):
Litigation (US):
Opposition (EP):
License (EP):
EPO Procedural Status: EX-RQ 2001-04-27 2001 Request for examination
Front Page Drawing:



Record 28/70 RU2219507C2 PERCEPTIVE WEIGHING METHOD AND DEVICE FOR EFFECTIVE CODING OF BROADBAND SIGNALS

Publication Number: RU2219507C2 20031220

Title: PERCEPTIVE WEIGHING METHOD AND DEVICE FOR EFFECTIVE CODING OF BROADBAND SIGNALS
Title - DWPI: Perceptual weighting device in digital wideband speech-audio encoder, filters preemphasized signal in relation to synthesis filter coefficient, to produce perceptually weighted signal
Priority Number: CA2252170A
Priority Date: 1998-10-27
Application Number: RU2001114194A
Application Date: 1999-10-27
Publication Date: 2003-12-20
IPC Class Table:

IPC	Section	Class	Subclass	Class Group	Subgroup
G01L001104	G	G01	G01L	G01L0011	G01L001104
G01L002102	G	G01	G01L	G01L0021	G01L002102
G10L001300	G	G10	G10L	G10L0013	G10L001300
G10L001912	G	G10	G10L	G10L0019	G10L001912
H03H001706	H	H03	H03H	H03H0017	H03H001706
H03M000730	H	H03	H03M	H03M0007	H03M000730
H03M000736	H	H03	H03M	H03M0007	H03M000736
H04B000162	H	H04	H04B	H04B0001	H04B000162
H04B000726	H	H04	H04B	H04B0007	H04B000726
H04B001404	H	H04	H04B	H04B0014	H04B001404
H04Q000722	H	H04	H04Q	H04Q0007	H04Q000722
H04Q000732	H	H04	H04Q	H04Q0007	H04Q000732

IPC Class Table - DWPI:

IPC - DWPI	Section - DWPI	Class - DWPI	Subclass - DWPI	Class Group - DWPI	Subgroup - DWPI
G01L001104	G	G01	G01L	G01L0011	G01L001104
G01L002102	G	G01	G01L	G01L0021	G01L002102
G10L001104	G	G10	G10L	G10L0011	G10L001104

G10L001300	G	G10	G10L	G10L0013	G10L001300
G10L001900	G	G10	G10L	G10L0019	G10L001900
G10L001904	G	G10	G10L	G10L0019	G10L001904
G10L001906	G	G10	G10L	G10L0019	G10L001906
G10L001912	G	G10	G10L	G10L0019	G10L001912
G10L001914	G	G10	G10L	G10L0019	G10L001914
G10L002102	G	G10	G10L	G10L0021	G10L002102
H03H001706	H	H03	H03H	H03H0017	H03H001706
H03M000730	H	H03	H03M	H03M0007	H03M000730
H03M000736	H	H03	H03M	H03M0007	H03M000736
H04B000162	H	H04	H04B	H04B0001	H04B000162
H04B001404	H	H04	H04B	H04B0014	H04B001404
H04B000726	H	H04	H04B	H04B0007	H04B000726
H04Q000722	H	H04	H04Q	H04Q0007	H04Q000722
H04Q000732	H	H04	H04Q	H04Q0007	H04Q000732

Assignee/Applicant:
Assignee - Current US:
JP F Terms:
JP FI Codes:
Assignee - Original:
Any CPC Table:

Type	Invention	Additional	Version	Office
Current	**G10L 19/26**	-	20130101	EP

ECLA: G10L001926
Abstract:

FIELD: radio engineering; coding digital broadband signals. SUBSTANCE: perceptive weighing device used for producing perceptively weighted signal in responding to broadband signal has signal emphasis entrance filter, synthesis filter calculator, and perceptive weighing filter. Emphasis entrance filter has transfer function P(z) = 1-muz-1, where mu is emphasis entrance multiplier whose value may be 0 and 1. Perceptive weighing filter has following transfer function: W(z) = A(z/gamma1)/(1-gamma2Z-1), 0<gamma2<gamma1<=1, where gamma2 and gamma1 are weighing control values. As a result, weighing broadband signal in formant region is conceptually separated from varying relative level of spectral components of this broadband signal. EFFECT:

enhanced reliability of signal recovery. 49 cl, 4 dwg

Language of Publication: RU

INPADOC Legal Status Table:

Post-Issuance (US):

Reassignment (US) Table:

Maintenance Status (US):

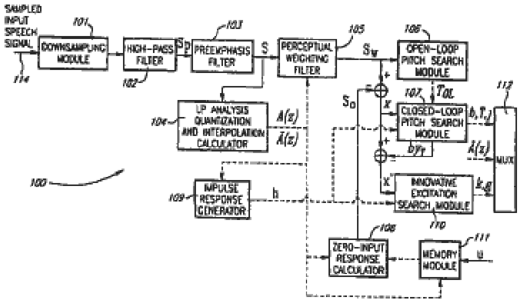
Litigation (US):

Opposition (EP):

License (EP):

EPO Procedural Status:

Front Page Drawing:



Record 29/70 PT1125276E METODO E DISPOSITIVO PARA PESQUISA DE ALTURA DE SOM DE BANDA LARGA ADAPTATIVA NA CODIFICACAO DE SINAIS DE BANDA LARGA

Publication Number: PT1125276E 20031231

Title: METODO E DISPOSITIVO PARA PESQUISA DE ALTURA DE SOM DE BANDA LARGA ADAPTATIVA NA CODIFICACAO DE SINAIS DE BANDA LARGA
Title - DWPI:
Priority Number: CA2252170A
Priority Date: 1998-10-27
Application Number: PT952199T
Application Date: 1999-10-27
Publication Date: 2003-12-31
IPC Class Table:

IPC	Section	Class	Subclass	Class Group	Subgroup
G01L001104	G	G01	G01L	G01L0011	G01L001104
G01L002102	G	G01	G01L	G01L0021	G01L002102
G10L001300	G	G10	G10L	G10L0013	G10L001300
G10L001912	G	G10	G10L	G10L0019	G10L001912
H03H001706	H	H03	H03H	H03H0017	H03H001706
H03M000730	H	H03	H03M	H03M0007	H03M000730
H03M000736	H	H03	H03M	H03M0007	H03M000736
H04B000162	H	H04	H04B	H04B0001	H04B000162
H04B000726	H	H04	H04B	H04B0007	H04B000726
H04B001404	H	H04	H04B	H04B0014	H04B001404
H04Q000722	H	H04	H04Q	H04Q0007	H04Q000722
H04Q000732	H	H04	H04Q	H04Q0007	H04Q000732

IPC Class Table - DWPI:
Assignee/Applicant: VOICEAGE CORP
Assignee - Current US:
JP F Terms:
JP FI Codes:
Assignee - Original:
Any CPC Table:

Type	Invention	Additional	Version	Office
Current	**G10L 19/26**	-	20130101	EP

ECLA: G10L001926
Abstract:
Language of Publication: PT
INPADOC Legal Status Table:
Post-Issuance (US):
Reassignment (US) Table:
Maintenance Status (US):
Litigation (US):
Opposition (EP):
License (EP):
EPO Procedural Status:
Front Page Drawing:

(No drawing/image available)

Record 30/70 PT1125284E METODO DE RECUPERACAO DE MEDIDOR DE ALTA FREQUENCIA E DISPOSITIVO PARA SINAL DE BANDA LARGA SINTETIZADO E SOBREAMOSTRADO

Publication Number: PT1125284E 20031231

Title: METODO DE RECUPERACAO DE MEDIDOR DE ALTA FREQUENCIA E DISPOSITIVO PARA SINAL DE BANDA LARGA SINTETIZADO E SOBREAMOSTRADO
Title - DWPI:
Priority Number: CA2252170A
Priority Date: 1998-10-27
Application Number: PT952183T
Application Date: 1999-10-27
Publication Date: 2003-12-31
IPC Class Table:

IPC	Section	Class	Subclass	Class Group	Subgroup
G01L001104	G	G01	G01L	G01L0011	G01L001104
G01L002102	G	G01	G01L	G01L0021	G01L002102
G10L001300	G	G10	G10L	G10L0013	G10L001300
G10L001912	G	G10	G10L	G10L0019	G10L001912
H03H001706	H	H03	H03H	H03H0017	H03H001706
H03M000730	H	H03	H03M	H03M0007	H03M000730
H03M000736	H	H03	H03M	H03M0007	H03M000736
H04B000162	H	H04	H04B	H04B0001	H04B000162
H04B000726	H	H04	H04B	H04B0007	H04B000726
H04B001404	H	H04	H04B	H04B0014	H04B001404
H04Q000722	H	H04	H04Q	H04Q0007	H04Q000722
H04Q000732	H	H04	H04Q	H04Q0007	H04Q000732

IPC Class Table - DWPI:
Assignee/Applicant: VOICEAGE CORP
Assignee - Current US:
JP F Terms:
JP FI Codes:
Assignee - Original:
Any CPC Table:

Type	Invention	Additional	Version	Office

Current	**G10L 19/26**	-	20130101	EP

ECLA: G10L001926
Abstract:
Language of Publication: PT
INPADOC Legal Status Table:
Post-Issuance (US):
Reassignment (US) Table:
Maintenance Status (US):
Litigation (US):
Opposition (EP):
License (EP):
EPO Procedural Status:
Front Page Drawing:

(No drawing/image available)

Record 31/70 PT1125285E MELHORAMENTO DA PERIODICIDADE NA DESCODIFICACAO DE SINAIS DE BANDA LARGA

Publication Number: PT1125285E 20031231

Title: MELHORAMENTO DA PERIODICIDADE NA DESCODIFICACAO DE SINAIS DE BANDA LARGA
Title - DWPI:
Priority Number: CA2252170A
Priority Date: 1998-10-27
Application Number: PT952200T
Application Date: 1999-10-27
Publication Date: 2003-12-31
IPC Class Table:

IPC	Section	Class	Subclass	Class Group	Subgroup
G01L001104	G	G01	G01L	G01L0011	G01L001104
G01L002102	G	G01	G01L	G01L0021	G01L002102
G10L001300	G	G10	G10L	G10L0013	G10L001300
G10L001912	G	G10	G10L	G10L0019	G10L001912
H03H001706	H	H03	H03H	H03H0017	H03H001706
H03M000730	H	H03	H03M	H03M0007	H03M000730
H03M000736	H	H03	H03M	H03M0007	H03M000736
H04B000162	H	H04	H04B	H04B0001	H04B000162
H04B000726	H	H04	H04B	H04B0007	H04B000726
H04B001404	H	H04	H04B	H04B0014	H04B001404
H04Q000722	H	H04	H04Q	H04Q0007	H04Q000722
H04Q000732	H	H04	H04Q	H04Q0007	H04Q000732

IPC Class Table - DWPI:
Assignee/Applicant: VOICEAGE CORP
Assignee - Current US:
JP F Terms:
JP FI Codes:
Assignee - Original:
Any CPC Table:

Type	Invention	Additional	Version	Office
Current	**G10L 19/26**	-	20130101	EP

ECLA: G10L001926
Abstract:
Language of Publication: PT
INPADOC Legal Status Table:
Post-Issuance (US):
Reassignment (US) Table:
Maintenance Status (US):
Litigation (US):
Opposition (EP):
License (EP):
EPO Procedural Status:
Front Page Drawing:

(No drawing/image available)

Record 32/70 AT256910T VORRICHTUNG ZUR RAUSCHMASKIERUNG UND VERFAHREN ZUR EFFIZIENTEN KODIERUNG VON BREITBANDSIGNALEN

Publication Number: AT256910T 20040115

Title: VORRICHTUNG ZUR RAUSCHMASKIERUNG UND VERFAHREN ZUR EFFIZIENTEN KODIERUNG VON BREITBANDSIGNALEN
Title - DWPI:
Priority Number: CA2252170A | WO1999CA1010A
Priority Date: 1998-10-27 | 1999-10-27
Application Number: AT1999952201T
Application Date: 1999-10-27
Publication Date: 2004-01-15
IPC Class Table:

IPC	Section	Class	Subclass	Class Group	Subgroup
G01L001104	G	G01	G01L	G01L0011	G01L001104
G01L002102	G	G01	G01L	G01L0021	G01L002102
G10L001300	G	G10	G10L	G10L0013	G10L001300
G10L001912	G	G10	G10L	G10L0019	G10L001912
H03H001706	H	H03	H03H	H03H0017	H03H001706
H03M000730	H	H03	H03M	H03M0007	H03M000730
H03M000736	H	H03	H03M	H03M0007	H03M000736
H04B000162	H	H04	H04B	H04B0001	H04B000162
H04B000726	H	H04	H04B	H04B0007	H04B000726
H04B001404	H	H04	H04B	H04B0014	H04B001404
H04Q000722	H	H04	H04Q	H04Q0007	H04Q000722
H04Q000732	H	H04	H04Q	H04Q0007	H04Q000732

IPC Class Table - DWPI:
Assignee/Applicant: VOICEAGE CORP
Assignee - Current US:
JP F Terms:
JP FI Codes:
Assignee - Original:
Any CPC Table:

Type	Invention	Additional	Version	Office
Current	**G10L 19/26**	-	20130101	EP

ECLA: G10L001926
Abstract:
Language of Publication: XX
INPADOC Legal Status Table:

Gazette Date	Code	INPADOC Legal Status Impact
2004-08-15	UEP	+
Description: PUBLICATION OF TRANSLATION OF EUROPEAN PATENT SPECIFICATION EP 1125286		

Post-Issuance (US):
Reassignment (US) Table:
Maintenance Status (US):
Litigation (US):
Opposition (EP):
License (EP):
EPO Procedural Status:
Front Page Drawing:

(No drawing/image available)

Record 33/70 JP03490685B2 The method and apparatus for the adaptive band pitch search in the encoding of a broadband signal

Publication Number: JP03490685B2 20040126
JP2002528775A 20020903

Title: The method and apparatus for the adaptive band pitch search in the encoding of a broadband signal
Title - DWPI: Pitch analysis device for digitally encoding wideband signal, chooses signal path having lowest calculated pitch prediction error
Priority Number: CA2252170A | WO1999CA1008A
Priority Date: 1998-10-27 | 1999-10-27
Application Number: JP2000578808A
Application Date: 1999-10-27
Publication Date: 2004-01-26
IPC Class Table:

IPC	Section	Class	Subclass	Class Group	Subgroup
G01L001104	G	G01	G01L	G01L0011	G01L001104
G01L002102	G	G01	G01L	G01L0021	G01L002102
G10L001300	G	G10	G10L	G10L0013	G10L001300
G10L001912	G	G10	G10L	G10L0019	G10L001912
H03H001706	H	H03	H03H	H03H0017	H03H001706
H03M000730	H	H03	H03M	H03M0007	H03M000730
H03M000736	H	H03	H03M	H03M0007	H03M000736
H04B000162	H	H04	H04B	H04B0001	H04B000162
H04B000726	H	H04	H04B	H04B0007	H04B000726
H04B001404	H	H04	H04B	H04B0014	H04B001404
H04Q000722	H	H04	H04Q	H04Q0007	H04Q000722
H04Q000732	H	H04	H04Q	H04Q0007	H04Q000732

IPC Class Table - DWPI:

IPC - DWPI	Section - DWPI	Class - DWPI	Subclass - DWPI	Class Group - DWPI	Subgroup - DWPI
G01L001104	G	G01	G01L	G01L0011	G01L001104
G01L002102	G	G01	G01L	G01L0021	G01L002102
G10L001104	G	G10	G10L	G10L0011	G10L001104

G10L001300	G	G10	G10L	G10L0013	G10L001300
G10L001900	G	G10	G10L	G10L0019	G10L001900
G10L001904	G	G10	G10L	G10L0019	G10L001904
G10L001906	G	G10	G10L	G10L0019	G10L001906
G10L001912	G	G10	G10L	G10L0019	G10L001912
G10L001914	G	G10	G10L	G10L0019	G10L001914
G10L002102	G	G10	G10L	G10L0021	G10L002102
H03H001706	H	H03	H03H	H03H0017	H03H001706
H03M000730	H	H03	H03M	H03M0007	H03M000730
H03M000736	H	H03	H03M	H03M0007	H03M000736
H04B000162	H	H04	H04B	H04B0001	H04B000162
H04B001404	H	H04	H04B	H04B0014	H04B001404
H04B000726	H	H04	H04B	H04B0007	H04B000726
H04Q000722	H	H04	H04Q	H04Q0007	H04Q000722
H04Q000732	H	H04	H04Q	H04Q0007	H04Q000732
A61K0031585	A	A61	A61K	A61K0031	A61K0031585

Assignee/Applicant: VOICEAGE CORP,CA
Assignee - Current US:
JP F Terms: | 5D045CA01 | 5D045DA11 | 5J064AA02 | 5J064BB03 | 5J064BB04 | 5J064BB12 | 5J064BC02 | 5J064BC08 | 5J064BC12 | 5J064BC18 | 5J064BC25 | 5J064BD02 | 5J064BD03 | 5K067 | 5K067BB04 | 5K067DD54 | 5K067EE02 | 5K067EE10 | 5K067HH21
JP FI Codes: | G10L000914-B | G10L000914-S | G10L000918-E | G10L001908-C | G10L001908-G | G10L001909 | G10L001912 | G10L001912-Z | H03M000730-B | H03M000736 | H04Q000700-643 | H04W008802-120
Assignee - Original: VOICEAGE CORP
Any CPC Table:

Type	Invention	Additional	Version	Office
Current	**G10L 19/26**	-	20130101	EP

ECLA: G10L001926
Abstract:

An improved pitch search method and device for digitally encoding a wideband signal, in particular but not exclusively a speech signal, in view of transmitting, or storing, and synthesizing this wideband sound signal. The new method and device which achieve efficient modeling of the

harmonic structure of the speech spectrum uses several forms of low pass filters applied to a pitch codevector, the one yielding higher prediction gain (i.e. the lowest pitch prediction error) is selected and the associated pitch codebook parameters are forwarded.

L'invention concerne un procédé amélioré de recherche de hauteur et un dispositif de codage numérique d'un signal à large bande, en particulier mais pas exclusivement un signal vocal, en vue de transmettre ou de stocker, et de synthétiser ce signal sonore à large bande. Le procédé et le dispositif nouveaux, lesquels permettent une modélisation efficace de la structure harmonique du spectre de la parole, utilisent plusieurs formes de filtres passe-bas appliqués à un vecteur de code de hauteur, celui permettant d'obtenir le gain de prédiction le plus haut (c'est-à-dire l'erreur de prédiction de hauteur la plus faible) est sélectionné et les paramètres de code de hauteur associés sont retransmis.

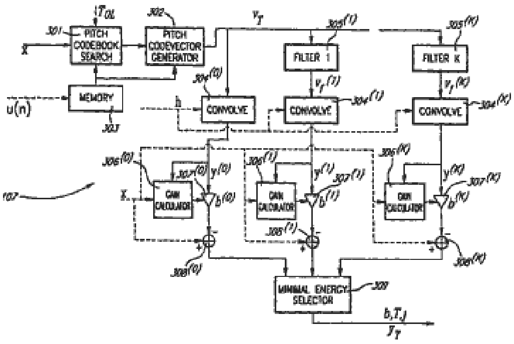
Language of Publication: JA

INPADOC Legal Status Table:

Gazette Date	Code	INPADOC Legal Status Impact
2015-11-10	R250	+
Description: RECEIPT OF ANNUAL FEES JAPANESE INTERMEDIATE CODE: R250		
2014-11-11	R250	+
Description: RECEIPT OF ANNUAL FEES JAPANESE INTERMEDIATE CODE: R250		
2012-11-06	FPAY	+
Description: RENEWAL FEE PAYMENT (PRS DATE IS RENEWAL DATE OF DATABASE) PAYMENT UNTIL: 20131107		
2012-11-01	FPAY	+
Description: RENEWAL FEE PAYMENT (PRS DATE IS RENEWAL DATE OF DATABASE) PAYMENT UNTIL: 20121107		
2011-11-08	FPAY	+
Description: RENEWAL FEE PAYMENT (PRS DATE IS RENEWAL DATE OF DATABASE) PAYMENT UNTIL: 20121107		
2011-11-04	FPAY	+
Description: RENEWAL FEE PAYMENT (PRS DATE IS RENEWAL DATE OF DATABASE) PAYMENT UNTIL: 20111107		
2010-11-16	FPAY	+
Description: RENEWAL FEE PAYMENT (PRS DATE IS RENEWAL DATE OF DATABASE) PAYMENT UNTIL: 20111107		
2009-11-10	FPAY	+
Description: RENEWAL FEE PAYMENT (PRS DATE IS RENEWAL DATE OF DATABASE) PAYMENT UNTIL: 20101107		

2008-11-11	FPAY	+
Description: RENEWAL FEE PAYMENT (PRS DATE IS RENEWAL DATE OF DATABASE) PAYMENT UNTIL: 20091107		
2008-11-06	FPAY	+
Description: RENEWAL FEE PAYMENT (PRS DATE IS RENEWAL DATE OF DATABASE) PAYMENT UNTIL: 20081107		
2007-11-06	FPAY	+
Description: RENEWAL FEE PAYMENT (PRS DATE IS RENEWAL DATE OF DATABASE) PAYMENT UNTIL: 20081107		
2007-11-01	FPAY	+
Description: RENEWAL FEE PAYMENT (PRS DATE IS RENEWAL DATE OF DATABASE) PAYMENT UNTIL: 20071107		
2006-11-07	R250	+
Description: RECEIPT OF ANNUAL FEES JAPANESE INTERMEDIATE CODE: R250		

Post-Issuance (US):
Reassignment (US) Table:
Maintenance Status (US):
Litigation (US):
Opposition (EP):
License (EP):
EPO Procedural Status:
Front Page Drawing:



Record 34/70 KR417634B1

Publication Number: KR417634B1 20040205

Title:
Title - DWPI:
Priority Number: CA2252170A
Priority Date: 1998-10-27
Application Number: KR20017005325A
Application Date: 2001-04-27
Publication Date: 2004-02-05
IPC Class Table:

IPC	Section	Class	Subclass	Class Group	Subgroup
G10L001900	G	G10	G10L	G10L0019	G10L001900
G01L001104	G	G01	G01L	G01L0011	G01L001104
G01L002102	G	G01	G01L	G01L0021	G01L002102
G10L001300	G	G10	G10L	G10L0013	G10L001300
G10L001912	G	G10	G10L	G10L0019	G10L001912
H03H001706	H	H03	H03H	H03H0017	H03H001706
H03M000730	H	H03	H03M	H03M0007	H03M000730
H03M000736	H	H03	H03M	H03M0007	H03M000736
H04B000162	H	H04	H04B	H04B0001	H04B000162
H04B000726	H	H04	H04B	H04B0007	H04B000726
H04B001404	H	H04	H04B	H04B0014	H04B001404
H04Q000722	H	H04	H04Q	H04Q0007	H04Q000722
H04Q000732	H	H04	H04Q	H04Q0007	H04Q000732

IPC Class Table - DWPI:
Assignee/Applicant:
Assignee - Current US:
JP F Terms:
JP FI Codes:
Assignee - Original:
Any CPC Table:

Type	Invention	Additional	Version	Office
Current	**G10L 19/26**	-	20130101	EP

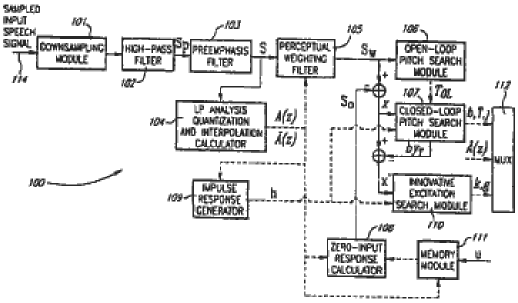
ECLA:
Abstract:

A pitch search method and device for digitally encoding a wideband signal, in particular but not exclusively a speech signal, in view of transmitting, or storing, and synthesizing this wideband sound signal. The new method and device which achieve efficient modeling of the harmonic structure of the speech spectrum uses several forms of low pass filters applied to a pitch codevector, the one yielding higher prediction gain (i.e. the lowest pitch prediction error) is selected and the associated pitch codebook parameters are forwarded.
Language of Publication: KO
INPADOC Legal Status Table:

Gazette Date	Code	INPADOC Legal Status Impact
2016-01-07	FPAY	-
Description: ANNUAL FEE PAYMENT		
2015-01-06	FPAY	-
Description: ANNUAL FEE PAYMENT		
2014-01-24	FPAY	-
Description: ANNUAL FEE PAYMENT		
2013-01-02	FPAY	-
Description: ANNUAL FEE PAYMENT		
2004-01-26	GRNT	+
Description: WRITTEN DECISION TO GRANT		
2003-11-25	E701	+
Description: DECISION TO GRANT OR REGISTRATION		
2001-09-11	A201	-
Description: REQUEST FOR EXAMINATION		

Post-Issuance (US):
Reassignment (US) Table:
Maintenance Status (US):
Litigation (US):
Opposition (EP):

License (EP):
EPO Procedural Status:
Front Page Drawing:



Record 35/70 KR417635B1

Publication Number: KR417635B1 20040205

Title:
Title - DWPI:
Priority Number: CA2252170A
Priority Date: 1998-10-27
Application Number: KR20017005326A
Application Date: 2001-04-27
Publication Date: 2004-02-05
IPC Class Table:

IPC	Section	Class	Subclass	Class Group	Subgroup
G01L001104	G	G01	G01L	G01L0011	G01L001104
G01L002102	G	G01	G01L	G01L0021	G01L002102
G10L001300	G	G10	G10L	G10L0013	G10L001300
G10L001912	G	G10	G10L	G10L0019	G10L001912
H03H001706	H	H03	H03H	H03H0017	H03H001706
H03M000730	H	H03	H03M	H03M0007	H03M000730
H03M000736	H	H03	H03M	H03M0007	H03M000736
H04B000162	H	H04	H04B	H04B0001	H04B000162
H04B000726	H	H04	H04B	H04B0007	H04B000726
H04B001404	H	H04	H04B	H04B0014	H04B001404
H04Q000722	H	H04	H04Q	H04Q0007	H04Q000722
H04Q000732	H	H04	H04Q	H04Q0007	H04Q000732

IPC Class Table - DWPI:
Assignee/Applicant:
Assignee - Current US:
JP F Terms:
JP FI Codes:
Assignee - Original:
Any CPC Table:

Type	Invention	Additional	Version	Office
Current	**G10L 19/26**	-	20130101	EP

ECLA:

Abstract:

A pitch search method and device for digitally encoding a wideband signal, in particular but not exclusively a speech signal, in view of transmitting, or storing, and synthesizing this wideband sound signal. The new method and device which achieve efficient modeling of the harmonic structure of the speech spectrum uses several forms of low pass filters applied to a pitch codevector, the one yielding higher prediction gain (i.e. the lowest pitch prediction error) is selected and the associated pitch codebook parameters are forwarded.

Language of Publication: KO

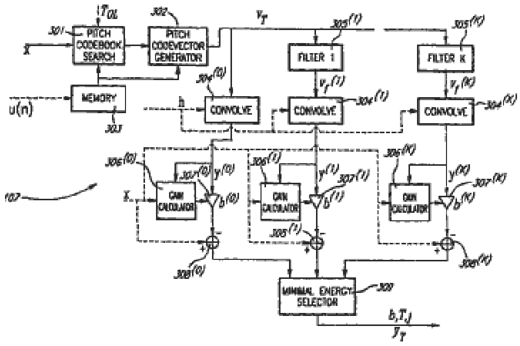
INPADOC Legal Status Table:

Gazette Date	Code	INPADOC Legal Status Impact
2016-01-07	FPAY	-
Description: ANNUAL FEE PAYMENT		
2015-01-06	FPAY	-
Description: ANNUAL FEE PAYMENT		
2014-01-24	FPAY	-
Description: ANNUAL FEE PAYMENT		
2013-01-02	FPAY	-
Description: ANNUAL FEE PAYMENT		
2004-01-26	GRNT	+
Description: WRITTEN DECISION TO GRANT		
2003-11-21	E701	+
Description: DECISION TO GRANT OR REGISTRATION		
2001-09-11	A201	-
Description: REQUEST FOR EXAMINATION		

Post-Issuance (US):
Reassignment (US) Table:
Maintenance Status (US):
Litigation (US):
Opposition (EP):
License (EP):

EPO Procedural Status:

Front Page Drawing:



Record 36/70 KR417836B1

Publication Number: KR417836B1 20040205

Title:
Title - DWPI:
Priority Number: CA2252170A
Priority Date: 1998-10-27
Application Number: KR20017005324A
Application Date: 2001-04-27
Publication Date: 2004-02-05
IPC Class Table:

IPC	Section	Class	Subclass	Class Group	Subgroup
G10L002102	G	G10	G10L	G10L0021	G10L002102
G01L001104	G	G01	G01L	G01L0011	G01L001104
G01L002102	G	G01	G01L	G01L0021	G01L002102
G10L001300	G	G10	G10L	G10L0013	G10L001300
G10L001912	G	G10	G10L	G10L0019	G10L001912
H03H001706	H	H03	H03H	H03H0017	H03H001706
H03M000730	H	H03	H03M	H03M0007	H03M000730
H03M000736	H	H03	H03M	H03M0007	H03M000736
H04B000162	H	H04	H04B	H04B0001	H04B000162
H04B000726	H	H04	H04B	H04B0007	H04B000726
H04B001404	H	H04	H04B	H04B0014	H04B001404
H04Q000722	H	H04	H04Q	H04Q0007	H04Q000722
H04Q000732	H	H04	H04Q	H04Q0007	H04Q000732

IPC Class Table - DWPI:
Assignee/Applicant:
Assignee - Current US:
JP F Terms:
JP FI Codes:
Assignee - Original:
Any CPC Table:

Type	Invention	Additional	Version	Office
Current	**G10L 19/26**	-	20130101	EP

ECLA:
Abstract:

A pitch search method and device for digitally encoding a wideband signal, in particular but not exclusively a speech signal, in view of transmitting, or storing, and synthesizing this wideband sound signal. The new method and device which achieve efficient modeling of the harmonic structure of the speech spectrum uses several forms of low pass filters applied to a pitch codevector, the one yielding higher prediction gain (i.e. the lowest pitch prediction error) is selected and the associated pitch codebook parameters are forwarded.

Language of Publication: KO
INPADOC Legal Status Table:

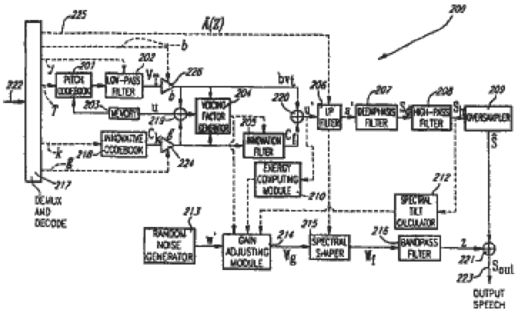
Gazette Date	Code	INPADOC Legal Status Impact
2016-01-08	FPAY	-
Description: ANNUAL FEE PAYMENT		
2015-01-06	FPAY	-
Description: ANNUAL FEE PAYMENT		
2014-01-27	FPAY	-
Description: ANNUAL FEE PAYMENT		
2012-12-28	FPAY	-
Description: ANNUAL FEE PAYMENT		
2004-01-27	GRNT	+
Description: WRITTEN DECISION TO GRANT		
2003-11-25	E701	+
Description: DECISION TO GRANT OR REGISTRATION		
2001-09-11	A201	-
Description: REQUEST FOR EXAMINATION		

Post-Issuance (US):
Reassignment (US) Table:
Maintenance Status (US):
Litigation (US):
Opposition (EP):

License (EP):

EPO Procedural Status:

Front Page Drawing:



Record 37/70 DK1125286T3 Indretning til perceptiv vægtning og fremgangsmåde ved effektiv kodning af bredbåndssignaler

Publication Number: DK1125286T3 20040419

Title: Indretning til perceptiv vægtning og fremgangsmåde ved effektiv kodning af bredbåndssignaler
Title - DWPI:
Priority Number: CA2252170A | WO1999CA1010A
Priority Date: 1998-10-27 | 1999-10-27
Application Number: DK1999952201T
Application Date: 1999-10-27
Publication Date: 2004-04-19
IPC Class Table:

IPC	Section	Class	Subclass	Class Group	Subgroup
G01L001104	G	G01	G01L	G01L0011	G01L001104
G01L002102	G	G01	G01L	G01L0021	G01L002102
G10L001300	G	G10	G10L	G10L0013	G10L001300
G10L001912	G	G10	G10L	G10L0019	G10L001912
H03H001706	H	H03	H03H	H03H0017	H03H001706
H03M000730	H	H03	H03M	H03M0007	H03M000730
H03M000736	H	H03	H03M	H03M0007	H03M000736
H04B000162	H	H04	H04B	H04B0001	H04B000162
H04B000726	H	H04	H04B	H04B0007	H04B000726
H04B001404	H	H04	H04B	H04B0014	H04B001404
H04Q000722	H	H04	H04Q	H04Q0007	H04Q000722
H04Q000732	H	H04	H04Q	H04Q0007	H04Q000732

IPC Class Table - DWPI:
Assignee/Applicant: VOICEAGE CORP
Assignee - Current US:
JP F Terms:
JP FI Codes:
Assignee - Original:
Any CPC Table:

Type	Invention	Additional	Version	Office
Current	**G10L 19/26**	-	20130101	EP

ECLA: G10L001926
Abstract:
Language of Publication: DA
INPADOC Legal Status Table:
Post-Issuance (US):
Reassignment (US) Table:
Maintenance Status (US):
Litigation (US):
Opposition (EP):
License (EP):
EPO Procedural Status:
Front Page Drawing:

(No drawing/image available)

Record 38/70 ES2205891T3 UN METODO Y UN DISPOSITIVO PARA UNA BUSQUEDA ADAPTATIVA DE TONO DE ANCHO DE BANDA AL CODIFICAR SEÑALES DE BANDA ANCHA.

Publication Number: ES2205891T3 20040501

Title: UN METODO Y UN DISPOSITIVO PARA UNA BUSQUEDA ADAPTATIVA DE TONO DE ANCHO DE BANDA AL CODIFICAR SEÑALES DE BANDA ANCHA.
Title - DWPI: Pitch analysis device for digitally encoding wideband signal, chooses signal path having lowest calculated pitch prediction error
Priority Number: CA2252170A
Priority Date: 1998-10-27
Application Number: ES1999952199T
Application Date: 1999-10-27
Publication Date: 2004-05-01
IPC Class Table:

IPC	Section	Class	Subclass	Class Group	Subgroup
G01L001104	G	G01	G01L	G01L0011	G01L001104
G01L002102	G	G01	G01L	G01L0021	G01L002102
G10L001300	G	G10	G10L	G10L0013	G10L001300
G10L001912	G	G10	G10L	G10L0019	G10L001912
H03H001706	H	H03	H03H	H03H0017	H03H001706
H03M000730	H	H03	H03M	H03M0007	H03M000730
H03M000736	H	H03	H03M	H03M0007	H03M000736
H04B000162	H	H04	H04B	H04B0001	H04B000162
H04B000726	H	H04	H04B	H04B0007	H04B000726
H04B001404	H	H04	H04B	H04B0014	H04B001404
H04Q000722	H	H04	H04Q	H04Q0007	H04Q000722
H04Q000732	H	H04	H04Q	H04Q0007	H04Q000732

IPC Class Table - DWPI:

IPC - DWPI	Section - DWPI	Class - DWPI	Subclass - DWPI	Class Group - DWPI	Subgroup - DWPI
G01L001104	G	G01	G01L	G01L0011	G01L001104
G01L002102	G	G01	G01L	G01L0021	G01L002102
G10L001104	G	G10	G10L	G10L0011	G10L001104

G10L001300	G	G10	G10L	G10L0013	G10L001300
G10L001900	G	G10	G10L	G10L0019	G10L001900
G10L001904	G	G10	G10L	G10L0019	G10L001904
G10L001906	G	G10	G10L	G10L0019	G10L001906
G10L001912	G	G10	G10L	G10L0019	G10L001912
G10L001914	G	G10	G10L	G10L0019	G10L001914
G10L002102	G	G10	G10L	G10L0021	G10L002102
H03H001706	H	H03	H03H	H03H0017	H03H001706
H03M000730	H	H03	H03M	H03M0007	H03M000730
H03M000736	H	H03	H03M	H03M0007	H03M000736
H04B000162	H	H04	H04B	H04B0001	H04B000162
H04B001404	H	H04	H04B	H04B0014	H04B001404
H04B000726	H	H04	H04B	H04B0007	H04B000726
H04Q000722	H	H04	H04Q	H04Q0007	H04Q000722
H04Q000732	H	H04	H04Q	H04Q0007	H04Q000732
A61K0031585	A	A61	A61K	A61K0031	A61K0031585

Assignee/Applicant:VOICEAGE CORP
Assignee - Current US:
JP F Terms:
JP FI Codes:
Assignee - Original:
Any CPC Table:

Type	Invention	Additional	Version	Office
Current	**G10L 19/26**	-	20130101	EP

ECLA: G10L001926
Abstract:

Un dispositivo de análisis de tono para producir un conjunto óptimo de parámetros de código de cifrado de tono en respuesta a una señal de banda ancha, que comprende: a) al menos dos caminos de señal asociados a respectivos conjuntos de parámetros del código de cifrado de tono, en los que: i) cada camino de señal comprende un dispositivo (307, 308) de cálculo de error de predicción de tono para calcular un error de predicción de tono de un vector de código de tono desde un dispositivo (301) de búsqueda de código de cifrado de tono, y ii) al menos uno de dichos dos caminos comprende un filtro (305) para filtrar el vector de código de tono antes de

proporcionar dicho vector de código de tono al dispositivo de cálculo de error de predicción de tono de dicho camino; y b) un selector (309) para comparar los errores de predicción de tono calculados en dichos al menos dos caminos de señal, para elegir el camino de señal que tenga el menor error de predicción de tono calculado y, para seleccionar el conjunto de parámetros de código de cifrado de tono asociados al camino de señal escogido.

Language of Publication: ES

INPADOC Legal Status Table:

Post-Issuance (US):

Reassignment (US) Table:

Maintenance Status (US):

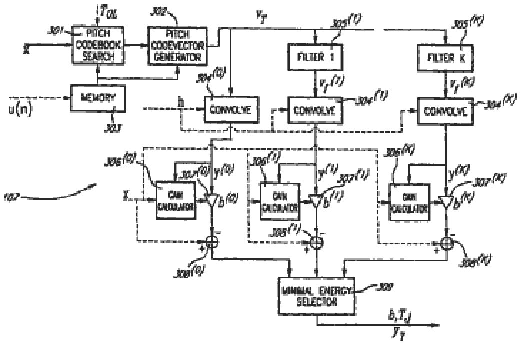
Litigation (US):

Opposition (EP):

License (EP):

EPO Procedural Status:

Front Page Drawing:



Record 39/70 ES2205892T3 AUMENTO DE LA PERIODICIDAD AL DESCODIFICAR SEÑALES DE BANDA ANCHA.

Publication Number: ES2205892T3 20040501

Title: AUMENTO DE LA PERIODICIDAD AL DESCODIFICAR SEÑALES DE BANDA ANCHA.
Title - DWPI: Periodicity enhancing device of excitation signal, reduces energy of low frequency portion of innovative code vector in relation to periodicity factor related to wideband signal
Priority Number: CA2252170A
Priority Date: 1998-10-27
Application Number: ES1999952200T
Application Date: 1999-10-27
Publication Date: 2004-05-01
IPC Class Table:

IPC	Section	Class	Subclass	Class Group	Subgroup
G01L001104	G	G01	G01L	G01L0011	G01L001104
G01L002102	G	G01	G01L	G01L0021	G01L002102
G10L001300	G	G10	G10L	G10L0013	G10L001300
G10L001912	G	G10	G10L	G10L0019	G10L001912
H03H001706	H	H03	H03H	H03H0017	H03H001706
H03M000730	H	H03	H03M	H03M0007	H03M000730
H03M000736	H	H03	H03M	H03M0007	H03M000736
H04B000162	H	H04	H04B	H04B0001	H04B000162
H04B000726	H	H04	H04B	H04B0007	H04B000726
H04B001404	H	H04	H04B	H04B0014	H04B001404
H04Q000722	H	H04	H04Q	H04Q0007	H04Q000722
H04Q000732	H	H04	H04Q	H04Q0007	H04Q000732

IPC Class Table - DWPI:

IPC - DWPI	Section - DWPI	Class - DWPI	Subclass - DWPI	Class Group - DWPI	Subgroup - DWPI
G01L001104	G	G01	G01L	G01L0011	G01L001104
G01L002102	G	G01	G01L	G01L0021	G01L002102
G10L001300	G	G10	G10L	G10L0013	G10L001300
G10L001912	G	G10	G10L	G10L0019	G10L001912

H03H001706	H	H03	H03H	H03H0017	H03H001706
H03M000730	H	H03	H03M	H03M0007	H03M000730
H03M000736	H	H03	H03M	H03M0007	H03M000736
H04B000162	H	H04	H04B	H04B0001	H04B000162
H04B001404	H	H04	H04B	H04B0014	H04B001404
H04B000726	H	H04	H04B	H04B0007	H04B000726
H04J000316	H	H04	H04J	H04J0003	H04J000316
H04J000324	H	H04	H04J	H04J0003	H04J000324
H04Q000722	H	H04	H04Q	H04Q0007	H04Q000722
H04Q000732	H	H04	H04Q	H04Q0007	H04Q000732
H04W007204	H	H04	H04W	H04W0072	H04W007204
H04W007212	H	H04	H04W	H04W0072	H04W007212
H04W007408	H	H04	H04W	H04W0074	H04W007408
G10L002102	G	G10	G10L	G10L0021	G10L002102
G10L001914	G	G10	G10L	G10L0019	G10L001914

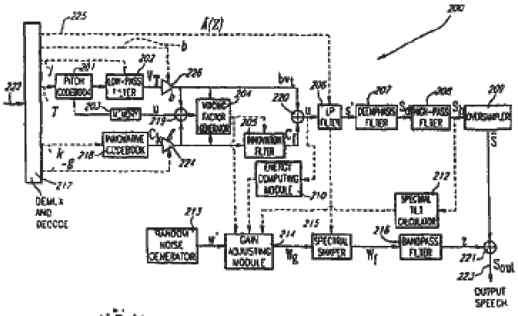
Assignee/Applicant: VOICEAGE CORP
Assignee - Current US:
JP F Terms:
JP FI Codes:
Assignee - Original:
Any CPC Table:

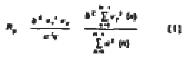
Type	Invention	Additional	Version	Office
Current	**G10L 19/26**	-	20130101	EP

ECLA: G10L001926
Abstract:

Un dispositivo para aumentar la periodicidad de una señal de excitación generada en relación con un vector de código de tono y un vector de código innovador para suministrar un filtro de síntesis de señal en una señal de banda ancha, comprendiendo dicho dispositivo de aumento de la periodicidad: a) un generador (204) de factores para calcular un factor de periodicidad relacionado con la señal de banda ancha; y b) un filtro 205 de innovación para filtrar el vector de código innovador en relación con dicho factor de periodicidad para reducir así la energía de la parte de baja frecuencia del vector de código innovador y aumentar la periodicidad de una parte de baja frecuencia de la señal de excitación.

Language of Publication: ES
INPADOC Legal Status Table:
Post-Issuance (US):
Reassignment (US) Table:
Maintenance Status (US):
Litigation (US):
Opposition (EP):
License (EP):
EPO Procedural Status:
Front Page Drawing:





Record 40/70 DE69910058T2 VERBESSERUNG DER PERIODIZITÄT EINES BREITBANDSIGNALS

Publication Number: DE69910058T2 20040519
DE69910058D1 20030904

Title: VERBESSERUNG DER PERIODIZITÄT EINES BREITBANDSIGNALS
Title - DWPI:
Priority Number: CA2252170A | WO1999CA1009A
Priority Date: 1998-10-27 | 1999-10-27
Application Number: DE69910058A
Application Date: 1999-10-27
Publication Date: 2004-05-19
IPC Class Table:

IPC	Section	Class	Subclass	Class Group	Subgroup
G01L001104	G	G01	G01L	G01L0011	G01L001104
G01L002102	G	G01	G01L	G01L0021	G01L002102
G10L001300	G	G10	G10L	G10L0013	G10L001300
G10L001912	G	G10	G10L	G10L0019	G10L001912
H03H001706	H	H03	H03H	H03H0017	H03H001706
H03M000730	H	H03	H03M	H03M0007	H03M000730
H03M000736	H	H03	H03M	H03M0007	H03M000736
H04B000162	H	H04	H04B	H04B0001	H04B000162
H04B000726	H	H04	H04B	H04B0007	H04B000726
H04B001404	H	H04	H04B	H04B0014	H04B001404
H04Q000722	H	H04	H04Q	H04Q0007	H04Q000722
H04Q000732	H	H04	H04Q	H04Q0007	H04Q000732

IPC Class Table - DWPI:
Assignee/Applicant: Voiceage Corp. Ville Mont-Royal Quebec CA
Assignee - Current US:
JP F Terms:
JP FI Codes:
Assignee - Original: Voiceage Corp. Ville Mont-Royal Quebec CA
Any CPC Table:

Type	Invention	Additional	Version	Office
Current	**G10L 19/26**	-	20130101	EP

ECLA: G10L001926

Abstract:

The present invention relates to a method and device for enhancing periodicity of an excitation signal produced in relation to a pitch codevector and an innovative codevector for supplying a signal synthesis filter in view of producing a synthesized wideband signal. In this periodicity enhancing device and method, a factor generator is responsive to the adaptive and innovative codevectors for calculating a periodicity factor. An innovation filter subsequently processes the innovative codevector in relation to this periodicity factor to reduce energy of a low frequency portion of the innovative codevector and enhance periodicity of a low frequency portion of the excitation signal. As an example, the innovation filter has a transfer function of the form: F(z)=-(z)+1-(z)-1 where is a periodicity factor, and the factor generator calculates the periodicity factor using the relation: = qR_p bounded by < q where q is an enhancement factor set for example to 0.25, and where R_p is represented by formula (I) where v_T is the pitch codevector, b is a pitch gain, N is a subframe length, and u is the excitation signal.

The present invention relates to a method and device for enhancing periodicity of an excitation signal produced in relation to a pitch codevector and an innovative codevector for supplying a signal synthesis filter in view of producing a synthesized wideband signal. In this periodicity enhancing device and method, a factor generator is responsive to the adaptive and innovative codevectors for calculating a periodicity factor. An innovation filter subsequently processes the innovative codevector in relation to this periodicity factor to reduce energy of a low frequency portion of the innovative codevector and enhance periodicity of a low frequency portion of the excitation signal. As an example, the innovation filter has a transfer function of the form: F(z)=-alpha (z)+1- alpha (z)<-1> where alpha is a periodicity factor, and the factor generator calculates the periodicity factor alpha using the relation: alpha = qR?p? bounded by alpha < q where q is an enhancement factor set for example to 0.25, and where R?p? is represented by formula (I) where v?T? is the pitch codevector, b is a pitch gain, N is a subframe length, and u is the excitation signal.

La présente invention concerne un procédé et un dispositif destinés à améliorer la périodicité d'un signal d'excitation produit par rapport à un vecteur de code de hauteur et un vecteur de code innovant permettant d'obtenir un filtre de synthèse de signal en vue de produire un signal synthétisé à large bande. Dans ce dispositif et ce procédé d'amélioration de la périodicité, un générateur de facteurs répond aux vecteurs de code adaptatifs et innovants pour calculer un facteur de périodicité. Un filtre d'innovation traite ensuite le vecteur de code innovant par rapport à ce facteur de périodicité pour réduire l'énergie d'une partie basse fréquence du vecteur de code innovant et améliorer la périodicité d'une partie basse fréquence du signal d'excitation. A titre d'exemple, le filtre d'innovation présente une fonction de transfert ayant la forme: F(z)=(z)+1-(z)-1 dans laquelle représente un facteur de périodicité, et le générateur de facteur calcule le facteur de périodicité à l'aide de la relation: = qR_p limitée par < q dans laquelle q représente un facteur d'amélioration fixé par exemple à 0,25, et dans laquelle R_p est représenté par la formule (I) où V_t représente le vecteur de code de hauteur, b représente un gain de hauteur, N représente une longueur de sous-bloc et u représente le signal d'excitation.

La présente invention concerne un procédé et un dispositif destinés à améliorer la périodicité d'un signal d'excitation produit par rapport à un vecteur de code de hauteur et un vecteur de code innovant permettant d'obtenir un filtre de synthèse de signal en vue de produire un signal

synthétisé à large bande. Dans ce dispositif et ce procédé d'amélioration de la périodicité, un générateur de facteurs répond aux vecteurs de code adaptatifs et innovants pour calculer un facteur de périodicité. Un filtre d'innovation traite ensuite le vecteur de code innovant par rapport à ce facteur de périodicité pour réduire l'énergie d'une partie basse fréquence du vecteur de code innovant et améliorer la périodicité d'une partie basse fréquence du signal d'excitation. A titre d'exemple, le filtre d'innovation présente une fonction de transfert ayant la forme: F(z)= alpha (z)+1- alpha (z)<-1> dans laquelle alpha représente un facteur de périodicité, et le générateur de facteur calcule le facteur alpha de périodicité à l'aide de la relation: alpha = qR?p? limitée par alpha < q dans laquelle q représente un facteur d'amélioration fixé par exemple à 0,25, et dans laquelle Rp est représenté par la formule (I) où V?t? représente le vecteur de code de hauteur, b représente un gain de hauteur, N représente une longueur de sous-bloc et u représente le signal d'excitation.

Language of Publication: DE

INPADOC Legal Status Table:

Post-Issuance (US):

Reassignment (US) Table:

Maintenance Status (US):

Litigation (US):

Opposition (EP):

License (EP):

EPO Procedural Status:

Front Page Drawing:


DE 699 10 058 T2 2004.05.19

Übersetzung der europäischen Patentschrift

G10L 21/02

Record 41/70 PT1125286E DISPOSITIVO E METODO DE PONDERACAO PERCEPTUAL PARA CODIFICAR EFICIENTEMENTE SINAIS DE BANDA LARGA

Publication Number: PT1125286E 20040531

Title: DISPOSITIVO E METODO DE PONDERACAO PERCEPTUAL PARA CODIFICAR EFICIENTEMENTE SINAIS DE BANDA LARGA
Title - DWPI:
Priority Number: CA2252170A
Priority Date: 1998-10-27
Application Number: PT952201T
Application Date: 1999-10-27
Publication Date: 2004-05-31
IPC Class Table:

IPC	Section	Class	Subclass	Class Group	Subgroup
G01L001104	G	G01	G01L	G01L0011	G01L001104
G01L002102	G	G01	G01L	G01L0021	G01L002102
G10L001300	G	G10	G10L	G10L0013	G10L001300
G10L001912	G	G10	G10L	G10L0019	G10L001912
H03H001706	H	H03	H03H	H03H0017	H03H001706
H03M000730	H	H03	H03M	H03M0007	H03M000730
H03M000736	H	H03	H03M	H03M0007	H03M000736
H04B000162	H	H04	H04B	H04B0001	H04B000162
H04B000726	H	H04	H04B	H04B0007	H04B000726
H04B001404	H	H04	H04B	H04B0014	H04B001404
H04Q000722	H	H04	H04Q	H04Q0007	H04Q000722
H04Q000732	H	H04	H04Q	H04Q0007	H04Q000732

IPC Class Table - DWPI:
Assignee/Applicant: VOICEAGE CORP
Assignee - Current US:
JP F Terms:
JP FI Codes:
Assignee - Original:
Any CPC Table:

Type	Invention	Additional	Version	Office
Current	**G10L 19/26**	-	20130101	EP

ECLA: G10L001926
Abstract:
Language of Publication: PT
INPADOC Legal Status Table:
Post-Issuance (US):
Reassignment (US) Table:
Maintenance Status (US):
Litigation (US):
Opposition (EP):
License (EP):
EPO Procedural Status:
Front Page Drawing:

(No drawing/image available)

Record 42/70 ES2207968T3 METODO DE RECUPERACION DE CONTENIDOS DE ALTA FRECUENCIA Y DISPOSITIVO PARA UNA SEÑAL SINTETIZADA, SOBREMUESTREADA DE BANDA ANCHA.

Publication Number: ES2207968T3 20040601

Title: METODO DE RECUPERACION DE CONTENIDOS DE ALTA FRECUENCIA Y DISPOSITIVO PARA UNA SEÑAL SINTETIZADA, SOBREMUESTREADA DE BANDA ANCHA.
Title - DWPI: High frequency content recovery device for use in audio video teleconferencing, performs summation of spectrally shaped noise sequence in oversampled synthesized signal version to produce full spectrum synthesized wide band signal
Priority Number: CA2252170A
Priority Date: 1998-10-27
Application Number: ES1999952183T
Application Date: 1999-10-27
Publication Date: 2004-06-01
IPC Class Table:

IPC	Section	Class	Subclass	Class Group	Subgroup
G01L001104	G	G01	G01L	G01L0011	G01L001104
G01L002102	G	G01	G01L	G01L0021	G01L002102
G10L001300	G	G10	G10L	G10L0013	G10L001300
G10L001912	G	G10	G10L	G10L0019	G10L001912
H03H001706	H	H03	H03H	H03H0017	H03H001706
H03M000730	H	H03	H03M	H03M0007	H03M000730
H03M000736	H	H03	H03M	H03M0007	H03M000736
H04B000162	H	H04	H04B	H04B0001	H04B000162
H04B000726	H	H04	H04B	H04B0007	H04B000726
H04B001404	H	H04	H04B	H04B0014	H04B001404
H04Q000722	H	H04	H04Q	H04Q0007	H04Q000722
H04Q000732	H	H04	H04Q	H04Q0007	H04Q000732

IPC Class Table - DWPI:

IPC - DWPI	Section - DWPI	Class - DWPI	Subclass - DWPI	Class Group - DWPI	Subgroup - DWPI
G10L001100	G	G10	G10L	G10L0011	G10L001100
G10L001300	G	G10	G10L	G10L0013	G10L001300

G10L001900	G	G10	G10L	G10L0019	G10L001900
G10L002100	G	G10	G10L	G10L0021	G10L002100
H03H001706	H	H03	H03H	H03H0017	H03H001706
H03M000730	H	H03	H03M	H03M0007	H03M000730
H03M000736	H	H03	H03M	H03M0007	H03M000736
H04B000162	H	H04	H04B	H04B0001	H04B000162
H04B001404	H	H04	H04B	H04B0014	H04B001404
H04B000726	H	H04	H04B	H04B0007	H04B000726
H04L002700	H	H04	H04L	H04L0027	H04L002700
G10L001104	G	G10	G10L	G10L0011	G10L001104
G10L001902	G	G10	G10L	G10L0019	G10L001902
G10L001904	G	G10	G10L	G10L0019	G10L001904
G10L001906	G	G10	G10L	G10L0019	G10L001906
G10L001912	G	G10	G10L	G10L0019	G10L001912
G10L002102	G	G10	G10L	G10L0021	G10L002102
G10L	G	G10	G10L	G10L	G10L

Assignee/Applicant: VOICEAGE CORP
Assignee - Current US:
JP F Terms:
JP FI Codes:
Assignee - Original:
Any CPC Table:

Type	Invention	Additional	Version	Office
Current	**G10L 19/26**	-	20130101	EP

ECLA: G10L001926
Abstract:

Dispositivo para recuperar un contenido de alta frecuencia de una señal de banda ancha, previamente diezmada, y para inyectar dicho contenido de alta frecuencia en una versión sintetizada, sobremuestreada, de dicha señal de banda ancha para producir una señal sintetizada de banda ancha de espectro completo, comprendiendo dicho dispositivo de recuperación del contenido de alta frecuencia: a) un generador (213) de ruido aleatorio para producir una secuencia de ruido que tiene un espectro determinado; b) una unidad (215) de conformación espectral para conformar el espectro de la secuencia de ruido en relación con los coeficientes de

filtro de predicción lineal relacionados con dicha señal diezmada de banda ancha; y c) un circuito (221) de inyección de señales para inyectar dicha secuencia de ruido conformada espectralmente en dicha versión sintetizada, sobremuestreada, de la señal para producir así dicha señal (223) sintetizada de banda ancha, de espectro completo.

Language of Publication: ES

INPADOC Legal Status Table:

Post-Issuance (US):

Reassignment (US) Table:

Maintenance Status (US):

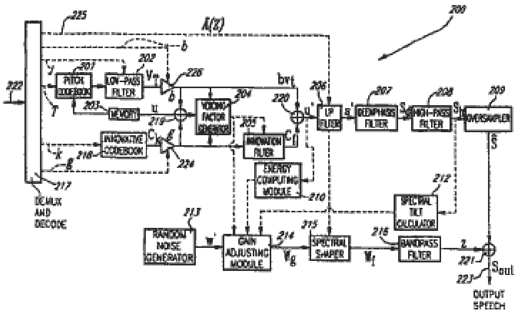
Litigation (US):

Opposition (EP):

License (EP):

EPO Procedural Status:

Front Page Drawing:



Record 43/70 DE69910239T2 VERFAHREN UND VORRICHTUNG ZUR ADAPTIVEN BANDBREITENABHÄNGIGEN GRUNDFREQUENZSUCHE FÜR DIE KODIERUNG BREITBANDIGER SIGNALE

Publication Number: DE69910239T2 20040624
DE69910239D1 20030911

Title: VERFAHREN UND VORRICHTUNG ZUR ADAPTIVEN BANDBREITENABHÄNGIGEN GRUNDFREQUENZSUCHE FÜR DIE KODIERUNG BREITBANDIGER SIGNALE
Title - DWPI:
Priority Number: CA2252170A | WO1999CA1008A
Priority Date: 1998-10-27 | 1999-10-27
Application Number: DE69910239A
Application Date: 1999-10-27
Publication Date: 2004-06-24
IPC Class Table:

IPC	Section	Class	Subclass	Class Group	Subgroup
G01L001104	G	G01	G01L	G01L0011	G01L001104
G01L002102	G	G01	G01L	G01L0021	G01L002102
G10L001300	G	G10	G10L	G10L0013	G10L001300
G10L001912	G	G10	G10L	G10L0019	G10L001912
H03H001706	H	H03	H03H	H03H0017	H03H001706
H03M000730	H	H03	H03M	H03M0007	H03M000730
H03M000736	H	H03	H03M	H03M0007	H03M000736
H04B000162	H	H04	H04B	H04B0001	H04B000162
H04B000726	H	H04	H04B	H04B0007	H04B000726
H04B001404	H	H04	H04B	H04B0014	H04B001404
H04Q000722	H	H04	H04Q	H04Q0007	H04Q000722
H04Q000732	H	H04	H04Q	H04Q0007	H04Q000732

IPC Class Table - DWPI:
Assignee/Applicant: Voiceage Corp. Ville Mont-Royal Quebec CA
Assignee - Current US:
JP F Terms:
JP FI Codes:
Assignee - Original: Voiceage Corp. Ville Mont-Royal Quebec CA
Any CPC Table:

Type	Invention	Additional	Version	Office

Current	**G10L 19/26**	-	20130101	EP

ECLA: G10L001926

Abstract:

An improved pitch search method and device for digitally encoding a wideband signal, in particular but not exclusively a speech signal, in view of transmitting, or storing, and synthesizing this wideband sound signal. The new method and device which achieve efficient modeling of the harmonic structure of the speech spectrum uses several forms of low pass filters applied to a pitch codevector, the one yielding higher prediction gain (i.e. the lowest pitch prediction error) is selected and the associated pitch codebook parameters are forwarded.

L'invention concerne un procédé amélioré de recherche de hauteur et un dispositif de codage numérique d'un signal à large bande, en particulier mais pas exclusivement un signal vocal, en vue de transmettre ou de stocker, et de synthétiser ce signal sonore à large bande. Le procédé et le dispositif nouveaux, lesquels permettent une modélisation efficace de la structure harmonique du spectre de la parole, utilisent plusieurs formes de filtres passe-bas appliqués à un vecteur de code de hauteur, celui permettant d'obtenir le gain de prédiction le plus haut (c'est-à-dire l'erreur de prédiction de hauteur la plus faible) est sélectionné et les paramètres de code de hauteur associés sont retransmis.

Language of Publication: DE

INPADOC Legal Status Table:

Post-Issuance (US):

Reassignment (US) Table:

Maintenance Status (US):

Litigation (US):

Opposition (EP):

License (EP):

EPO Procedural Status:

Front Page Drawing:

(19) Bundesrepublik Deutschland
Deutsches Patent- und Markenamt

(10) **DE 699 10 239 T2** 2004.06.24

(12) Übersetzung der europäischen Patentschrift

(97) EP 1 125 276 B1
(21) Deutsches Aktenzeichen: 699 10 239.1
(86) PCT-Aktenzeichen: PCT/CA99/01001
(96) Europäisches Aktenzeichen: 99 952 199.3
(87) PCT-Veröffentlichungs-Nr.: WO 00/25305
(86) PCT-Anmeldetag: 27.10.1999
(87) Veröffentlichungstag der PCT-Anmeldung: 04.05.2000
(97) Erstveröffentlichung durch das EPA: 22.08.2001
(97) Veröffentlichungstag der Patenterteilung beim EPA: 06.08.2003
(47) Veröffentlichungstag im Patentblatt: 24.06.2004

(51) Int Cl.7: **G10L 11/04**

(30) Unionspriorität:
2252170 27.10.1998 CA

(73) Patentinhaber:
Voiceage Corp., Ville Mont-Royal, Quebec, CA

(74) Vertreter:
Beetz & Partner, 80333 München

(84) Benannte Vertragsstaaten:
AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LI, LU, MC, NL, PT, SE

(72) Erfinder:
BESSETTE, Bruno, Rock Forest, CA; SALAMI, Redwan, Sherbrooke, CA; LEFEBVRE, Roch, Canton de Magog, CA

(54) Bezeichnung: **VERFAHREN UND VORRICHTUNG ZUR ADAPTIVEN BANDBREITENABHÄNGIGEN GRUNDFREQUENZSUCHE FÜR DIE KODIERUNG BREITBANDIGER SIGNALE**

Record 44/70 DE69910240T2 VORRICHTUNG UND VERFAHREN ZUR WIEDERHERSTELLUNG DES HOCHFREQUENZANTEILS EINES ÜBERABGETASTETEN SYNTHETISIERTEN BREITBANDSIGNALS

Publication Number: DE69910240T2 20040624
DE69910240D1 20030911

Title: VORRICHTUNG UND VERFAHREN ZUR WIEDERHERSTELLUNG DES HOCHFREQUENZANTEILS EINES ÜBERABGETASTETEN SYNTHETISIERTEN BREITBANDSIGNALS
Title - DWPI:
Priority Number: CA2252170A | WO1999CA990A
Priority Date: 1998-10-27 | 1999-10-27
Application Number: DE69910240A
Application Date: 1999-10-27
Publication Date: 2004-06-24
IPC Class Table:

IPC	Section	Class	Subclass	Class Group	Subgroup
G01L001104	G	G01	G01L	G01L0011	G01L001104
G01L002102	G	G01	G01L	G01L0021	G01L002102
G10L001300	G	G10	G10L	G10L0013	G10L001300
G10L001912	G	G10	G10L	G10L0019	G10L001912
H03H001706	H	H03	H03H	H03H0017	H03H001706
H03M000730	H	H03	H03M	H03M0007	H03M000730
H03M000736	H	H03	H03M	H03M0007	H03M000736
H04B000162	H	H04	H04B	H04B0001	H04B000162
H04B000726	H	H04	H04B	H04B0007	H04B000726
H04B001404	H	H04	H04B	H04B0014	H04B001404
H04Q000722	H	H04	H04Q	H04Q0007	H04Q000722
H04Q000732	H	H04	H04Q	H04Q0007	H04Q000732

IPC Class Table - DWPI:
Assignee/Applicant: Voiceage Corp. Ville Mont-Royal Quebec CA
Assignee - Current US:
JP F Terms:
JP FI Codes:
Assignee - Original: Voiceage Corp. Ville Mont-Royal Quebec CA
Any CPC Table:

Type	Invention	Additional	Version	Office
Current	**G10L 19/26**	-	20130101	EP

ECLA: G10L001926
Abstract:

In a method and device for recovering the high frequency content of a wideband signal previously down-sampled during encoding, and for injecting, during decoding, this high frequency content in an over-sampled synthesized version of the wideband signal to produce a full-spectrum synthesized wideband signal, a white noise generator produces a white noise sequence. Serially interconnected gain adjustment unit, spectral shaper and band-pass filter spectrally shapes the white noise sequence in relation to a set of shaping parameters representative of the down-sampled wideband signal such as a voicing factor, an energy scaling factor, a tilt scaling factor, and linear prediction filter coefficients. A signal injection circuit finally injects the spectrally-shaped white noise sequence in the over-sampled synthesized signal version to thereby produce the full-spectrum synthesized wideband signal.

Dans un procédé et un dispositif pour la récupération du contenu à haute fréquence d'un signal à large bande préalablement sous-échantillonné pendant le codage, et pour l'injection, pendant le décodage, de ce contenu à haute fréquence dans une version synthétisée suréchantillonée du signal à large bande, de manière qu'un signal à large bande synthétisé en spectre continu soit produit, un générateur de bruits blancs produit une séquence de bruits blancs. Une unité d'ajustement de gain un circuit de mise en forme spectrale et un filtre passe-bande, interconnectés en série, mettent en forme la séquence de bruits blancs par rapport à un ensemble de paramètres de mise en forme représentatifs du signal à large bande sous-échantillonné, tel qu'un facteur de verbalisation, un facteur de mise à l'échelle d'énergie, un facteur de mise à l'échelle de basculement et des coefficients de filtre de prédiction linéaire. Un circuit d'injection de signal injecte finalement la séquence de bruits blancs mise en forme spectralement dans la version de signal synthétisé suréchantillonné de sorte que le signal à large bande synthétisé en spectre continu soit produit.
Language of Publication: DE
INPADOC Legal Status Table:
Post-Issuance (US):
Reassignment (US) Table:
Maintenance Status (US):
Litigation (US):
Opposition (EP):
License (EP):
EPO Procedural Status:
Front Page Drawing:

(19) Bundesrepublik Deutschland
Deutsches Patent- und Markenamt

(10) **DE 699 10 240 T2** 2004.06.24

(12) **Übersetzung der europäischen Patentschrift**

(97) EP 1 125 284 B1
(21) Deutsches Aktenzeichen: [illegible]
(86) PCT-Aktenzeichen: [illegible]
(96) Europäisches Aktenzeichen: [illegible]
(87) PCT-Veröffentlichungs-Nr.: [illegible]
(86) PCT-Anmeldetag: 27.10.1999
(87) Veröffentlichungstag der PCT-Anmeldung: [illegible]
(97) Erstveröffentlichung durch das EPA: [illegible]
(97) Veröffentlichungstag der Patenterteilung beim EPA: [illegible]
(47) Veröffentlichungstag im Patentblatt: [illegible]

(51) Int Cl.⁷: G10L 21/02

(30) Unionspriorität: [illegible] 27.10.1998 CA

(73) Patentinhaber: Voiceage Corp., [illegible], CA

(74) Vertreter: König & Köster Patentanwälte, [illegible] München

(84) Benannte Vertragsstaaten: [illegible]

(72) Erfinder: [illegible]

(54) Bezeichnung: VORRICHTUNG UND VERFAHREN ZUR [illegible]

Anmerkung: [illegible]

Die Übersetzung ist gemäß [illegible]

Record 45/70 ES2212642T3 DISPOSITIVO DE CODIFICACION PERCEPTUAL Y METODO PARA LA CODIFICACION EFICAZ DE SEÑALES DE BANDA ANCHA.

Publication Number: ES2212642T3 20040716

Title: DISPOSITIVO DE CODIFICACION PERCEPTUAL Y METODO PARA LA CODIFICACION EFICAZ DE SEÑALES DE BANDA ANCHA.
Title - DWPI: Perceptual weighting device in digital wideband speech-audio encoder, filters preemphasized signal in relation to synthesis filter coefficient, to produce perceptually weighted signal
Priority Number: CA2252170A
Priority Date: 1998-10-27
Application Number: ES1999952201T
Application Date: 1999-10-27
Publication Date: 2004-07-16
IPC Class Table:

IPC	Section	Class	Subclass	Class Group	Subgroup
G01L001104	G	G01	G01L	G01L0011	G01L001104
G01L002102	G	G01	G01L	G01L0021	G01L002102
G10L001300	G	G10	G10L	G10L0013	G10L001300
G10L001912	G	G10	G10L	G10L0019	G10L001912
H03H001706	H	H03	H03H	H03H0017	H03H001706
H03M000730	H	H03	H03M	H03M0007	H03M000730
H03M000736	H	H03	H03M	H03M0007	H03M000736
H04B000162	H	H04	H04B	H04B0001	H04B000162
H04B000726	H	H04	H04B	H04B0007	H04B000726
H04B001404	H	H04	H04B	H04B0014	H04B001404
H04Q000722	H	H04	H04Q	H04Q0007	H04Q000722
H04Q000732	H	H04	H04Q	H04Q0007	H04Q000732

IPC Class Table - DWPI:

IPC - DWPI	Section - DWPI	Class - DWPI	Subclass - DWPI	Class Group - DWPI	Subgroup - DWPI
G01L001104	G	G01	G01L	G01L0011	G01L001104
G01L002102	G	G01	G01L	G01L0021	G01L002102
G10L001104	G	G10	G10L	G10L0011	G10L001104

G10L001300	G	G10	G10L	G10L0013	G10L001300
G10L001900	G	G10	G10L	G10L0019	G10L001900
G10L001904	G	G10	G10L	G10L0019	G10L001904
G10L001906	G	G10	G10L	G10L0019	G10L001906
G10L001912	G	G10	G10L	G10L0019	G10L001912
G10L001914	G	G10	G10L	G10L0019	G10L001914
G10L002102	G	G10	G10L	G10L0021	G10L002102
H03H001706	H	H03	H03H	H03H0017	H03H001706
H03M000730	H	H03	H03M	H03M0007	H03M000730
H03M000736	H	H03	H03M	H03M0007	H03M000736
H04B000162	H	H04	H04B	H04B0001	H04B000162
H04B001404	H	H04	H04B	H04B0014	H04B001404
H04B000726	H	H04	H04B	H04B0007	H04B000726
H04Q000722	H	H04	H04Q	H04Q0007	H04Q000722
H04Q000732	H	H04	H04Q	H04Q0007	H04Q000732

Assignee/Applicant: VOICEAGE CORP
Assignee - Current US:
JP F Terms:
JP FI Codes:
Assignee - Original:
Any CPC Table:

Type	Invention	Additional	Version	Office
Current	**G10L 19/26**	-	20130101	EP

ECLA: G10L001926
Abstract:

Un dispositivo de ponderación perceptual para generar una señal perceptualmente ponderada como respuesta a una señal de banda ancha con el fin de reducir una diferencia entre una señal ponderada de banda ancha y una señal de banda ancha ponderada sintetizada posteriormente, comprendiendo dicho dispositivo de ponderación perceptual: a) un filtro (103) de pre-énfasis de señales que responde a la señal de banda ancha para reforzar el contenido de alta frecuencia de la señal de banda ancha para generar así una señal (S) pre-enfatizada; b) un calculador (104) de filtro de síntesis que responde a dicha señal pre-enfatizada para generar coeficientes (A(z)) del filtro de síntesis; y c) un filtro (105) de ponderación perceptual, que responde a dicha señal (S)

pre-enfatizada y a dichos coeficientes (A(z)) del filtro de síntesis, para filtrar dicha señal pre-enfatizada en relación con dichos coeficientes del filtro de síntesis para generar así la señal (Sw) ponderada perceptualmente; teniendo dichofiltro de ponderación perceptual una función de transferencia con un denominador fijo por lo que la ponderación de dicha señal de banda ancha en una región de formación está sustancialmente desacoplada de una inclinación espectral de dicha señal de banda ancha.

Language of Publication: ES

INPADOC Legal Status Table:

Post-Issuance (US):

Reassignment (US) Table:

Maintenance Status (US):

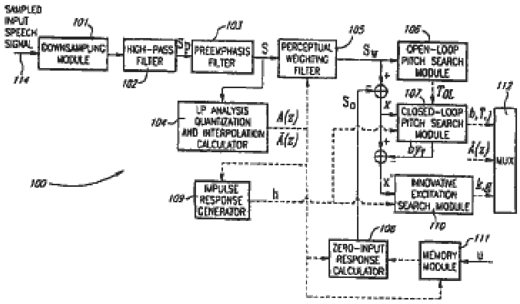
Litigation (US):

Opposition (EP):

License (EP):

EPO Procedural Status:

Front Page Drawing:



Record 46/70 HK1043234A1 PERCEPTUAL WEIGHTING DEVICE AND METHOD FOR EFFICIENT CODING OF WIDE BAND VOICE SIGNAL, AND CELLULAR COMMUNICATION SYSTEM USING SAID DEVICE

Publication Number: HK1043234A1 20040716

Title: PERCEPTUAL WEIGHTING DEVICE AND METHOD FOR EFFICIENT CODING OF WIDE BAND VOICE SIGNAL, AND CELLULAR COMMUNICATION SYSTEM USING SAID DEVICE
Title - DWPI:
Priority Number: CA2252170A | WO1999CA1010A
Priority Date: 1998-10-27 | 1999-10-27
Application Number: HK2002104592A
Application Date: 2002-06-20
Publication Date: 2004-07-16
IPC Class Table:

IPC	Section	Class	Subclass	Class Group	Subgroup
G01L001104	G	G01	G01L	G01L0011	G01L001104
G01L002102	G	G01	G01L	G01L0021	G01L002102
G10L001300	G	G10	G10L	G10L0013	G10L001300
G10L001912	G	G10	G10L	G10L0019	G10L001912
H03H001706	H	H03	H03H	H03H0017	H03H001706
H03M000730	H	H03	H03M	H03M0007	H03M000730
H03M000736	H	H03	H03M	H03M0007	H03M000736
H04B000162	H	H04	H04B	H04B0001	H04B000162
H04B000726	H	H04	H04B	H04B0007	H04B000726
H04B001404	H	H04	H04B	H04B0014	H04B001404
H04Q000722	H	H04	H04Q	H04Q0007	H04Q000722
H04Q000732	H	H04	H04Q	H04Q0007	H04Q000732

IPC Class Table - DWPI:
Assignee/Applicant: VOICEAGE CORP
Assignee - Current US:
JP F Terms:
JP FI Codes:
Assignee - Original:
Any CPC Table:

Type	Invention	Additional	Version	Office

Current	**G10L 19/26**	-	20130101	EP

ECLA: G10L001926
Abstract:
Language of Publication: ZH
INPADOC Legal Status Table:
Post-Issuance (US):
Reassignment (US) Table:
Maintenance Status (US):
Litigation (US):
Opposition (EP):
License (EP):
EPO Procedural Status:
Front Page Drawing:

(No drawing/image available)

Record 47/70 CN1165891C High frequency content recovering method and device for over-sampled synthesized wideband signal **|** Method and apparatus for synthetic wideband signal for the sampling high frequency component recovering the

Publication Number: CN1165891C 20040908
CN1328683A 20011226

Title: High frequency content recovering method and device for over-sampled synthesized wideband signal **|** Method and apparatus for synthetic wideband signal for the sampling high frequency component recovering the
Title - DWPI: Periodicity enhancing device of excitation signal, reduces energy of low frequency portion of innovative code vector in relation to periodicity factor related to wideband signal
Priority Number: CA2252170A
Priority Date: 1998-10-27
Application Number: CN1999813640A
Application Date: 1999-10-27
Publication Date: 2004-09-08
IPC Class Table:

IPC	Section	Class	Subclass	Class Group	Subgroup
G01L001104	G	G01	G01L	G01L0011	G01L001104
G01L002102	G	G01	G01L	G01L0021	G01L002102
G10L001300	G	G10	G10L	G10L0013	G10L001300
G10L001912	G	G10	G10L	G10L0019	G10L001912
H03H001706	H	H03	H03H	H03H0017	H03H001706
H03M000730	H	H03	H03M	H03M0007	H03M000730
H03M000736	H	H03	H03M	H03M0007	H03M000736
H04B000162	H	H04	H04B	H04B0001	H04B000162
H04B000726	H	H04	H04B	H04B0007	H04B000726
H04B001404	H	H04	H04B	H04B0014	H04B001404
H04Q000722	H	H04	H04Q	H04Q0007	H04Q000722
H04Q000732	H	H04	H04Q	H04Q0007	H04Q000732

IPC Class Table - DWPI:

IPC - DWPI	Section - DWPI	Class - DWPI	Subclass - DWPI	Class Group - DWPI	Subgroup - DWPI
G01L001104	G	G01	G01L	G01L0011	G01L001104
G01L002102	G	G01	G01L	G01L0021	G01L002102

G10L001300	G	G10	G10L	G10L0013	G10L001300
G10L001912	G	G10	G10L	G10L0019	G10L001912
H03H001706	H	H03	H03H	H03H0017	H03H001706
H03M000730	H	H03	H03M	H03M0007	H03M000730
H03M000736	H	H03	H03M	H03M0007	H03M000736
H04B000162	H	H04	H04B	H04B0001	H04B000162
H04B001404	H	H04	H04B	H04B0014	H04B001404
H04B000726	H	H04	H04B	H04B0007	H04B000726
H04J000316	H	H04	H04J	H04J0003	H04J000316
H04J000324	H	H04	H04J	H04J0003	H04J000324
H04Q000722	H	H04	H04Q	H04Q0007	H04Q000722
H04Q000732	H	H04	H04Q	H04Q0007	H04Q000732
H04W007204	H	H04	H04W	H04W0072	H04W007204
H04W007212	H	H04	H04W	H04W0072	H04W007212
H04W007408	H	H04	H04W	H04W0074	H04W007408
G10L002102	G	G10	G10L	G10L0021	G10L002102
G10L001914	G	G10	G10L	G10L0019	G10L001914

Assignee/Applicant: VOICEAGE CORP,CA
Assignee - Current US:
JP F Terms:
JP FI Codes:
Assignee - Original: VOICEAGE CORP
Any CPC Table:

Type	Invention	Additional	Version	Office
Current	**G10L 19/26**	-	20130101	EP

ECLA: G10L001926
Abstract:

In a method and device for recovering the high frequency content of a wideband signal previously down-sampled during encoding, and for injecting, during decoding, this high frequency content in an over-sampled synthesized version of the wideband signal to produce a full-spectrum synthesized wideband signal, a white noise generator produces a white noise sequence. Serially interconnected gain adjustment unit, spectral shaper and band-pass filter spectrally shapes the

white noise sequence in relation to a set of shaping parameters representative of the down-sampled wideband signal such as a voicing factor, an energy scaling factor, a tilt scaling factor, and linear prediction filter coefficients. A signal injection circuit finally injects the spectrally-shaped white noise sequence in the over-sampled synthesized signal version to thereby produce the full-spectrum synthesized wideband signal.

When used for a wideband signal is down-sampling the front face the recovering high frequency component, and used for the high frequency component of the first input sampling the sampled wideband signal in version, so as to generate a full-frequency spectrum into a method and apparatus for wideband signal, a white noise generator generates a white noise sequence to the lower. Connection in series the gain adjusting module, frequency spectrum shaper and a band-pass filter according to relative to the first set of shaped parameter sampling wideband signal such as a voice factor, an energy scale factor, an inclined amplification factor, and linear prediction coefficient and the frequency spectrum shaping for the white noise sequence. At last, a signal injection circuit to the frequency spectrum is shaped white noise sequence is inputted to the in the sampled synthesized signal version, so as to generate the full frequency spectrum synthesized wideband signal.

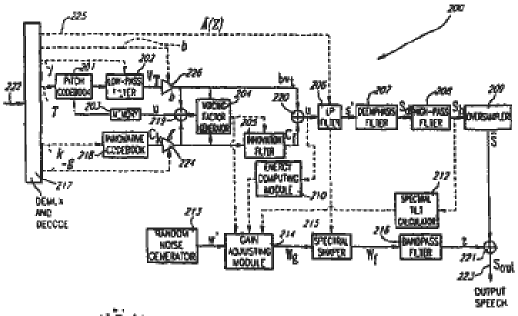
Dans un procédé et un dispositif pour la récupération du contenu à haute fréquence d'un signal à large bande préalablement sous-échantillonné pendant le codage, et pour l'injection, pendant le décodage, de ce contenu à haute fréquence dans une version synthétisée suréchantillonée du signal à large bande, de manière qu'un signal à large bande synthétisé en spectre continu soit produit, un générateur de bruits blancs produit une séquence de bruits blancs. Une unité d'ajustement de gain un circuit de mise en forme spectrale et un filtre passe-bande, interconnectés en série, mettent en forme la séquence de bruits blancs par rapport à un ensemble de paramètres de mise en forme représentatifs du signal à large bande sous-échantillonné, tel qu'un facteur de verbalisation, un facteur de mise à l'échelle d'énergie, un facteur de mise à l'échelle de basculement et des coefficients de filtre de prédiction linéaire. Un circuit d'injection de signal injecte finalement la séquence de bruits blancs mise en forme spectralement dans la version de signal synthétisé suréchantillonné de sorte que le signal à large bande synthétisé en spectre continu soit produit.

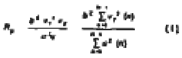
Language of Publication: ZH

INPADOC Legal Status Table:

Gazette Date	**Code**	**INPADOC Legal Status Impact**
2004-09-08	C14	+
Description: GRANTED		
2001-12-26	C10	-
Description: REQUEST OF EXAMINATION AS TO SUBSTANCE		
2001-12-26	C06	+
Description: PUBLICATION		

Post-Issuance (US):
Reassignment (US) Table:
Maintenance Status (US):
Litigation (US):
Opposition (EP):
License (EP):
EPO Procedural Status:
Front Page Drawing:





Record 48/70 CN1165892C Method and apparatus for periodicity enhancement in decoding wideband signals | Method and apparatus for periodically when the particular picture is eventually decoded wideband signal enhanced

Publication Number: CN1165892C 20040908
CN1328684A 20011226

Title: Method and apparatus for periodicity enhancement in decoding wideband signals | Method and apparatus for periodically when the particular picture is eventually decoded wideband signal enhanced
Title - DWPI: Periodicity enhancing device of excitation signal, reduces energy of low frequency portion of innovative code vector in relation to periodicity factor related to wideband signal
Priority Number: CA2252170A
Priority Date: 1998-10-27
Application Number: CN1999813641A
Application Date: 1999-10-27
Publication Date: 2004-09-08
IPC Class Table:

IPC	Section	Class	Subclass	Class Group	Subgroup
G01L001104	G	G01	G01L	G01L0011	G01L001104
G01L002102	G	G01	G01L	G01L0021	G01L002102
G10L001300	G	G10	G10L	G10L0013	G10L001300
G10L001912	G	G10	G10L	G10L0019	G10L001912
H03H001706	H	H03	H03H	H03H0017	H03H001706
H03M000730	H	H03	H03M	H03M0007	H03M000730
H03M000736	H	H03	H03M	H03M0007	H03M000736
H04B000162	H	H04	H04B	H04B0001	H04B000162
H04B000726	H	H04	H04B	H04B0007	H04B000726
H04B001404	H	H04	H04B	H04B0014	H04B001404
H04Q000722	H	H04	H04Q	H04Q0007	H04Q000722
H04Q000732	H	H04	H04Q	H04Q0007	H04Q000732

IPC Class Table - DWPI:

IPC - DWPI	Section - DWPI	Class - DWPI	Subclass - DWPI	Class Group - DWPI	Subgroup - DWPI
G01L001104	G	G01	G01L	G01L0011	G01L001104
G01L002102	G	G01	G01L	G01L0021	G01L002102

G10L001300	G	G10	G10L	G10L0013	G10L001300
G10L001912	G	G10	G10L	G10L0019	G10L001912
H03H001706	H	H03	H03H	H03H0017	H03H001706
H03M000730	H	H03	H03M	H03M0007	H03M000730
H03M000736	H	H03	H03M	H03M0007	H03M000736
H04B000162	H	H04	H04B	H04B0001	H04B000162
H04B001404	H	H04	H04B	H04B0014	H04B001404
H04B000726	H	H04	H04B	H04B0007	H04B000726
H04J000316	H	H04	H04J	H04J0003	H04J000316
H04J000324	H	H04	H04J	H04J0003	H04J000324
H04Q000722	H	H04	H04Q	H04Q0007	H04Q000722
H04Q000732	H	H04	H04Q	H04Q0007	H04Q000732
H04W007204	H	H04	H04W	H04W0072	H04W007204
H04W007212	H	H04	H04W	H04W0072	H04W007212
H04W007408	H	H04	H04W	H04W0074	H04W007408
G10L002102	G	G10	G10L	G10L0021	G10L002102
G10L001914	G	G10	G10L	G10L0019	G10L001914

Assignee/Applicant: VOICEAGE CORP,CA
Assignee - Current US:
JP F Terms:
JP FI Codes:
Assignee - Original: VOICEAGE CORP
Any CPC Table:

Type	Invention	Additional	Version	Office
Current	**G10L 19/26**	-	20130101	EP

ECLA: G10L001926
Abstract:

The present invention relates to a method and device for enhancing periodicity of an excitation signal produced in relation to a pitch codevector and an innovative codevector for supplying a signal synthesis filter in view of producing a synthesized wideband signal. In this periodicity enhancing device and method, a factor generator is responsive to the adaptive and innovative codevectors for calculating a periodicity factor. An innovation filter subsequently processes the

innovative codevector in relation to this periodicity factor to reduce energy of a low frequency portion of the innovative codevector and enhance periodicity of a low frequency portion of the excitation signal. As an example, the innovation filter has a transfer function of the form: F(z)=-(z)+1-(z)-1 where is a periodicity factor, and the factor generator calculates the periodicity factor using the relation: = qR_p bounded by < q where q is an enhancement factor set for example to 0.25, and where R_p is represented by formula (I) where v_T is the pitch codevector, b is a pitch gain, N is a subframe length, and u is the excitation signal.

The present invention relates to a method and device for enhancing periodicity of an excitation signal produced in relation to a pitch codevector and an innovative codevector for supplying a signal synthesis filter in view of producing a synthesized wideband signal. In this periodicity enhancing device and method, a factor generator is responsive to the adaptive and innovative codevectors for calculating a periodicity factor. An innovation filter subsequently processes the innovative codevector in relation to this periodicity factor to reduce energy of a low frequency portion of the innovative codevector and enhance periodicity of a low frequency portion of the excitation signal. As an example, the innovation filter has a transfer function of the form: F(z)=-alpha (z)+1- alpha (z)<-1> where alpha is a periodicity factor, and the factor generator calculates the periodicity factor alpha using the relation: alpha = qR?p? bounded by alpha < q where q is an enhancement factor set for example to 0.25, and where R?p? is represented by formula (I) where v?T? is the pitch codevector, b is a pitch gain, N is a subframe length, and u is the excitation signal.

This invention claims a method for enhancing a periodicity of an excitation signal of a method and a device, to generate the excitation signal is a tone code vectors and a new code vector relevant to provide a wideband signal providing a signal synthesis filter. A periodic factor in the periodic enhanced method and device, a factor generator in response to the adaptive code vector and new, calculating the correlation with the wideband signal. After that, relative to the periodic factor, a new filter for filtering the new code vector, so as to reduce the new code vector to low frequency component of the energy, and the enhancement of the excitation signal is a low frequency component part. $num As the example, the transfer function of the new filter is one of the following form: F (z) = alpha z + 1- z

La présente invention concerne un procédé et un dispositif destinés à améliorer la périodicité d'un signal d'excitation produit par rapport à un vecteur de code de hauteur et un vecteur de code innovant permettant d'obtenir un filtre de synthèse de signal en vue de produire un signal synthétisé à large bande. Dans ce dispositif et ce procédé d'amélioration de la périodicité, un générateur de facteurs répond aux vecteurs de code adaptatifs et innovants pour calculer un facteur de périodicité. Un filtre d'innovation traite ensuite le vecteur de code innovant par rapport à ce facteur de périodicité pour réduire l'énergie d'une partie basse fréquence du vecteur de code innovant et améliorer la périodicité d'une partie basse fréquence du signal d'excitation. A titre d'exemple, le filtre d'innovation présente une fonction de transfert ayant la forme: F(z)=(z)+1-(z)-1 dans laquelle représente un facteur de périodicité, et le générateur de facteur calcule le facteur de périodicité à l'aide de la relation: = qR_p limitée par < q dans laquelle q représente un facteur d'amélioration fixé par exemple à 0,25, et dans laquelle R_p est représenté par la formule (I) où V_t représente le vecteur de code de hauteur, b représente un gain de hauteur, N représente une longueur de sous-bloc et u représente le signal d'excitation.

La présente invention concerne un procédé et un dispositif destinés à améliorer la périodicité d'un signal d'excitation produit par rapport à un vecteur de code de hauteur et un vecteur de code innovant permettant d'obtenir un filtre de synthèse de signal en vue de produire un signal synthétisé à large bande. Dans ce dispositif et ce procédé d'amélioration de la périodicité, un générateur de facteurs répond aux vecteurs de code adaptatifs et innovants pour calculer un facteur de périodicité. Un filtre d'innovation traite ensuite le vecteur de code innovant par rapport à ce facteur de périodicité pour réduire l'énergie d'une partie basse fréquence du vecteur de code innovant et améliorer la périodicité d'une partie basse fréquence du signal d'excitation. A titre d'exemple, le filtre d'innovation présente une fonction de transfert ayant la forme: F(z)= alpha (z)+1- alpha (z)<-1> dans laquelle alpha représente un facteur de périodicité, et le générateur de facteur calcule le facteur alpha de périodicité à l'aide de la relation: alpha = qR?p? limitée par alpha < q dans laquelle q représente un facteur d'amélioration fixé par exemple à 0,25, et dans laquelle Rp est représenté par la formule (I) où V?t? représente le vecteur de code de hauteur, b représente un gain de hauteur, N représente une longueur de sous-bloc et u représente le signal d'excitation.

Language of Publication: ZH

INPADOC Legal Status Table:

Gazette Date	Code	INPADOC Legal Status Impact
2004-09-08	C14	+
Description: GRANTED		
2001-12-26	C10	-
Description: REQUEST OF EXAMINATION AS TO SUBSTANCE		
2001-12-26	C06	+
Description: PUBLICATION		

Post-Issuance (US):

Reassignment (US) Table:

Maintenance Status (US):

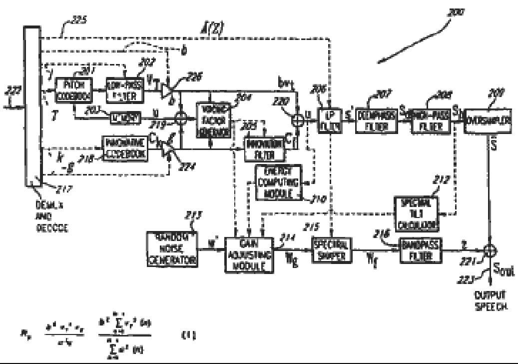
Litigation (US):

Opposition (EP):

License (EP):

EPO Procedural Status:

Front Page Drawing:



Record 49/70 JP03566652B2 The auditory-weights attachment device and method for the efficient encoding of a broadband signal

Publication Number: JP03566652B2 20040915
JP2002528776A 20020903

Title: The auditory-weights attachment device and method for the efficient encoding of a broadband signal
Title - DWPI: Perceptual weighting device in digital wideband speech-audio encoder, filters preemphasized signal in relation to synthesis filter coefficient, to produce perceptually weighted signal
Priority Number: CA2252170A | WO1999CA1010A
Priority Date: 1998-10-27 | 1999-10-27
Application Number: JP2000578811A
Application Date: 1999-10-27
Publication Date: 2004-09-15
IPC Class Table:

IPC	Section	Class	Subclass	Class Group	Subgroup
G01L001104	G	G01	G01L	G01L0011	G01L001104
G01L002102	G	G01	G01L	G01L0021	G01L002102
G10L001300	G	G10	G10L	G10L0013	G10L001300
G10L001912	G	G10	G10L	G10L0019	G10L001912
H03H001706	H	H03	H03H	H03H0017	H03H001706
H03M000730	H	H03	H03M	H03M0007	H03M000730
H03M000736	H	H03	H03M	H03M0007	H03M000736
H04B000162	H	H04	H04B	H04B0001	H04B000162
H04B000726	H	H04	H04B	H04B0007	H04B000726
H04B001404	H	H04	H04B	H04B0014	H04B001404
H04Q000722	H	H04	H04Q	H04Q0007	H04Q000722
H04Q000732	H	H04	H04Q	H04Q0007	H04Q000732

IPC Class Table - DWPI:

IPC - DWPI	Section - DWPI	Class - DWPI	Subclass - DWPI	Class Group - DWPI	Subgroup - DWPI
G01L001104	G	G01	G01L	G01L0011	G01L001104
G01L002102	G	G01	G01L	G01L0021	G01L002102

G10L001104	G	G10	G10L	G10L0011	G10L001104
G10L001300	G	G10	G10L	G10L0013	G10L001300
G10L001900	G	G10	G10L	G10L0019	G10L001900
G10L001904	G	G10	G10L	G10L0019	G10L001904
G10L001906	G	G10	G10L	G10L0019	G10L001906
G10L001912	G	G10	G10L	G10L0019	G10L001912
G10L001914	G	G10	G10L	G10L0019	G10L001914
G10L002102	G	G10	G10L	G10L0021	G10L002102
H03H001706	H	H03	H03H	H03H0017	H03H001706
H03M000730	H	H03	H03M	H03M0007	H03M000730
H03M000736	H	H03	H03M	H03M0007	H03M000736
H04B000162	H	H04	H04B	H04B0001	H04B000162
H04B001404	H	H04	H04B	H04B0014	H04B001404
H04B000726	H	H04	H04B	H04B0007	H04B000726
H04Q000722	H	H04	H04Q	H04Q0007	H04Q000722
H04Q000732	H	H04	H04Q	H04Q0007	H04Q000732

Assignee/Applicant: VOICEAGE CORP
Assignee - Current US:
JP F Terms: | 5D045CA01 | 5D045CB01 | 5J064AA01 | 5J064BA06 | 5J064BB03 | 5J064BC01 | 5J064BC08 | 5J064BC12 | 5J064BC16 | 5J064BC25 | 5J064BD02 | 5K066BB01 | 5K066DD33 | 5K066FF09
JP FI Codes: | G10L000914-H | G10L000914-M | G10L000914-S | G10L001912 | G10L001912-Z | G10L001914-520A | G10L001926-A | H03M000736 | H04B000162
Assignee - Original: VOICEAGE CORP
Any CPC Table:

Type	Invention	Additional	Version	Office
Current	**G10L 19/26**	-	20130101	EP

ECLA: G10L001926
Abstract:

A perceptual weighting device for producing a perceptually weighted signal in response to a wideband signal comprises a signal preemphasis filter, a synthesis filter claculator, and a perceptual weighting filter. The signal preemphasis filter enhances high frequency content of the wideband signal to thereby produce a preemphasised signal. The signal preemphasis filter has a

transfer function of the form: P(z)=1-z-1 wherein is a preemphasis factor having a value located between 0 and 1. The synthesis filter calculator is responsive to the preemphasised signal for producing synthesis filter coefficients. Finally, the perceptual weighting filter processes the preemphasised signal in relation to the synthesis filter coefficients to produce the perceptually weighted signal. The perceptual weighting filter has a transfer function, with fixed denominator, of the form: W(z) A (z/$_1$) / (1-$_2$z-1) where 0<$_2$<$_1$ 1 and $_2$ and $_1$ are weighting control values, whereby weighting of the wideband signal in a format region is substantially decoupled from a spectral tilt of this wideband signal.

A perceptual weighting device for producing a perceptually weighted signal in response to a wideband signal comprises a signal preemphasis filter, a synthesis filter claculator, and a perceptual weighting filter. The signal preemphasis filter enhances high frequency content of the wideband signal to thereby produce a preemphasised signal. The signal preemphasis filter has a transfer function of the form: P(z)=1 - mu z<-1> wherein mu is a preemphasis factor having a value located between 0 and 1. The synthesis filter calculator is responsive to the preemphasised signal for producing synthesis filter coefficients. Finally, the perceptual weighting filter processes the preemphasised signal in relation to the synthesis filter coefficients to produce the perceptually weighted signal. The perceptual weighting filter has a transfer function, with fixed denominator, of the form: W(z) A (z/ gamma 1) / (1- gamma 2z<-1>) where 0< gamma 2< gamma 1 </=1 and gamma 2 and gamma 1 are weighting control values, whereby weighting of the wideband signal in a format region is substantially decoupled from a spectral tilt of this wideband signal.

Un dispositif de pondération perceptive destiné à produire un signal pondéré perceptivement en réponse à un signal à large bande comprend un filtre de préaccentuation de signal, un calculateur de filtre de synthèse, et un filtre de pondération perceptive. Le filtre de préaccentuation du signal augmente le contenu de haute fréquence du signal à large bande pour produire ainsi un signal préaccentué. Ce filtre de préaccentuation du signal présente une fonction de transfert ayant la forme: P(z) = 1-z-1, dans laquelle est un facteur de préaccentuation ayant une valeur située entre 0 et 1. Le calculateur du filtre de synthèse répond au signal préaccentué afin de produire des coefficients du filtre de synthèse. Enfin, le filtre de pondération perceptive traite le signal préaccentué par rapport aux coefficients du filtre de synthèse pour produire le signal à pondération perceptive. Le filtre à pondération perceptive a une fonction de transfert, avec un dénominateur fixe, ayant la forme: W(z) = A(z)/$_1$) / (1 $_2$z-1) dans laquelle 0 < $_2$< $_1$ 1 et $_2$ ainsi que $_1$ sont des valeurs de régulation de pondération, de manière que la pondération du signal à large bande dans une région de formant est sensiblement découplée d'une inclinaison spectrale de ce signal à large bande.

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gamma 2 < gamma 1 </= 1 et gamma 2 ainsi que gamma 1 sont des valeurs de régulation de pondération, de manière que la pondération du signal à large bande dans une région de formant est sensiblement découplée d'une inclinaison spectrale de ce signal à large bande.

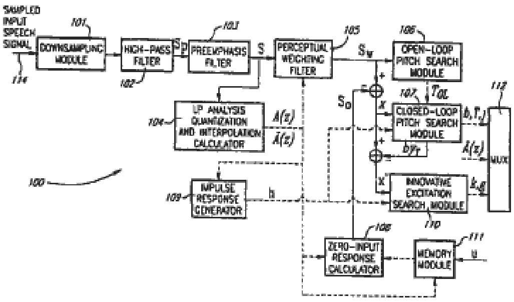
Language of Publication: JA

INPADOC Legal Status Table:

Gazette Date	Code	INPADOC Legal Status Impact
2015-03-31	R250	+
Description: RECEIPT OF ANNUAL FEES JAPANESE INTERMEDIATE CODE: R250		
2014-06-03	R250	+
Description: RECEIPT OF ANNUAL FEES JAPANESE INTERMEDIATE CODE: R250		
2012-06-05	FPAY	+
Description: RENEWAL FEE PAYMENT (PRS DATE IS RENEWAL DATE OF DATABASE) PAYMENT UNTIL: 20130618		
2012-05-31	FPAY	+
Description: RENEWAL FEE PAYMENT (PRS DATE IS RENEWAL DATE OF DATABASE) PAYMENT UNTIL: 20120618		
2011-06-07	FPAY	+
Description: RENEWAL FEE PAYMENT (PRS DATE IS RENEWAL DATE OF DATABASE) PAYMENT UNTIL: 20120618		
2011-06-02	FPAY	+
Description: RENEWAL FEE PAYMENT (PRS DATE IS RENEWAL DATE OF DATABASE) PAYMENT UNTIL: 20110618		
2010-06-08	FPAY	+
Description: RENEWAL FEE PAYMENT (PRS DATE IS RENEWAL DATE OF DATABASE) PAYMENT UNTIL: 20110618		
2009-06-09	FPAY	+
Description: RENEWAL FEE PAYMENT (PRS DATE IS RENEWAL DATE OF DATABASE) PAYMENT UNTIL: 20100618		
2009-06-04	FPAY	+
Description: RENEWAL FEE PAYMENT (PRS DATE IS RENEWAL DATE OF DATABASE) PAYMENT UNTIL: 20090618		
2008-06-10	FPAY	+
Description: RENEWAL FEE PAYMENT (PRS DATE IS RENEWAL DATE OF DATABASE) PAYMENT UNTIL: 20090618		

2008-06-05	FPAY	+
Description: RENEWAL FEE PAYMENT (PRS DATE IS RENEWAL DATE OF DATABASE) PAYMENT UNTIL: 20080618		
2007-06-05	R250	+
Description: RECEIPT OF ANNUAL FEES JAPANESE INTERMEDIATE CODE: R250		
2004-06-18	R150	+
Description: CERTIFICATE OF PATENT (=GRANT) OR REGISTRATION OF UTILITY MODEL JAPANESE INTERMEDIATE CODE: R150		
2004-06-17	A61	+
Description: FIRST PAYMENT OF ANNUAL FEES (DURING GRANT PROCEDURE) JAPANESE INTERMEDIATE CODE: A61 2004-06-10		
2004-05-12	A01	+
Description: WRITTEN DECISION TO GRANT A PATENT OR TO GRANT A REGISTRATION (UTILITY MODEL) JAPANESE INTERMEDIATE CODE: A01 2004-05-11		
2004-05-06	TRDD	+
Description: DECISION OF GRANT OR REJECTION WRITTEN		

Post-Issuance (US):
Reassignment (US) Table:
Maintenance Status (US):
Litigation (US):
Opposition (EP):
License (EP):
EPO Procedural Status:
Front Page Drawing:



Record 50/70 US6795805B1 Periodicity enhancement in decoding wideband signals

Publication Number: US6795805B1 20040921

Title: Periodicity enhancement in decoding wideband signals
Title - DWPI: Periodicity enhancing device of excitation signal, reduces energy of low frequency portion of innovative code vector in relation to periodicity factor related to wideband signal
Priority Number: CA2252170A | WO1999CA1009A
Priority Date: 1998-10-27 | 1999-10-27
Application Number: US2001830331A
Application Date: 2001-07-23
Publication Date: 2004-09-21
IPC Class Table:

IPC	Section	Class	Subclass	Class Group	Subgroup
G01L001104	G	G01	G01L	G01L0011	G01L001104
G01L002102	G	G01	G01L	G01L0021	G01L002102
G10L001300	G	G10	G10L	G10L0013	G10L001300
G10L001912	G	G10	G10L	G10L0019	G10L001912
H03H001706	H	H03	H03H	H03H0017	H03H001706
H03M000730	H	H03	H03M	H03M0007	H03M000730
H03M000736	H	H03	H03M	H03M0007	H03M000736
H04B000162	H	H04	H04B	H04B0001	H04B000162
H04B000726	H	H04	H04B	H04B0007	H04B000726
H04B001404	H	H04	H04B	H04B0014	H04B001404
H04Q000722	H	H04	H04Q	H04Q0007	H04Q000722
H04Q000732	H	H04	H04Q	H04Q0007	H04Q000732

IPC Class Table - DWPI:

IPC - DWPI	Section - DWPI	Class - DWPI	Subclass - DWPI	Class Group - DWPI	Subgroup - DWPI
G01L001104	G	G01	G01L	G01L0011	G01L001104
G01L002102	G	G01	G01L	G01L0021	G01L002102
G10L001300	G	G10	G10L	G10L0013	G10L001300
G10L001912	G	G10	G10L	G10L0019	G10L001912
H03H001706	H	H03	H03H	H03H0017	H03H001706

H03M000730	H	H03	H03M	H03M0007	H03M000730
H03M000736	H	H03	H03M	H03M0007	H03M000736
H04B000162	H	H04	H04B	H04B0001	H04B000162
H04B001404	H	H04	H04B	H04B0014	H04B001404
H04B000726	H	H04	H04B	H04B0007	H04B000726
H04J000316	H	H04	H04J	H04J0003	H04J000316
H04J000324	H	H04	H04J	H04J0003	H04J000324
H04Q000722	H	H04	H04Q	H04Q0007	H04Q000722
H04Q000732	H	H04	H04Q	H04Q0007	H04Q000732
H04W007204	H	H04	H04W	H04W0072	H04W007204
H04W007212	H	H04	H04W	H04W0072	H04W007212
H04W007408	H	H04	H04W	H04W0074	H04W007408
G10L002102	G	G10	G10L	G10L0021	G10L002102
G10L001914	G	G10	G10L	G10L0019	G10L001914

Assignee/Applicant: Voiceage Corporation,Quebec,CA
Assignee - Current US: SAINT LAWRENCE COMMUNICATIONS LLC
JP F Terms:
JP FI Codes:
Assignee - Original: Voiceage Corporation
Any CPC Table:

Type	Invention	Additional	Version	Office
Current	**G10L 19/26**	-	20130101	EP

ECLA: G10L001926
Abstract:

An alternative approach by which periodicity enhancement of an excitation signal is achieved through filtering an innovative codevector by an innovation filter to reduce low frequency content of the innovative codevector and enhance the periodicity at low frequencies more than high frequencies.

La présente invention concerne un procédé et un dispositif destinés à améliorer la périodicité d'un signal d'excitation produit par rapport à un vecteur de code de hauteur et un vecteur de code innovant permettant d'obtenir un filtre de synthèse de signal en vue de produire un signal synthétisé à large bande. Dans ce dispositif et ce procédé d'amélioration de la périodicité, un générateur de facteurs répond aux vecteurs de code adaptatifs et innovants pour calculer un

facteur de périodicité. Un filtre d'innovation traite ensuite le vecteur de code innovant par rapport à ce facteur de périodicité pour réduire l'énergie d'une partie basse fréquence du vecteur de code innovant et améliorer la périodicité d'une partie basse fréquence du signal d'excitation. A titre d'exemple, le filtre d'innovation présente une fonction de transfert ayant la forme: F(z)=(z)+1-(z)-1 dans laquelle représente un facteur de périodicité, et le générateur de facteur calcule le facteur de périodicité à l'aide de la relation: = qR_p limitée par <q dans laquelle q représente un facteur d'amélioration fixé par exemple à 0,25, et dans laquelle R_p est représenté par la formule (I) où V_t représente le vecteur de code de hauteur, b représente un gain de hauteur, N représente une longueur de sous-bloc et u représente le signal d'excitation.

La présente invention concerne un procédé et un dispositif destinés à améliorer la périodicité d'un signal d'excitation produit par rapport à un vecteur de code de hauteur et un vecteur de code innovant permettant d'obtenir un filtre de synthèse de signal en vue de produire un signal synthétisé à large bande. Dans ce dispositif et ce procédé d'amélioration de la périodicité, un générateur de facteurs répond aux vecteurs de code adaptatifs et innovants pour calculer un facteur de périodicité. Un filtre d'innovation traite ensuite le vecteur de code innovant par rapport à ce facteur de périodicité pour réduire l'énergie d'une partie basse fréquence du vecteur de code innovant et améliorer la périodicité d'une partie basse fréquence du signal d'excitation. A titre d'exemple, le filtre d'innovation présente une fonction de transfert ayant la forme: F(z)= alpha (z)+1- alpha (z)<-1> dans laquelle alpha représente un facteur de périodicité, et le générateur de facteur calcule le facteur alpha de périodicité à l'aide de la relation: alpha = qR?p? limitée par alpha < q dans laquelle q représente un facteur d'amélioration fixé par exemple à 0,25, et dans laquelle Rp est représenté par la formule (I) où V?t? représente le vecteur de code de hauteur, b représente un gain de hauteur, N représente une longueur de sous-bloc et u représente le signal d'excitation.

Language of Publication: EN

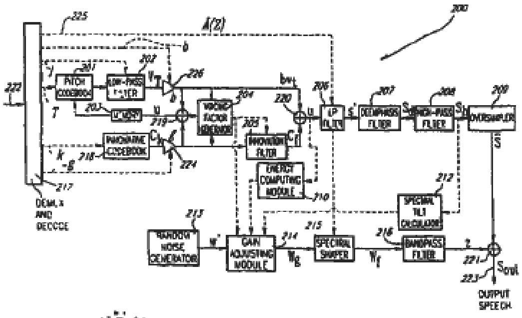
INPADOC Legal Status Table:

Gazette Date	Code	INPADOC Legal Status Impact
2014-01-23	AS	-
Description: ASSIGNMENT SAINT LAWRENCE COMMUNICATIONS LLC, TEXAS ASSIGNMENT OF ASSIGNORS INTEREST; ASSIGNOR:VOICEAGE CORPORATION; REEL/FRAME:032032/0113 2013-12-29		
2012-02-27	FPAY	+
Description: FEE PAYMENT		
2008-02-20	FPAY	+
Description: FEE PAYMENT		
2001-07-23	AS	-
Description: ASSIGNMENT VOICEAGE CORPORATION, CANADA ASSIGNMENT OF ASSIGNORS INTEREST; ASSIGNORS:BESSETTE, BRUNO; SALAMI, REDWAN; LEFEBVRE, ROCH; REEL/FRAME:012062/0736 2001-06-06		

Post-Issuance (US):
Reassignment (US) Table:

Assignee	Assignor	Date Signed	Reel/Frame	Date
SAINT LAWRENCE COMMUNICATIONS LLC,PLANO,TX,US	VOICEAGE CORPORATION	2013-12-29	032032/0113	2014-01-23
Conveyance: ASSIGNMENT OF ASSIGNORS INTEREST (SEE DOCUMENT FOR DETAILS).				
Correspondent: JENNIFER GRAFF 2400 DALLAS PARKWAY SUITE 200 PLANO, TX 75093				
VOICEAGE CORPORATION,QUEBEC,CA	BESSETTE, BRUNO	2001-06-06	012062/0736	2001-07-23
	SALAMI, REDWAN	2001-06-06		
	LEFEBVRE, ROCH	2001-06-06		
Conveyance: ASSIGNMENT OF ASSIGNORS INTEREST (SEE DOCUMENT FOR DETAILS).				
Correspondent: DARBY & DARBY P.C. MELVIN C. GARNER 805 THIRD AVENUE, 27TH FLOOR NEW YORK, NEW YORK 10022-7513				

Maintenance Status (US):
Litigation (US): 2016-01-27 2016 Saint Lawrence Communications LLC Apple Inc. AT&T Mobility LLC Cellco Partnership d/b/a Verizon Wireless E.D. Texas 2:16cv00082 **|** 2015-09-11 2015 HTC Corporation HTC America Inc Acacia Research Corporation Saint Lawrence Communications LLC E.D. Texas 2:15cv01510 **|** 2015-06-02 2015 Saint Lawrence Communications LLC HTC Corporation HTC America, Inc. E.D. Texas 2:15cv00919 **|** 2015-03-10 2015 Saint Lawrence Communications LLC ZTE Corporation ZTE USA, Inc. ZTE (TX) Inc. E.D. Texas 2:15cv00349 **|** 2015-03-10 2015 Saint Lawrence Communications LLC Sony Mobile Communications (USA) Inc. Sony Electronics, Inc. E.D. Texas 2:15cv00350 **|** 2015-03-10 2015 Saint Lawrence Communications LLC Motorola Mobility LLC E.D. Texas 2:15cv00351 **|** 2015-03-09 2015 HTC Corporation HTC America, Inc. Acacia Research Corporation Saint Lawrence Communications LLC C.D. California 8:15cv00378 **|** 2014-11-18 2014 Saint Lawrence Communications LLC LG Electronics, Inc. LG Electronics USA, Inc. LG Electronics Alabama, Inc E.D. Texas 2:14cv01055 **|** 2014-04-02 2014 Saint Lawrence communications LLC Samsung Electronics Co. Ltd. Samsung Electronics America, Inc. Samsung Telecommunications America, LLC Samsung Austin Semiconductor, LLC E.D. Texas 2:14cv00293
Opposition (EP):
License (EP):
EPO Procedural Status:
Front Page Drawing:



$$R_p = \frac{b^2 v_T^t v_T}{u^t u} = \frac{b^2 \sum_{n=0}^{N-1} v_T^2(n)}{\sum_{n=0}^{N-1} u^2(n)} \qquad (1)$$

Record 51/70 DE69913724T2 VORRICHTUNG ZUR RAUSCHMASKIERUNG UND VERFAHREN ZUR EFFIZIENTEN KODIERUNG VON BREITBANDSIGNALEN

Publication Number: DE69913724T2 20041007
DE69913724D1 20040129

Title: VORRICHTUNG ZUR RAUSCHMASKIERUNG UND VERFAHREN ZUR EFFIZIENTEN KODIERUNG VON BREITBANDSIGNALEN
Title - DWPI:
Priority Number: CA2252170A | WO1999CA1010A
Priority Date: 1998-10-27 | 1999-10-27
Application Number: DE69913724A
Application Date: 1999-10-27
Publication Date: 2004-10-07
IPC Class Table:

IPC	Section	Class	Subclass	Class Group	Subgroup
G01L001104	G	G01	G01L	G01L0011	G01L001104
G01L002102	G	G01	G01L	G01L0021	G01L002102
G10L001300	G	G10	G10L	G10L0013	G10L001300
G10L001912	G	G10	G10L	G10L0019	G10L001912
H03H001706	H	H03	H03H	H03H0017	H03H001706
H03M000730	H	H03	H03M	H03M0007	H03M000730
H03M000736	H	H03	H03M	H03M0007	H03M000736
H04B000162	H	H04	H04B	H04B0001	H04B000162
H04B000726	H	H04	H04B	H04B0007	H04B000726
H04B001404	H	H04	H04B	H04B0014	H04B001404
H04Q000722	H	H04	H04Q	H04Q0007	H04Q000722
H04Q000732	H	H04	H04Q	H04Q0007	H04Q000732

IPC Class Table - DWPI:
Assignee/Applicant: Voiceage Corp. Ville Mont-Royal Quebec CA
Assignee - Current US:
JP F Terms:
JP FI Codes:
Assignee - Original: Voiceage Corp. Ville Mont-Royal Quebec CA
Any CPC Table:

Type	Invention	Additional	Version	Office

Current	**G10L 19/26**	-	20130101	EP

ECLA: G10L001926

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Un dispositif de pondération perceptive destiné à produire un signal pondéré perceptivement en réponse à un signal à large bande comprend un filtre de préaccentuation de signal, un calculateur de filtre de synthèse, et un filtre de pondération perceptive. Le filtre de préaccentuation du signal augmente le contenu de haute fréquence du signal à large bande pour produire ainsi un signal préaccentué. Ce filtre de préaccentuation du signal présente une fonction de transfert ayant la forme: P(z) = 1-z-1, dans laquelle est un facteur de préaccentuation ayant une valeur située entre 0 et 1. Le calculateur du filtre de synthèse répond au signal préaccentué afin de produire des coefficients du filtre de synthèse. Enfin, le filtre de pondération perceptive traite le signal préaccentué par rapport aux coefficients du filtre de synthèse pour produire le signal à pondération perceptive. Le filtre à pondération perceptive a une fonction de transfert, avec un dénominateur fixe, ayant la forme: W(z) = A(z)/$_1$) / (1 $_2$z-1) dans laquelle 0 < $_2$< $_1$ 1 et $_2$ ainsi que $_1$ sont des valeurs de régulation de pondération, de manière que la pondération du signal à large bande dans une région de formant est sensiblement découplée d'une inclinaison spectrale de ce signal à large bande.

Un dispositif de pondération perceptive destiné à produire un signal pondéré perceptivement en

réponse à un signal à large bande comprend un filtre de préaccentuation de signal, un calculateur de filtre de synthèse, et un filtre de pondération perceptive. Le filtre de préaccentuation du signal augmente le contenu de haute fréquence du signal à large bande pour produire ainsi un signal préaccentué. Ce filtre de préaccentuation du signal présente une fonction de transfert ayant la forme: P(z) = 1- mu z<-1>, dans laquelle mu est un facteur de préaccentuation ayant une valeur située entre 0 et 1. Le calculateur du filtre de synthèse répond au signal préaccentué afin de produire des coefficients du filtre de synthèse. Enfin, le filtre de pondération perceptive traite le signal préaccentué par rapport aux coefficients du filtre de synthèse pour produire le signal à pondération perceptive. Le filtre à pondération perceptive a une fonction de transfert, avec un dénominateur fixe, ayant la forme: W(z) = A(z)/ gamma 1) / (1 gamma 2z<-1>) dans laquelle 0 < gamma 2 < gamma 1 </= 1 et gamma 2 ainsi que gamma 1 sont des valeurs de régulation de pondération, de manière que la pondération du signal à large bande dans une région de formant est sensiblement découplée d'une inclinaison spectrale de ce signal à large bande.
Language of Publication: DE
INPADOC Legal Status Table:
Post-Issuance (US):
Reassignment (US) Table:
Maintenance Status (US):
Litigation (US):
Opposition (EP):
License (EP):
EPO Procedural Status:
Front Page Drawing:


DE 699 13 724 T2 2004.10.07

Übersetzung der europäischen Patentschrift

G10L 21/02

Record 52/70 US6807524B1 Perceptual weighting device and method for efficient coding of wideband signals

Publication Number: US6807524B1 20041019

Title: Perceptual weighting device and method for efficient coding of wideband signals
Title - DWPI: Perceptual weighting device in digital wideband speech-audio encoder, filters preemphasized signal in relation to synthesis filter coefficient, to produce perceptually weighted signal
Priority Number: CA2252170A | WO1999CA1010A
Priority Date: 1998-10-27 | 1999-10-27
Application Number: US2001830276A
Application Date: 2001-06-20
Publication Date: 2004-10-19
IPC Class Table:

IPC	Section	Class	Subclass	Class Group	Subgroup
G01L001104	G	G01	G01L	G01L0011	G01L001104
G01L002102	G	G01	G01L	G01L0021	G01L002102
G10L001300	G	G10	G10L	G10L0013	G10L001300
G10L001912	G	G10	G10L	G10L0019	G10L001912
H03H001706	H	H03	H03H	H03H0017	H03H001706
H03M000730	H	H03	H03M	H03M0007	H03M000730
H03M000736	H	H03	H03M	H03M0007	H03M000736
H04B000162	H	H04	H04B	H04B0001	H04B000162
H04B000726	H	H04	H04B	H04B0007	H04B000726
H04B001404	H	H04	H04B	H04B0014	H04B001404
H04Q000722	H	H04	H04Q	H04Q0007	H04Q000722
H04Q000732	H	H04	H04Q	H04Q0007	H04Q000732

IPC Class Table - DWPI:

IPC - DWPI	Section - DWPI	Class - DWPI	Subclass - DWPI	Class Group - DWPI	Subgroup - DWPI
G01L001104	G	G01	G01L	G01L0011	G01L001104
G01L002102	G	G01	G01L	G01L0021	G01L002102
G10L001104	G	G10	G10L	G10L0011	G10L001104

G10L001300	G	G10	G10L	G10L0013	G10L001300
G10L001900	G	G10	G10L	G10L0019	G10L001900
G10L001904	G	G10	G10L	G10L0019	G10L001904
G10L001906	G	G10	G10L	G10L0019	G10L001906
G10L001912	G	G10	G10L	G10L0019	G10L001912
G10L001914	G	G10	G10L	G10L0019	G10L001914
G10L002102	G	G10	G10L	G10L0021	G10L002102
H03H001706	H	H03	H03H	H03H0017	H03H001706
H03M000730	H	H03	H03M	H03M0007	H03M000730
H03M000736	H	H03	H03M	H03M0007	H03M000736
H04B000162	H	H04	H04B	H04B0001	H04B000162
H04B001404	H	H04	H04B	H04B0014	H04B001404
H04B000726	H	H04	H04B	H04B0007	H04B000726
H04Q000722	H	H04	H04Q	H04Q0007	H04Q000722
H04Q000732	H	H04	H04Q	H04Q0007	H04Q000732

Assignee/Applicant: Voiceage Corporation,Quebec,CA
Assignee - Current US: SAINT LAWRENCE COMMUNICATIONS LLC
JP F Terms:
JP FI Codes:
Assignee - Original: Voiceage Corporation
Any CPC Table:

Type	Invention	Additional	Version	Office
Current	**G10L 19/26**	-	20130101	EP

ECLA: G10L001926
Abstract:

A perceptual weighting device for producing a perceptually weighted signal in response to a wideband signal comprises a signal pre-emphasis filter, a synthesis filter calculator, and a perceptual weighting filter. The signal pre-emphasis filter enhances the high frequency content of the wideband signal to thereby produce a pre-emphasized signal. The signal pre-emphasis filter has a transfer function of the form: P(z)=1-muz<-1>, wherein mu is a pre-emphasis factor having a value located between 0 and 1. The synthesis filter calculator is responsive to the pre-emphasized signal for producing synthesis filter coefficients. Finally, the perceptual weighting filter processes the pre-emphasized signal in relation to the synthesis filter coefficients to produce the perceptually

weighted signal. The perceptual weighting filter has a transfer function, with fixed denominator, of the form: W (z)=A (z/gamma1)/(1-gamma2z<-1>) where 0<GAMMA2<GAMMA1<=1.

A perceptual weighting device for producing a perceptually weighted signal in response to a wideband signal comprises a signal pre-emphasis filter, a synthesis filter calculator, and a perceptual weighting filter. The signal pre-emphasis filter enhances the high frequency content of the wideband signal to thereby produce a pre-emphasized signal. The signal pre-emphasis filter has a transfer function of the form: P(z)=1-z -1, wherein is a pre-emphasis factor having a value located between 0 and 1. The synthesis filter calculator is responsive to the pre-emphasized signal for producing synthesis filter coefficients. Finally, the perceptual weighting filter processes the pre-emphasized signal in relation to the synthesis filter coefficients to produce the perceptually weighted signal. The perceptual weighting filter has a transfer function, with fixed denominator, of the form: W (z)=A (z/ $_1$)/(1- $_2$z -1) where 0< $_2$< $_1$1.

Un dispositif de pondération perceptive destiné à produire un signal pondéré perceptivement en réponse à un signal à large bande comprend un filtre de préaccentuation de signal, un calculateur de filtre de synthèse, et un filtre de pondération perceptive. Le filtre de préaccentuation du signal augmente le contenu de haute fréquence du signal à large bande pour produire ainsi un signal préaccentué. Ce filtre de préaccentuation du signal présente une fonction de transfert ayant la forme: P(z) = 1-z-1, dans laquelle est un facteur de préaccentuation ayant une valeur située entre 0 et 1. Le calculateur du filtre de synthèse répond au signal préaccentué afin de produire des coefficients du filtre de synthèse. Enfin, le filtre de pondération perceptive traite le signal préaccentué par rapport aux coefficients du filtre de synthèse pour produire le signal à pondération perceptive. Le filtre à pondération perceptive a une fonction de transfert, avec un dénominateur fixe, ayant la forme: W(z) = A(z)/$_1$) / (1 $_2$z-1) dans laquelle 0 < $_2$< $_1$ 1 et $_2$ ainsi que $_1$ sont des valeurs de régulation de pondération, de manière que la pondération du signal à large bande dans une région de formant est sensiblement découplée d'une inclinaison spectrale de ce signal à large bande.

Un dispositif de pondération perceptive destiné à produire un signal pondéré perceptivement en réponse à un signal à large bande comprend un filtre de préaccentuation de signal, un calculateur de filtre de synthèse, et un filtre de pondération perceptive. Le filtre de préaccentuation du signal augmente le contenu de haute fréquence du signal à large bande pour produire ainsi un signal préaccentué. Ce filtre de préaccentuation du signal présente une fonction de transfert ayant la forme: P(z) = 1- mu z<-1>, dans laquelle mu est un facteur de préaccentuation ayant une valeur située entre 0 et 1. Le calculateur du filtre de synthèse répond au signal préaccentué afin de produire des coefficients du filtre de synthèse. Enfin, le filtre de pondération perceptive traite le signal préaccentué par rapport aux coefficients du filtre de synthèse pour produire le signal à pondération perceptive. Le filtre à pondération perceptive a une fonction de transfert, avec un dénominateur fixe, ayant la forme: W(z) = A(z)/ gamma 1) / (1 gamma 2z<-1>) dans laquelle 0 < gamma 2 < gamma 1 </= 1 et gamma 2 ainsi que gamma 1 sont des valeurs de régulation de pondération, de manière que la pondération du signal à large bande dans une région de formant est sensiblement découplée d'une inclinaison spectrale de ce signal à large bande.

Language of Publication: EN

INPADOC Legal Status Table:

Gazette Date	Code	INPADOC Legal Status Impact

2014-01-23	AS	-
Description: ASSIGNMENT SAINT LAWRENCE COMMUNICATIONS LLC, TEXAS ASSIGNMENT OF ASSIGNORS INTEREST; ASSIGNOR:VOICEAGE CORPORATION; REEL/FRAME:032032/0113 2013-12-29		
2012-03-16	FPAY	+
Description: FEE PAYMENT		
2008-03-17	FPAY	+
Description: FEE PAYMENT		
2001-06-20	AS	-
Description: ASSIGNMENT VOICEAGE CORP., CANADA ASSIGNMENT OF ASSIGNORS INTEREST; ASSIGNORS:BESSETTE, BRUNO; SALAMI, REDWAN; LEFEBVRE, ROCH; REEL/FRAME:011913/0427 2001-06-06		

Post-Issuance (US):
Reassignment (US) Table:

Assignee	Assignor	Date Signed	Reel/Frame	Date
SAINT LAWRENCE COMMUNICATIONS LLC,PLANO,TX,US	VOICEAGE CORPORATION	2013-12-29	032032/0113	2014-01-23
Conveyance: ASSIGNMENT OF ASSIGNORS INTEREST (SEE DOCUMENT FOR DETAILS).				
Corresponent: JENNIFER GRAFF 2400 DALLAS PARKWAY SUITE 200 PLANO, TX 75093				
VOICEAGE CORP.,QUEBEC,CA	BESSETTE, BRUNO	2001-06-06	011913/0427	2001-06-20
	SALAMI, REDWAN	2001-06-06		
	LEFEBVRE, ROCH	2001-06-06		
Conveyance: ASSIGNMENT OF ASSIGNORS INTEREST (SEE DOCUMENT FOR DETAILS).				
Corresponent: BIRCH, STEWART, KOLASCH & BIRCH, LLP F. PRINCE BUTLER P.O. BOX 747 FALLS CHURCH, VA 22040-0747				

Maintenance Status (US):
Litigation (US): 2016-01-27 2016 Saint Lawrence Communications LLC Apple Inc. AT&T Mobility LLC Cellco Partnership d/b/a Verizon Wireless E.D. Texas 2:16cv00082 | 2015-09-11 2015 HTC Corporation HTC America Inc Acacia Research Corporation Saint Lawrence Communications LLC E.D. Texas 2:15cv01510 | 2015-06-02 2015 Saint Lawrence Communications LLC HTC Corporation HTC America, Inc. E.D. Texas 2:15cv00919 | 2015-03-10 2015 Saint Lawrence Communications LLC ZTE Corporation ZTE USA, Inc. ZTE (TX) Inc. E.D. Texas 2:15cv00349 |

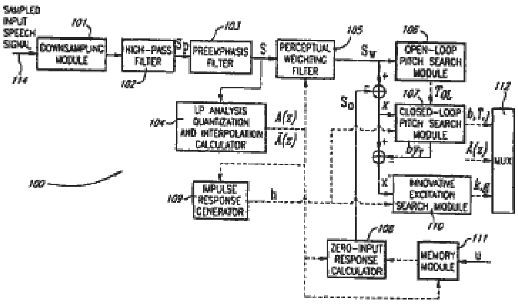
2015-03-10 2015 Saint Lawrence Communications LLC Sony Mobile Communications (USA) Inc. Sony Electronics, Inc. E.D. Texas 2:15cv00350 **|** 2015-03-10 2015 Saint Lawrence Communications LLC Motorola Mobility LLC E.D. Texas 2:15cv00351 **|** 2015-03-09 2015 HTC Corporation HTC America, Inc. Acacia Research Corporation Saint Lawrence Communications LLC C.D. California 8:15cv00378 **|** 2014-11-18 2014 Saint Lawrence Communications LLC LG Electronics, Inc. LG Electronics USA, Inc. LG Electronics Alabama, Inc E.D. Texas 2:14cv01055 **|** 2014-04-02 2014 Saint Lawrence communications LLC Samsung Electronics Co. Ltd. Samsung Electronics America, Inc. Samsung Telecommunications America, LLC Samsung Austin Semiconductor, LLC E.D. Texas 2:14cv00293

Opposition (EP):

License (EP):

EPO Procedural Status:

Front Page Drawing:



Record 53/70 CN1172292C Method and device for adaptive bandwidth pitch search in coding wideband signals **|** Method and apparatus for adaptive bandwidth tone searching in the encoded wideband signal

Publication Number: CN1172292C 20041020
CN1328681A 20011226

Title: Method and device for adaptive bandwidth pitch search in coding wideband signals **|** Method and apparatus for adaptive bandwidth tone searching in the encoded wideband signal
Title - DWPI: Pitch analysis device for digitally encoding wideband signal, chooses signal path having lowest calculated pitch prediction error
Priority Number: CA2252170A
Priority Date: 1998-10-27
Application Number: CN1999813601A
Application Date: 1999-10-27
Publication Date: 2004-10-20
IPC Class Table:

IPC	Section	Class	Subclass	Class Group	Subgroup
G01L001104	G	G01	G01L	G01L0011	G01L001104
G01L002102	G	G01	G01L	G01L0021	G01L002102
G10L001300	G	G10	G10L	G10L0013	G10L001300
G10L001912	G	G10	G10L	G10L0019	G10L001912
H03H001706	H	H03	H03H	H03H0017	H03H001706
H03M000730	H	H03	H03M	H03M0007	H03M000730
H03M000736	H	H03	H03M	H03M0007	H03M000736
H04B000162	H	H04	H04B	H04B0001	H04B000162
H04B000726	H	H04	H04B	H04B0007	H04B000726
H04B001404	H	H04	H04B	H04B0014	H04B001404
H04Q000722	H	H04	H04Q	H04Q0007	H04Q000722
H04Q000732	H	H04	H04Q	H04Q0007	H04Q000732

IPC Class Table - DWPI:

IPC - DWPI	Section - DWPI	Class - DWPI	Subclass - DWPI	Class Group - DWPI	Subgroup - DWPI
G01L001104	G	G01	G01L	G01L0011	G01L001104
G01L002102	G	G01	G01L	G01L0021	G01L002102

G10L001104	G	G10	G10L	G10L0011	G10L001104
G10L001300	G	G10	G10L	G10L0013	G10L001300
G10L001900	G	G10	G10L	G10L0019	G10L001900
G10L001904	G	G10	G10L	G10L0019	G10L001904
G10L001906	G	G10	G10L	G10L0019	G10L001906
G10L001912	G	G10	G10L	G10L0019	G10L001912
G10L001914	G	G10	G10L	G10L0019	G10L001914
G10L002102	G	G10	G10L	G10L0021	G10L002102
H03H001706	H	H03	H03H	H03H0017	H03H001706
H03M000730	H	H03	H03M	H03M0007	H03M000730
H03M000736	H	H03	H03M	H03M0007	H03M000736
H04B000162	H	H04	H04B	H04B0001	H04B000162
H04B001404	H	H04	H04B	H04B0014	H04B001404
H04B000726	H	H04	H04B	H04B0007	H04B000726
H04Q000722	H	H04	H04Q	H04Q0007	H04Q000722
H04Q000732	H	H04	H04Q	H04Q0007	H04Q000732
A61K0031585	A	A61	A61K	A61K0031	A61K0031585

Assignee/Applicant: Wosiaige Ltd.
Assignee - Current US:
JP F Terms:
JP FI Codes:
Assignee - Original: Wosiaige Ltd.
Any CPC Table:

Type	Invention	Additional	Version	Office
Current	**G10L 19/26**	-	20130101	EP

ECLA: G10L001926
Abstract:

An improved pitch search method and device for digitally encoding a wideband signal, in particular but not exclusively a speech signal, in view of transmitting, or storing, and synthesizing this wideband sound signal. The new method and device which achieve efficient modeling of the harmonic structure of the speech spectrum uses several forms of low pass filters applied to a pitch codevector, the one yielding higher prediction gain (i.e. the lowest pitch prediction error) is

selected and the associated pitch codebook parameters are forwarded.

A number of $num to improve a broadband signal, in particular but not limited in one of voice signal, the digital code to transmit or store, and the synthesis tone searching method and device of the broadband signal. This new method and device can effectively to establish model for resonance structure of this voice frequency spectrum by using the application to a tone code vector, several low-pass filter, and can realize high prediction gain of a low-pass filter (namely, the lowest tone prediction error and transmitting related to codebook parameter.

L'invention concerne un procédé amélioré de recherche de hauteur et un dispositif de codage numérique d'un signal à large bande, en particulier mais pas exclusivement un signal vocal, en vue de transmettre ou de stocker, et de synthétiser ce signal sonore à large bande. Le procédé et le dispositif nouveaux, lesquels permettent une modélisation efficace de la structure harmonique du spectre de la parole, utilisent plusieurs formes de filtres passe-bas appliqués à un vecteur de code de hauteur, celui permettant d'obtenir le gain de prédiction le plus haut (c'est-à-dire l'erreur de prédiction de hauteur la plus faible) est sélectionné et les paramètres de code de hauteur associés sont retransmis.

Language of Publication: ZH

INPADOC Legal Status Table:

Gazette Date	Code	INPADOC Legal Status Impact
2004-10-20	C14	+
Description: GRANTED		
2001-12-26	C10	-
Description: REQUEST OF EXAMINATION AS TO SUBSTANCE		
2001-12-26	C06	+
Description: PUBLICATION		

Post-Issuance (US):

Reassignment (US) Table:

Maintenance Status (US):

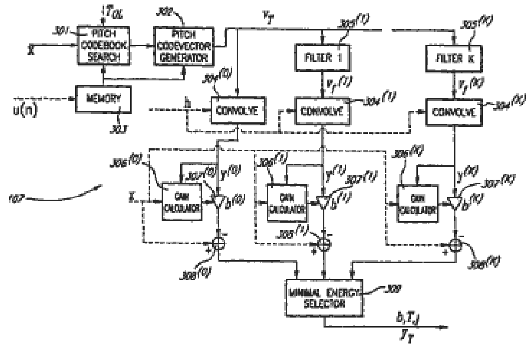
Litigation (US):

Opposition (EP):

License (EP):

EPO Procedural Status:

Front Page Drawing:


PITCH CODEBOOK SEARCH
PITCH CODEVECTOR GENERATOR
MEMORY
FILTER 1
FILTER K
CONVOLVE
CONVOLVE
CONVOLVE
GAIN CALCULATOR
GAIN CALCULATOR
GAIN CALCULATOR
MINIMAL ENERGY SELECTOR
u(n)
301
302
303
309

Record 54/70 NO317603B1 Innretning og fremgangsmate for perseptuell veiing, for effektiv koding av bredbandssignaler

Publication Number: NO317603B1 20041122
NO200102068D0 20010426
NO200102068A 20010627

Title: Innretning og fremgangsmate for perseptuell veiing, for effektiv koding av bredbandssignaler
Title - DWPI: Perceptual weighting device in digital wideband speech-audio encoder, filters preemphasized signal in relation to synthesis filter coefficient, to produce perceptually weighted signal
Priority Number: CA2252170A | WO1999CA1010A
Priority Date: 1998-10-27 | 1999-10-27
Application Number: NO20012068A
Application Date: 2001-04-26
Publication Date: 2004-11-22
IPC Class Table:

IPC	Section	Class	Subclass	Class Group	Subgroup
G01L001104	G	G01	G01L	G01L0011	G01L001104
G01L002102	G	G01	G01L	G01L0021	G01L002102
G10L001300	G	G10	G10L	G10L0013	G10L001300
G10L001912	G	G10	G10L	G10L0019	G10L001912
H03H001706	H	H03	H03H	H03H0017	H03H001706
H03M000730	H	H03	H03M	H03M0007	H03M000730
H03M000736	H	H03	H03M	H03M0007	H03M000736
H04B000162	H	H04	H04B	H04B0001	H04B000162
H04B000726	H	H04	H04B	H04B0007	H04B000726
H04B001404	H	H04	H04B	H04B0014	H04B001404
H04Q000722	H	H04	H04Q	H04Q0007	H04Q000722
H04Q000732	H	H04	H04Q	H04Q0007	H04Q000732

IPC Class Table - DWPI:

IPC - DWPI	Section - DWPI	Class - DWPI	Subclass - DWPI	Class Group - DWPI	Subgroup - DWPI
G01L001104	G	G01	G01L	G01L0011	G01L001104
G01L002102	G	G01	G01L	G01L0021	G01L002102

G10L001104	G	G10	G10L	G10L0011	G10L001104
G10L001300	G	G10	G10L	G10L0013	G10L001300
G10L001900	G	G10	G10L	G10L0019	G10L001900
G10L001904	G	G10	G10L	G10L0019	G10L001904
G10L001906	G	G10	G10L	G10L0019	G10L001906
G10L001912	G	G10	G10L	G10L0019	G10L001912
G10L001914	G	G10	G10L	G10L0019	G10L001914
G10L002102	G	G10	G10L	G10L0021	G10L002102
H03H001706	H	H03	H03H	H03H0017	H03H001706
H03M000730	H	H03	H03M	H03M0007	H03M000730
H03M000736	H	H03	H03M	H03M0007	H03M000736
H04B000162	H	H04	H04B	H04B0001	H04B000162
H04B001404	H	H04	H04B	H04B0014	H04B001404
H04B000726	H	H04	H04B	H04B0007	H04B000726
H04Q000722	H	H04	H04Q	H04Q0007	H04Q000722
H04Q000732	H	H04	H04Q	H04Q0007	H04Q000732

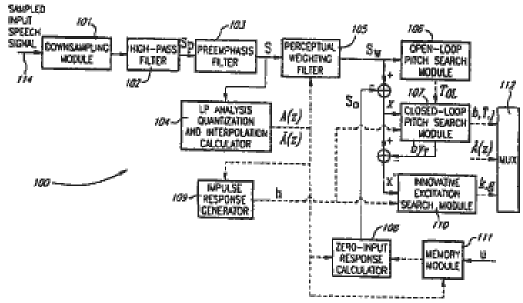
Assignee/Applicant: VOICEAGE CORP
Assignee - Current US:
JP F Terms:
JP FI Codes:
Assignee - Original:
Any CPC Table:

Type	Invention	Additional	Version	Office
Current	**G10L 19/26**	-	20130101	EP

ECLA: G10L001926
Abstract:
Language of Publication: NO
INPADOC Legal Status Table:
Post-Issuance (US):
Reassignment (US) Table:
Maintenance Status (US):
Litigation (US):
Opposition (EP):
License (EP):

EPO Procedural Status:

Front Page Drawing:



Record 55/70 NO318627B1 Fremgangsmate og innretning for a gjenvinne hoyfrekvensinnhold av oversamplet, syntetisert bredbandssignal

Publication Number: NO318627B1 20050418
NO200102067D0 20010426
NO200102067A 20010627

Title: Fremgangsmate og innretning for a gjenvinne hoyfrekvensinnhold av oversamplet, syntetisert bredbandssignal
Title - DWPI: High frequency content recovery device for use in audio video teleconferencing, performs summation of spectrally shaped noise sequence in oversampled synthesized signal version to produce full spectrum synthesized wide band signal
Priority Number: CA2252170A | WO1999CA990A
Priority Date: 1998-10-27 | 1999-10-27
Application Number: NO20012067A
Application Date: 2001-04-26
Publication Date: 2005-04-18
IPC Class Table:

IPC	Section	Class	Subclass	Class Group	Subgroup
G01L001104	G	G01	G01L	G01L0011	G01L001104
G01L002102	G	G01	G01L	G01L0021	G01L002102
G10L001300	G	G10	G10L	G10L0013	G10L001300
G10L001912	G	G10	G10L	G10L0019	G10L001912
H03H001706	H	H03	H03H	H03H0017	H03H001706
H03M000730	H	H03	H03M	H03M0007	H03M000730
H03M000736	H	H03	H03M	H03M0007	H03M000736
H04B000162	H	H04	H04B	H04B0001	H04B000162
H04B000726	H	H04	H04B	H04B0007	H04B000726
H04B001404	H	H04	H04B	H04B0014	H04B001404
H04Q000722	H	H04	H04Q	H04Q0007	H04Q000722
H04Q000732	H	H04	H04Q	H04Q0007	H04Q000732

IPC Class Table - DWPI:

IPC - DWPI	Section - DWPI	Class - DWPI	Subclass - DWPI	Class Group - DWPI	Subgroup - DWPI
G10L001100	G	G10	G10L	G10L0011	G10L001100
G10L001300	G	G10	G10L	G10L0013	G10L001300

G10L001900	G	G10	G10L	G10L0019	G10L001900
G10L002100	G	G10	G10L	G10L0021	G10L002100
H03H001706	H	H03	H03H	H03H0017	H03H001706
H03M000730	H	H03	H03M	H03M0007	H03M000730
H03M000736	H	H03	H03M	H03M0007	H03M000736
H04B000162	H	H04	H04B	H04B0001	H04B000162
H04B001404	H	H04	H04B	H04B0014	H04B001404
H04B000726	H	H04	H04B	H04B0007	H04B000726
H04L002700	H	H04	H04L	H04L0027	H04L002700
G10L001104	G	G10	G10L	G10L0011	G10L001104
G10L001902	G	G10	G10L	G10L0019	G10L001902
G10L001904	G	G10	G10L	G10L0019	G10L001904
G10L001906	G	G10	G10L	G10L0019	G10L001906
G10L001912	G	G10	G10L	G10L0019	G10L001912
G10L002102	G	G10	G10L	G10L0021	G10L002102
G10L	G	G10	G10L	G10L	G10L

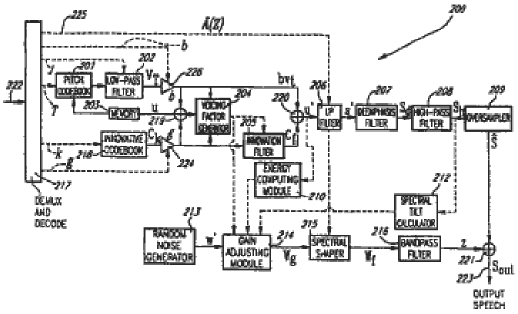
Assignee/Applicant: VOICEAGE CORP
Assignee - Current US:
JP F Terms:
JP FI Codes:
Assignee - Original:
Any CPC Table:

Type	Invention	Additional	Version	Office
Current	**G10L 19/26**	-	20130101	EP

ECLA: G10L001926
Abstract:
Language of Publication: NO
INPADOC Legal Status Table:
Post-Issuance (US):
Reassignment (US) Table:
Maintenance Status (US):
Litigation (US):
Opposition (EP):
License (EP):

EPO Procedural Status:

Front Page Drawing:



Record 56/70 US20050108005A1 Method and device for adaptive bandwidth pitch search in coding wideband signals

Publication Number: US20050108005A1 20050519

Title: Method and device for adaptive bandwidth pitch search in coding wideband signals
Title - DWPI: Periodicity enhancing device of excitation signal, reduces energy of low frequency portion of innovative code vector in relation to periodicity factor related to wideband signal
Priority Number: CA2252170A | WO1999CA1008A | US2001830114A
Priority Date: 1998-10-27 | 1999-10-27 | 2001-06-20
Application Number: US2004964752A
Application Date: 2004-10-15
Publication Date: 2005-05-19
IPC Class Table:

IPC	Section	Class	Subclass	Class Group	Subgroup
G01L001104	G	G01	G01L	G01L0011	G01L001104
G01L002102	G	G01	G01L	G01L0021	G01L002102
G10L001300	G	G10	G10L	G10L0013	G10L001300
G10L001912	G	G10	G10L	G10L0019	G10L001912
H03H001706	H	H03	H03H	H03H0017	H03H001706
H03M000730	H	H03	H03M	H03M0007	H03M000730
H03M000736	H	H03	H03M	H03M0007	H03M000736
H04B000162	H	H04	H04B	H04B0001	H04B000162
H04B000726	H	H04	H04B	H04B0007	H04B000726
H04B001404	H	H04	H04B	H04B0014	H04B001404
H04Q000722	H	H04	H04Q	H04Q0007	H04Q000722
H04Q000732	H	H04	H04Q	H04Q0007	H04Q000732

IPC Class Table - DWPI:

IPC - DWPI	Section - DWPI	Class - DWPI	Subclass - DWPI	Class Group - DWPI	Subgroup - DWPI
G01L001104	G	G01	G01L	G01L0011	G01L001104
G01L002102	G	G01	G01L	G01L0021	G01L002102
G10L001300	G	G10	G10L	G10L0013	G10L001300
G10L001912	G	G10	G10L	G10L0019	G10L001912

H03H001706	H	H03	H03H	H03H0017	H03H001706
H03M000730	H	H03	H03M	H03M0007	H03M000730
H03M000736	H	H03	H03M	H03M0007	H03M000736
H04B000162	H	H04	H04B	H04B0001	H04B000162
H04B001404	H	H04	H04B	H04B0014	H04B001404
H04B000726	H	H04	H04B	H04B0007	H04B000726
H04J000316	H	H04	H04J	H04J0003	H04J000316
H04J000324	H	H04	H04J	H04J0003	H04J000324
H04Q000722	H	H04	H04Q	H04Q0007	H04Q000722
H04Q000732	H	H04	H04Q	H04Q0007	H04Q000732
H04W007204	H	H04	H04W	H04W0072	H04W007204
H04W007212	H	H04	H04W	H04W0072	H04W007212
H04W007408	H	H04	H04W	H04W0074	H04W007408
G10L002102	G	G10	G10L	G10L0021	G10L002102
G10L001914	G	G10	G10L	G10L0019	G10L001914

Assignee/Applicant: Voiceage corporation,Ville Mont Royal,CA
Assignee - Current US: SAINT LAWRENCE COMMUNICATIONS LLC
JP F Terms:
JP FI Codes:
Assignee - Original: Voiceage corporation
Any CPC Table:

Type	Invention	Additional	Version	Office
Current	**G10L 19/26**	-	20130101	EP

ECLA: G10L001926
Abstract:

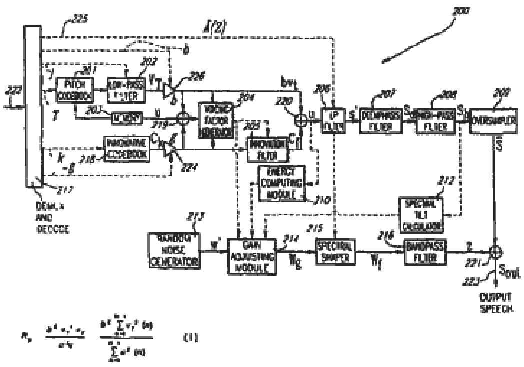
A pitch search method and device for digitally encoding a wideband signal, in particular but not exclusively a speech signal, in view of transmitting, or storing, and synthesizing this wideband sound signal. The new method and device which achieve efficient modeling of the harmonic structure of the speech spectrum uses several forms of low pass filters applied to a pitch codevector, the one yielding higher prediction gain (i.e. the lowest pitch prediction error) is selected and the associated pitch codebook parameters are forwarded.
Language of Publication: EN
INPADOC Legal Status Table:

Gazette Date	Code	INPADOC Legal Status Impact
2014-01-23	AS	-
Description: ASSIGNMENT SAINT LAWRENCE COMMUNICATIONS LLC, TEXAS ASSIGNMENT OF ASSIGNORS INTEREST; ASSIGNOR:VOICEAGE CORPORATION; REEL/FRAME:032032/0113 2013-12-29		

Post-Issuance (US):
Reassignment (US) Table:

Assignee	Assignor	Date Signed	Reel/Frame	Date
SAINT LAWRENCE COMMUNICATIONS LLC,PLANO,TX,US	VOICEAGE CORPORATION	2013-12-29	032032/0113	2014-01-23
Conveyance: ASSIGNMENT OF ASSIGNORS INTEREST (SEE DOCUMENT FOR DETAILS).				
Corresponent: JENNIFER GRAFF 2400 DALLAS PARKWAY SUITE 200 PLANO, TX 75093				

Maintenance Status (US):
Litigation (US):
Opposition (EP):
License (EP):
EPO Procedural Status:
Front Page Drawing:



Record 57/70 US20050108007A1 Perceptual weighting device and method for efficient coding of wideband signals

Publication Number: US20050108007A1 20050519

Title: Perceptual weighting device and method for efficient coding of wideband signals
Title - DWPI: Periodicity enhancing device of excitation signal, reduces energy of low frequency portion of innovative code vector in relation to periodicity factor related to wideband signal
Priority Number: CA2252170A | WO1999CA1010A | US2001830276A
Priority Date: 1998-10-27 | 1999-10-27 | 2001-06-20
Application Number: US2004965795A
Application Date: 2004-10-18
Publication Date: 2005-05-19
IPC Class Table:

IPC	Section	Class	Subclass	Class Group	Subgroup
G01L001104	G	G01	G01L	G01L0011	G01L001104
G01L002102	G	G01	G01L	G01L0021	G01L002102
G10L001300	G	G10	G10L	G10L0013	G10L001300
G10L001912	G	G10	G10L	G10L0019	G10L001912
H03H001706	H	H03	H03H	H03H0017	H03H001706
H03M000730	H	H03	H03M	H03M0007	H03M000730
H03M000736	H	H03	H03M	H03M0007	H03M000736
H04B000162	H	H04	H04B	H04B0001	H04B000162
H04B000726	H	H04	H04B	H04B0007	H04B000726
H04B001404	H	H04	H04B	H04B0014	H04B001404
H04Q000722	H	H04	H04Q	H04Q0007	H04Q000722
H04Q000732	H	H04	H04Q	H04Q0007	H04Q000732

IPC Class Table - DWPI:

IPC - DWPI	Section - DWPI	Class - DWPI	Subclass - DWPI	Class Group - DWPI	Subgroup - DWPI
G01L001104	G	G01	G01L	G01L0011	G01L001104
G01L002102	G	G01	G01L	G01L0021	G01L002102
G10L001300	G	G10	G10L	G10L0013	G10L001300
G10L001912	G	G10	G10L	G10L0019	G10L001912

H03H001706	H	H03	H03H	H03H0017	H03H001706
H03M000730	H	H03	H03M	H03M0007	H03M000730
H03M000736	H	H03	H03M	H03M0007	H03M000736
H04B000162	H	H04	H04B	H04B0001	H04B000162
H04B001404	H	H04	H04B	H04B0014	H04B001404
H04B000726	H	H04	H04B	H04B0007	H04B000726
H04J000316	H	H04	H04J	H04J0003	H04J000316
H04J000324	H	H04	H04J	H04J0003	H04J000324
H04Q000722	H	H04	H04Q	H04Q0007	H04Q000722
H04Q000732	H	H04	H04Q	H04Q0007	H04Q000732
H04W007204	H	H04	H04W	H04W0072	H04W007204
H04W007212	H	H04	H04W	H04W0072	H04W007212
H04W007408	H	H04	H04W	H04W0074	H04W007408
G10L002102	G	G10	G10L	G10L0021	G10L002102
G10L001914	G	G10	G10L	G10L0019	G10L001914

Assignee/Applicant: Voiceage Corporation,Ville Mont Royal,CA
Assignee - Current US: SAINT LAWRENCE COMMUNICATIONS LLC
JP F Terms:
JP FI Codes:
Assignee - Original: Voiceage Corporation
Any CPC Table:

Type	Invention	Additional	Version	Office
Current	**G10L 19/26**	-	20130101	EP

ECLA: G10L001926
Abstract:

A perceptual weighting device for producing a perceptually weighted signal in response to a wideband signal comprises a signal pre-emphasis filter, a synthesis filter calculator, and a perceptual weighting filter. The signal pre-emphasis filter enhances the high frequency content of the wideband signal to thereby produce a pre-emphasized signal. The signal pre-emphasis filter has a transfer function of the form: P(z)=1-muz⁻¹, wherein mu is a pre-emphasis factor having a value located between 0 and 1. The synthesis filter calculator is responsive to the pre-emphasized signal for producing synthesis filter coefficients. Finally, the perceptual weighting filter processes the pre-emphasized signal in relation to the synthesis filter coefficients to produce

the perceptually weighted signal. The perceptual weighting filter has a transfer function, with fixed denominator, of the form: W(z)=A(z/gamma₁)/(1-gamma₂z⁻¹) where 0<gamma₂<gamma₁<=1.

A perceptual weighting device for producing a perceptually weighted signal in response to a wideband signal comprises a signal pre-emphasis filter, a synthesis filter calculator, and a perceptual weighting filter. The signal pre-emphasis filter enhances the high frequency content of the wideband signal to thereby produce a pre-emphasized signal. The signal pre-emphasis filter has a transfer function of the form: P(z)=1-z -1, wherein is a pre-emphasis factor having a value located between 0 and 1. The synthesis filter calculator is responsive to the pre-emphasized signal for producing synthesis filter coefficients. Finally, the perceptual weighting filter processes the pre-emphasized signal in relation to the synthesis filter coefficients to produce the perceptually weighted signal. The perceptual weighting filter has a transfer function, with fixed denominator, of the form: W(z)=A(z/$_1$)/(1-$_2$z-1) where 0<$_2$<$_1$1.

Language of Publication: EN

INPADOC Legal Status Table:

Gazette Date	Code	INPADOC Legal Status Impact
2014-01-23	AS	-
Description: ASSIGNMENT SAINT LAWRENCE COMMUNICATIONS LLC, TEXAS ASSIGNMENT OF ASSIGNORS INTEREST; ASSIGNOR:VOICEAGE CORPORATION; REEL/FRAME:032032/0113 2013-12-29		

Post-Issuance (US):

Reassignment (US) Table:

Assignee	Assignor	Date Signed	Reel/Frame	Date
SAINT LAWRENCE COMMUNICATIONS LLC,PLANO,TX,US	VOICEAGE CORPORATION	2013-12-29	032032/0113	2014-01-23
Conveyance: ASSIGNMENT OF ASSIGNORS INTEREST (SEE DOCUMENT FOR DETAILS).				
Corresponent: JENNIFER GRAFF 2400 DALLAS PARKWAY SUITE 200 PLANO, TX 75093				

Maintenance Status (US):

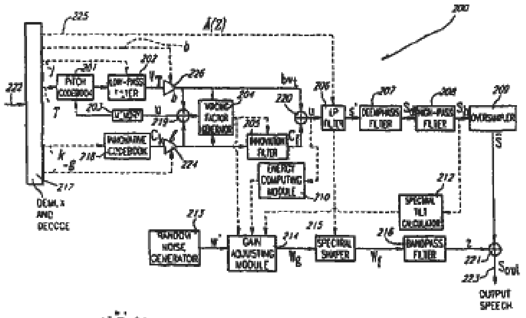
Litigation (US):

Opposition (EP):

License (EP):

EPO Procedural Status:

Front Page Drawing:



$$R_p = \frac{b^2 v_T^T v_T}{u^T u} = \frac{b^2 \sum_{n=0}^{N-1} v_T^2(n)}{\sum_{n=0}^{N-1} u^2(n)} \qquad (1)$$

Record 58/70 NO319181B1 Fremgangsmate og innretning for tonehoydesok med adaptiv bandbredde ved koding av bredbandssignaler

Publication Number: NO319181B1 20050627
NO200102066D0 20010426
NO200102066A 20010627

Title: Fremgangsmate og innretning for tonehoydesok med adaptiv bandbredde ved koding av bredbandssignaler
Title - DWPI: Pitch analysis device for digitally encoding wideband signal, chooses signal path having lowest calculated pitch prediction error
Priority Number: CA2252170A | WO1999CA1008A
Priority Date: 1998-10-27 | 1999-10-27
Application Number: NO20012066A
Application Date: 2001-04-26
Publication Date: 2005-06-27
IPC Class Table:

IPC	Section	Class	Subclass	Class Group	Subgroup
G01L001104	G	G01	G01L	G01L0011	G01L001104
G01L002102	G	G01	G01L	G01L0021	G01L002102
G10L001300	G	G10	G10L	G10L0013	G10L001300
G10L001912	G	G10	G10L	G10L0019	G10L001912
H03H001706	H	H03	H03H	H03H0017	H03H001706
H03M000730	H	H03	H03M	H03M0007	H03M000730
H03M000736	H	H03	H03M	H03M0007	H03M000736
H04B000162	H	H04	H04B	H04B0001	H04B000162
H04B000726	H	H04	H04B	H04B0007	H04B000726
H04B001404	H	H04	H04B	H04B0014	H04B001404
H04Q000722	H	H04	H04Q	H04Q0007	H04Q000722
H04Q000732	H	H04	H04Q	H04Q0007	H04Q000732

IPC Class Table - DWPI:

IPC - DWPI	Section - DWPI	Class - DWPI	Subclass - DWPI	Class Group - DWPI	Subgroup - DWPI
G01L001104	G	G01	G01L	G01L0011	G01L001104
G01L002102	G	G01	G01L	G01L0021	G01L002102

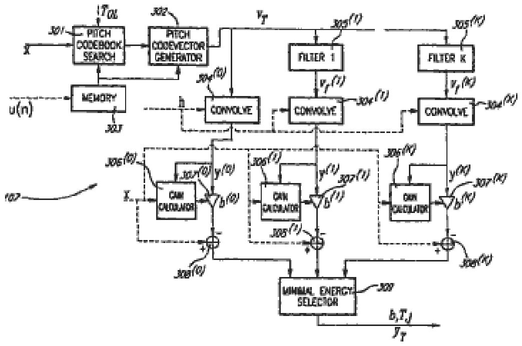
G10L001104	G	G10	G10L	G10L0011	G10L001104
G10L001300	G	G10	G10L	G10L0013	G10L001300
G10L001900	G	G10	G10L	G10L0019	G10L001900
G10L001904	G	G10	G10L	G10L0019	G10L001904
G10L001906	G	G10	G10L	G10L0019	G10L001906
G10L001912	G	G10	G10L	G10L0019	G10L001912
G10L001914	G	G10	G10L	G10L0019	G10L001914
G10L002102	G	G10	G10L	G10L0021	G10L002102
H03H001706	H	H03	H03H	H03H0017	H03H001706
H03M000730	H	H03	H03M	H03M0007	H03M000730
H03M000736	H	H03	H03M	H03M0007	H03M000736
H04B000162	H	H04	H04B	H04B0001	H04B000162
H04B001404	H	H04	H04B	H04B0014	H04B001404
H04B000726	H	H04	H04B	H04B0007	H04B000726
H04Q000722	H	H04	H04Q	H04Q0007	H04Q000722
H04Q000732	H	H04	H04Q	H04Q0007	H04Q000732
A61K0031585	A	A61	A61K	A61K0031	A61K0031585

Assignee/Applicant: VOICEAGE CORP
Assignee - Current US:
JP F Terms:
JP FI Codes:
Assignee - Original:
Any CPC Table:

Type	Invention	Additional	Version	Office
Current	**G10L 19/26**	-	20130101	EP

ECLA: G10L001926
Abstract:
Language of Publication: NO
INPADOC Legal Status Table:
Post-Issuance (US):
Reassignment (US) Table:
Maintenance Status (US):
Litigation (US):

Opposition (EP):
License (EP):
EPO Procedural Status:
Front Page Drawing:



Record 59/70 CA2347743C A METHOD AND DEVICE FOR ADAPTIVE BANDWIDTH PITCH SEARCH IN CODING WIDEBAND SIGNALS | PROCEDE ET DISPOSITIF DE RECHERCHE ADAPTATIVE DE LA HAUTEUR DE LARGEUR DE BANDE DANS LE CODAGE DE SIGNAUX A LARGE BANDE

Publication Number: CA2347743C 20050927
CA2347743A1 20000504

Title: A METHOD AND DEVICE FOR ADAPTIVE BANDWIDTH PITCH SEARCH IN CODING WIDEBAND SIGNALS | PROCEDE ET DISPOSITIF DE RECHERCHE ADAPTATIVE DE LA HAUTEUR DE LARGEUR DE BANDE DANS LE CODAGE DE SIGNAUX A LARGE BANDE
Title - DWPI: Pitch analysis device for digitally encoding wideband signal, chooses signal path having lowest calculated pitch prediction error
Priority Number: CA2252170A | WO1999CA1008A
Priority Date: 1998-10-27 | 1999-10-27
Application Number: CA2347743A
Application Date: 1999-10-27
Publication Date: 2005-09-27
IPC Class Table:

IPC	Section	Class	Subclass	Class Group	Subgroup
G01L001104	G	G01	G01L	G01L0011	G01L001104
G01L002102	G	G01	G01L	G01L0021	G01L002102
G10L001300	G	G10	G10L	G10L0013	G10L001300
G10L001912	G	G10	G10L	G10L0019	G10L001912
H03H001706	H	H03	H03H	H03H0017	H03H001706
H03M000730	H	H03	H03M	H03M0007	H03M000730
H03M000736	H	H03	H03M	H03M0007	H03M000736
H04B000162	H	H04	H04B	H04B0001	H04B000162
H04B000726	H	H04	H04B	H04B0007	H04B000726
H04B001404	H	H04	H04B	H04B0014	H04B001404
H04Q000722	H	H04	H04Q	H04Q0007	H04Q000722
H04Q000732	H	H04	H04Q	H04Q0007	H04Q000732

IPC Class Table - DWPI:

IPC - DWPI	Section - DWPI	Class - DWPI	Subclass - DWPI	Class Group - DWPI	Subgroup - DWPI
G01L001104	G	G01	G01L	G01L0011	G01L001104

G01L002102	G	G01	G01L	G01L0021	G01L002102
G10L001104	G	G10	G10L	G10L0011	G10L001104
G10L001300	G	G10	G10L	G10L0013	G10L001300
G10L001900	G	G10	G10L	G10L0019	G10L001900
G10L001904	G	G10	G10L	G10L0019	G10L001904
G10L001906	G	G10	G10L	G10L0019	G10L001906
G10L001912	G	G10	G10L	G10L0019	G10L001912
G10L001914	G	G10	G10L	G10L0019	G10L001914
G10L002102	G	G10	G10L	G10L0021	G10L002102
H03H001706	H	H03	H03H	H03H0017	H03H001706
H03M000730	H	H03	H03M	H03M0007	H03M000730
H03M000736	H	H03	H03M	H03M0007	H03M000736
H04B000162	H	H04	H04B	H04B0001	H04B000162
H04B001404	H	H04	H04B	H04B0014	H04B001404
H04B000726	H	H04	H04B	H04B0007	H04B000726
H04Q000722	H	H04	H04Q	H04Q0007	H04Q000722
H04Q000732	H	H04	H04Q	H04Q0007	H04Q000732
A61K0031585	A	A61	A61K	A61K0031	A61K0031585

Assignee/Applicant: VOICEAGE CORPORATION,MONTREAL,Q1,CA
Assignee - Current US:
JP F Terms:
JP FI Codes:
Assignee - Original: VOICEAGE CORPORATION
Any CPC Table:

Type	Invention	Additional	Version	Office
Current	**G10L 19/26**	-	20130101	EP

ECLA: G10L001926
Abstract:

An improved pitch search method and device for digitally encoding a wideband signal, in particular but not exclusively a speech signal, in view of transmitting, or storing, and synthesizing this wideband sound signal. The new method and device which achieve efficient modeling of the harmonic structure of the speech spectrum uses several forms of low pass filters applied to a

pitch codevector, the one yielding higher prediction gain (i.e, the lowest pitch prediction error) is selected and the associated pitch codebook parameters are forwarded.

Language of Publication: EN

INPADOC Legal Status Table:

Gazette Date	Code	INPADOC Legal Status Impact
2002-03-06	EEER	+
Description: EXAMINATION REQUEST		

Post-Issuance (US):

Reassignment (US) Table:

Maintenance Status (US):

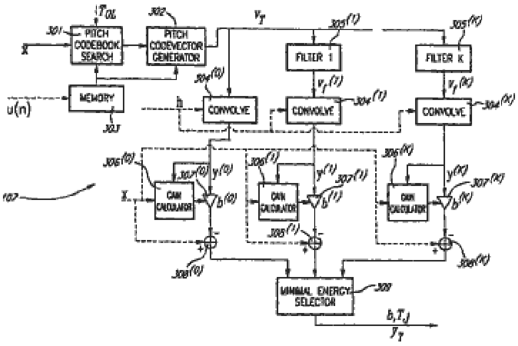
Litigation (US):

Opposition (EP):

License (EP):

EPO Procedural Status: EX-RQ 2002-03-06 2002 Request for examination

Front Page Drawing:



Record 60/70 CA2347667C PERIODICITY ENHANCEMENT IN DECODING WIDEBAND SIGNALS | AMELIORATION DE LA PERIODICITE DANS LE DECODAGE DE SIGNAUX ALARGE BANDE

Publication Number: CA2347667C 20060214
CA2347667A1 20000504

Title: PERIODICITY ENHANCEMENT IN DECODING WIDEBAND SIGNALS | AMELIORATION DE LA PERIODICITE DANS LE DECODAGE DE SIGNAUX ALARGE BANDE
Title - DWPI: Periodicity enhancing device of excitation signal, reduces energy of low frequency portion of innovative code vector in relation to periodicity factor related to wideband signal
Priority Number: CA2252170A | WO1999CA1009A
Priority Date: 1998-10-27 | 1999-10-27
Application Number: CA2347667A
Application Date: 1999-10-27
Publication Date: 2006-02-14
IPC Class Table:

IPC	Section	Class	Subclass	Class Group	Subgroup
G01L001104	G	G01	G01L	G01L0011	G01L001104
G01L002102	G	G01	G01L	G01L0021	G01L002102
G10L001300	G	G10	G10L	G10L0013	G10L001300
G10L001912	G	G10	G10L	G10L0019	G10L001912
H03H001706	H	H03	H03H	H03H0017	H03H001706
H03M000730	H	H03	H03M	H03M0007	H03M000730
H03M000736	H	H03	H03M	H03M0007	H03M000736
H04B000162	H	H04	H04B	H04B0001	H04B000162
H04B000726	H	H04	H04B	H04B0007	H04B000726
H04B001404	H	H04	H04B	H04B0014	H04B001404
H04Q000722	H	H04	H04Q	H04Q0007	H04Q000722
H04Q000732	H	H04	H04Q	H04Q0007	H04Q000732

IPC Class Table - DWPI:

IPC - DWPI	Section - DWPI	Class - DWPI	Subclass - DWPI	Class Group - DWPI	Subgroup - DWPI
G01L001104	G	G01	G01L	G01L0011	G01L001104
G01L002102	G	G01	G01L	G01L0021	G01L002102

G10L001300	G	G10	G10L	G10L0013	G10L001300
G10L001912	G	G10	G10L	G10L0019	G10L001912
H03H001706	H	H03	H03H	H03H0017	H03H001706
H03M000730	H	H03	H03M	H03M0007	H03M000730
H03M000736	H	H03	H03M	H03M0007	H03M000736
H04B000162	H	H04	H04B	H04B0001	H04B000162
H04B001404	H	H04	H04B	H04B0014	H04B001404
H04B000726	H	H04	H04B	H04B0007	H04B000726
H04J000316	H	H04	H04J	H04J0003	H04J000316
H04J000324	H	H04	H04J	H04J0003	H04J000324
H04Q000722	H	H04	H04Q	H04Q0007	H04Q000722
H04Q000732	H	H04	H04Q	H04Q0007	H04Q000732
H04W007204	H	H04	H04W	H04W0072	H04W007204
H04W007212	H	H04	H04W	H04W0072	H04W007212
H04W007408	H	H04	H04W	H04W0074	H04W007408
G10L002102	G	G10	G10L	G10L0021	G10L002102
G10L001914	G	G10	G10L	G10L0019	G10L001914

Assignee/Applicant: VOICEAGE CORPORATION,MONTREAL,Q1,CA
Assignee - Current US:
JP F Terms:
JP FI Codes:
Assignee - Original: VOICEAGE CORPORATION
Any CPC Table:

Type	Invention	Additional	Version	Office
Current	**G10L 19/26**	-	20130101	EP

ECLA: G10L001926
Abstract:

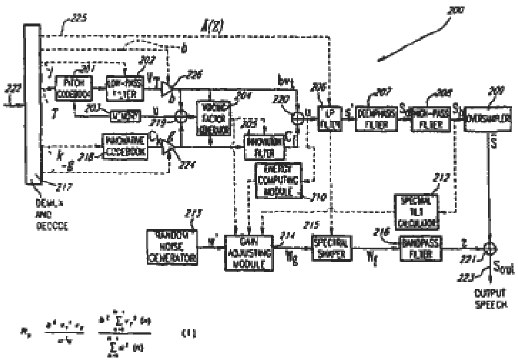
The present invention relates to a method and device for enhancing periodici ty of an excitation signal produced in relation to a pitch codevector and an innovative codevector for supplying a signal synthesis filter in view of producing a synthesized wideband signal. In this periodicity enhancing device and method, a factor generator is responsi ve to the adaptive and innovative codevectors for calculating a periodicity factor. An innovation filter subsequently processes the

innovative codevector in relation to this periodicity factor to reduce energy of a low frequency portion of the innovative codevector and enhance periodicity of a low frequency portion of the excitation signal. As an example, the innovation filter has a transfer function of the form: F(z)- -.alpha.(z)+1-.alpha.(z)-1 where .alpha. is a periodicity factor, and the factor generator calculates the periodicity factor .alpha. using the relatio n: .alpha. = qR p bounded by .alpha. < q where q is an enhancement factor se t for example to 0.25, and where R p is represented by formula (I) where v~ is the pitch codevector, b is a pitch gain, N is a subframe length, and u is the excitation signal.

The present invention relates to a method and device for enhancing periodicity of an excitation signal produced in relation to a pitchcodevector and an innovative codevector for supplying a signal synthesis filter in view of producing a synthesized wideband signal. Inthis periodicity enhancing device and method, a factor generator is responsive to the adaptive and innovative codevectors for calculatinga periodicity factor. An innovation filter subsequently processes the innovative codevector in relation to this periodicity factor to reduceenergy of a low frequency portion of the innovative codevector and enhance periodicity of a low frequency portion of the excitation signal.As an example, the innovation filter has a transfer function of the form: F(z)-.alpha.(z)+1-.alpha.(z)-1 where .alpha. is a periodicity factor, and thefactor generator calculates the periodicity factor .alpha. using the relation: .alpha. = qR p bounded by .alpha. < q where q is an enhancement factor set for example to 0.25, and where R p is represented by formula (I) where v~ is the pitch codevector, b is a pitch gain, N is a subframe length, and u is the excitation signal.
Language of Publication: EN
INPADOC Legal Status Table:

Gazette Date	Code	INPADOC Legal Status Impact
2002-03-06	EEER	+
Description: EXAMINATION REQUEST		

Post-Issuance (US):
Reassignment (US) Table:
Maintenance Status (US):
Litigation (US):
Opposition (EP):
License (EP):
EPO Procedural Status: EX-RQ 2002-03-06 2002 Request for examination
Front Page Drawing:



Record 61/70 CA2347668C PERCEPTUAL WEIGHTING DEVICE AND METHOD FOR EFFICIENT CODING OF WIDEBAND SIGNALS | DISPOSITIF ET PROCEDE DE PONDERATION PERCEPTIVE POUR LE CODAGE EFFICACE DE SIGNAUX A LARGE BANDE

Publication Number: CA2347668C 20060214
CA2347668A1 20000504

Title: PERCEPTUAL WEIGHTING DEVICE AND METHOD FOR EFFICIENT CODING OF WIDEBAND SIGNALS | DISPOSITIF ET PROCEDE DE PONDERATION PERCEPTIVE POUR LE CODAGE EFFICACE DE SIGNAUX A LARGE BANDE
Title - DWPI: Perceptual weighting device in digital wideband speech-audio encoder, filters preemphasized signal in relation to synthesis filter coefficient, to produce perceptually weighted signal
Priority Number: CA2252170A | WO1999CA1010A
Priority Date: 1998-10-27 | 1999-10-27
Application Number: CA2347668A
Application Date: 1999-10-27
Publication Date: 2006-02-14
IPC Class Table:

IPC	Section	Class	Subclass	Class Group	Subgroup
G01L001104	G	G01	G01L	G01L0011	G01L001104
G01L002102	G	G01	G01L	G01L0021	G01L002102
G10L001300	G	G10	G10L	G10L0013	G10L001300
G10L001912	G	G10	G10L	G10L0019	G10L001912
H03H001706	H	H03	H03H	H03H0017	H03H001706
H03M000730	H	H03	H03M	H03M0007	H03M000730
H03M000736	H	H03	H03M	H03M0007	H03M000736
H04B000162	H	H04	H04B	H04B0001	H04B000162
H04B000726	H	H04	H04B	H04B0007	H04B000726
H04B001404	H	H04	H04B	H04B0014	H04B001404
H04Q000722	H	H04	H04Q	H04Q0007	H04Q000722
H04Q000732	H	H04	H04Q	H04Q0007	H04Q000732

IPC Class Table - DWPI:

IPC - DWPI	Section - DWPI	Class - DWPI	Subclass - DWPI	Class Group - DWPI	Subgroup - DWPI
G01L001104	G	G01	G01L	G01L0011	G01L001104

G01L002102	G	G01	G01L	G01L0021	G01L002102
G10L001104	G	G10	G10L	G10L0011	G10L001104
G10L001300	G	G10	G10L	G10L0013	G10L001300
G10L001900	G	G10	G10L	G10L0019	G10L001900
G10L001904	G	G10	G10L	G10L0019	G10L001904
G10L001906	G	G10	G10L	G10L0019	G10L001906
G10L001912	G	G10	G10L	G10L0019	G10L001912
G10L001914	G	G10	G10L	G10L0019	G10L001914
G10L002102	G	G10	G10L	G10L0021	G10L002102
H03H001706	H	H03	H03H	H03H0017	H03H001706
H03M000730	H	H03	H03M	H03M0007	H03M000730
H03M000736	H	H03	H03M	H03M0007	H03M000736
H04B000162	H	H04	H04B	H04B0001	H04B000162
H04B001404	H	H04	H04B	H04B0014	H04B001404
H04B000726	H	H04	H04B	H04B0007	H04B000726
H04Q000722	H	H04	H04Q	H04Q0007	H04Q000722
H04Q000732	H	H04	H04Q	H04Q0007	H04Q000732

Assignee/Applicant: VOICEAGE CORPORATION,MONTREAL,Q1,CA
Assignee - Current US:
JP F Terms:
JP FI Codes:
Assignee - Original: VOICEAGE CORPORATION
Any CPC Table:

Type	Invention	Additional	Version	Office
Current	**G10L 19/26**	-	20130101	EP

ECLA: G10L001926
Abstract:

A perceptual weighting device for producing a perceptually weighted signal in response to a wideband signal comprises a signalpreemphasis filter, a synthesis filter claculator, and a perceptual weighting filter. The signal preemphasis filter enhances high frequencycontent of the wideband signal to thereby produce a preemphasised signal. The signal preemphasis filter has a transfer function of the form:p(z)-1 - μz-1 wherein μ is a preemphasis factor having a value located

between 0 and 1. The synthesis filter calculator is responsive to thepreemphasised signal for producing synthesis filter coefficients. Finally, the perceptual weighting filter processes the preemphasised signalin relation to the synthesis filter coefficients to produce the perceptually weighted signal. The perceptual weighting filter has a transferfunction, with fixed denominator, of the form: W(z) A (z/.gamma.1) / (1.gamma.2z-1) where 0 < .gamma.2 < .gamma.1 <= and .gamma.1 and .gamma.2 are weighting control values, whereby weighting of the wideband signal in a format region is substantially decoupled from a spectral tilt of this wideband signal.

A perceptual weighting device for producing a perceptually weighted signal i n response to a wideband signal comprises a signal preemphasis filter, a synthesis filter claculator, and a perceptual weightin g filter. The signal preemphasis filter enhances high frequency content of the wideband signal to thereby produce a preemphasised signal. Th e signal preemphasis filter has a transfer function of the form: p(z)-1 - .mu.z-1 wherein .mu. is a preemphasis factor having a value located between 0 and 1. The synthesis filter calculator is responsive to the preemphasised signal for producing synthesis filter coefficients. Finally, t he perceptual weighting filter processes the preemphasised signal in relation to the synthesis filter coefficients to produce the perceptually weighted signal. The perceptual weighting filter has a transfer function, with fixed denominator, of the form: W(z) A (z/.gamma.1) / (1- .gamma.2z-1) where 0 < .gamma.2 < .gamma.1 .ltoreq. and .gamma.1 and . gamma.2 are weighting control values, whereby weighting of the wideband signal in a format region is substantially decoupled from a spectral tilt of this wideband signal.

Language of Publication: EN

INPADOC Legal Status Table:

Gazette Date	Code	INPADOC Legal Status Impact
2002-03-06	EER	+
Description: EXAMINATION REQUEST		

Post-Issuance (US):

Reassignment (US) Table:

Maintenance Status (US):

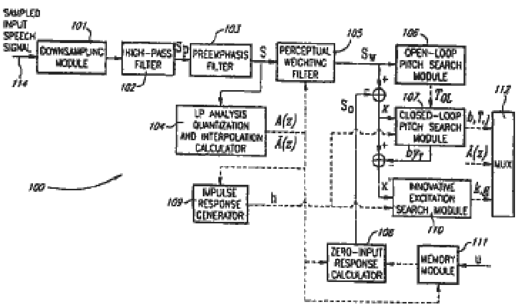
Litigation (US):

Opposition (EP):

License (EP):

EPO Procedural Status: EX-RQ 2002-03-06 2002 Request for examination

Front Page Drawing:



Record 62/70 US7151802B1 High frequency content recovering method and device for over-sampled synthesized wideband signal

Publication Number: US7151802B1 20061219

Title: High frequency content recovering method and device for over-sampled synthesized wideband signal
Title - DWPI: High frequency content recovery device for use in audio video teleconferencing, performs summation of spectrally shaped noise sequence in oversampled synthesized signal version to produce full spectrum synthesized wide band signal
Priority Number: CA2252170A | WO1999CA990A
Priority Date: 1998-10-27 | 1999-10-27
Application Number: US2001830332A
Application Date: 2001-07-23
Publication Date: 2006-12-19
IPC Class Table:

IPC	Section	Class	Subclass	Class Group	Subgroup
H04L002700	H	H04	H04L	H04L0027	H04L002700
G01L001104	G	G01	G01L	G01L0011	G01L001104
G01L002102	G	G01	G01L	G01L0021	G01L002102
G10L001300	G	G10	G10L	G10L0013	G10L001300
G10L001912	G	G10	G10L	G10L0019	G10L001912
H03H001706	H	H03	H03H	H03H0017	H03H001706
H03M000730	H	H03	H03M	H03M0007	H03M000730
H03M000736	H	H03	H03M	H03M0007	H03M000736
H04B000162	H	H04	H04B	H04B0001	H04B000162
H04B000726	H	H04	H04B	H04B0007	H04B000726
H04B001404	H	H04	H04B	H04B0014	H04B001404
H04Q000722	H	H04	H04Q	H04Q0007	H04Q000722
H04Q000732	H	H04	H04Q	H04Q0007	H04Q000732

IPC Class Table - DWPI:

IPC - DWPI	Section - DWPI	Class - DWPI	Subclass - DWPI	Class Group - DWPI	Subgroup - DWPI
G10L001100	G	G10	G10L	G10L0011	G10L001100
G10L001300	G	G10	G10L	G10L0013	G10L001300

G10L001900	G	G10	G10L	G10L0019	G10L001900
G10L002100	G	G10	G10L	G10L0021	G10L002100
H03H001706	H	H03	H03H	H03H0017	H03H001706
H03M000730	H	H03	H03M	H03M0007	H03M000730
H03M000736	H	H03	H03M	H03M0007	H03M000736
H04B000162	H	H04	H04B	H04B0001	H04B000162
H04B001404	H	H04	H04B	H04B0014	H04B001404
H04B000726	H	H04	H04B	H04B0007	H04B000726
H04L002700	H	H04	H04L	H04L0027	H04L002700
G10L001104	G	G10	G10L	G10L0011	G10L001104
G10L001902	G	G10	G10L	G10L0019	G10L001902
G10L001904	G	G10	G10L	G10L0019	G10L001904
G10L001906	G	G10	G10L	G10L0019	G10L001906
G10L001912	G	G10	G10L	G10L0019	G10L001912
G10L002102	G	G10	G10L	G10L0021	G10L002102
G10L	G	G10	G10L	G10L	G10L

Assignee/Applicant: Voiceage Corporation,Quebec,CA
Assignee - Current US: SAINT LAWRENCE COMMUNICATIONS LLC
JP F Terms:
JP FI Codes:
Assignee - Original: Voiceage Corporation
Any CPC Table:

Type	Invention	Additional	Version	Office
Current	**G10L 19/26**	-	20130101	EP

ECLA: G10L001926
Abstract:

In a method and device for recovering the high frequency content of a wideband signal previously down-sampled, and for injecting this high frequency content in an over-sampled synthesized version of the wideband signal to produce a fill-spectrum synthesized wideband signal, a random noise generator produces a noise sequence having a given spectrum. A spectral shaping unit spectrally shapes the noise sequence in relation to linear prediction filter coefficients related to the down-sampled wideband signal. A signal injection circuit finally injects the spectrally-shaped noise sequence in the over-sampled synthesized signal version to thereby produce the full-spectrum

synthesized wideband signal.

Language of Publication: EN

INPADOC Legal Status Table:

Gazette Date	Code	INPADOC Legal Status Impact
2015-10-13	IPR	-
Description: AIA TRIAL PROCEEDING FILED BEFORE THE PATENT AND APPEAL BOARD: INTER PARTES REVIEW TRIAL NO: IPR2015-01874 2015-09-04		
2014-05-21	FPAY	+
Description: FEE PAYMENT		
2014-01-23	AS	-
Description: ASSIGNMENT SAINT LAWRENCE COMMUNICATIONS LLC, TEXAS ASSIGNMENT OF ASSIGNORS INTEREST; ASSIGNOR:VOICEAGE CORPORATION; REEL/FRAME:032032/0113 2013-12-29		
2010-05-10	FPAY	+
Description: FEE PAYMENT		
2001-07-23	AS	-
Description: ASSIGNMENT VOICEAGE CORPORATION, CANADA ASSIGNMENT OF ASSIGNORS INTEREST; ASSIGNORS:BESSETTE, BRUNO; SALAMI, REDWAN; LEFEBVRE, ROCH; REEL/FRAME:012063/0979 2001-06-06		

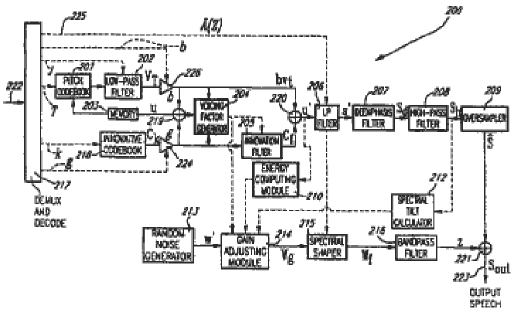
Post-Issuance (US):

Reassignment (US) Table:

Assignee	Assignor	Date Signed	Reel/Frame	Date
SAINT LAWRENCE COMMUNICATIONS LLC,PLANO,TX,US	VOICEAGE CORPORATION	2013-12-29	032032/0113	2014-01-23
Conveyance: ASSIGNMENT OF ASSIGNORS INTEREST (SEE DOCUMENT FOR DETAILS).				
Corresponent: JENNIFER GRAFF 2400 DALLAS PARKWAY SUITE 200 PLANO, TX 75093				
VOICEAGE CORPORATION,VILLE MONT-ROYAL, QUEBEC,CA	BESSETTE, BRUNO	2001-06-06	012063/0979	2001-07-23
	SALAMI, REDWAN	2001-06-06		
	LEFEBVRE, ROCH	2001-06-06		
Conveyance: ASSIGNMENT OF ASSIGNORS INTEREST (SEE DOCUMENT FOR DETAILS).				

Corresponent: DARBY & DARBY P.C. MELVIN C. GARNER 805 THIRD AVENUE, 27TH FLOOR NEW YORK, NY 10022-7513

Maintenance Status (US):
Litigation (US): 2016-01-27 2016 Saint Lawrence Communications LLC Apple Inc. AT&T Mobility LLC Cellco Partnership d/b/a Verizon Wireless E.D. Texas 2:16cv00082 | 2015-09-11 2015 HTC Corporation HTC America Inc Acacia Research Corporation Saint Lawrence Communications LLC E.D. Texas 2:15cv01510 | 2015-06-02 2015 Saint Lawrence Communications LLC HTC Corporation HTC America, Inc. E.D. Texas 2:15cv00919 | 2015-03-10 2015 Saint Lawrence Communications LLC ZTE Corporation ZTE USA, Inc. ZTE (TX) Inc. E.D. Texas 2:15cv00349 | 2015-03-10 2015 Saint Lawrence Communications LLC Sony Mobile Communications (USA) Inc. Sony Electronics, Inc. E.D. Texas 2:15cv00350 | 2015-03-10 2015 Saint Lawrence Communications LLC Motorola Mobility LLC E.D. Texas 2:15cv00351 | 2015-03-09 2015 HTC Corporation HTC America, Inc. Acacia Research Corporation Saint Lawrence Communications LLC C.D. California 8:15cv00378 | 2014-11-18 2014 Saint Lawrence Communications LLC LG Electronics, Inc. LG Electronics USA, Inc. LG Electronics Alabama, Inc E.D. Texas 2:14cv01055 | 2014-04-02 2014 Saint Lawrence communications LLC Samsung Electronics Co. Ltd. Samsung Electronics America, Inc. Samsung Telecommunications America, LLC Samsung Austin Semiconductor, LLC E.D. Texas 2:14cv00293
Opposition (EP):
License (EP):
EPO Procedural Status:
Front Page Drawing:



Record 63/70 JP03869211B2 Periodic emphasis in decoding of a wideband|broadband signal

Publication Number: JP03869211B2 20070117
JP2002528983A 20020903

Title: Periodic emphasis in decoding of a wideband|broadband signal
Title - DWPI: Periodicity enhancing device of excitation signal, reduces energy of low frequency portion of innovative code vector in relation to periodicity factor related to wideband signal
Priority Number: CA2252170A | WO1999CA1009A
Priority Date: 1998-10-27 | 1999-10-27
Application Number: JP2000578810A
Application Date: 1999-10-27
Publication Date: 2007-01-17
IPC Class Table:

IPC	Section	Class	Subclass	Class Group	Subgroup
H04B001404	H	H04	H04B	H04B0014	H04B001404
G01L001104	G	G01	G01L	G01L0011	G01L001104
G01L002102	G	G01	G01L	G01L0021	G01L002102
G10L001300	G	G10	G10L	G10L0013	G10L001300
G10L001912	G	G10	G10L	G10L0019	G10L001912
H03H001706	H	H03	H03H	H03H0017	H03H001706
H03M000730	H	H03	H03M	H03M0007	H03M000730
H03M000736	H	H03	H03M	H03M0007	H03M000736
H04B000162	H	H04	H04B	H04B0001	H04B000162
H04B000726	H	H04	H04B	H04B0007	H04B000726
H04Q000722	H	H04	H04Q	H04Q0007	H04Q000722
H04Q000732	H	H04	H04Q	H04Q0007	H04Q000732

IPC Class Table - DWPI:

IPC - DWPI	Section - DWPI	Class - DWPI	Subclass - DWPI	Class Group - DWPI	Subgroup - DWPI
G01L001104	G	G01	G01L	G01L0011	G01L001104
G01L002102	G	G01	G01L	G01L0021	G01L002102
G10L001300	G	G10	G10L	G10L0013	G10L001300
G10L001912	G	G10	G10L	G10L0019	G10L001912

H03H001706	H	H03	H03H	H03H0017	H03H001706
H03M000730	H	H03	H03M	H03M0007	H03M000730
H03M000736	H	H03	H03M	H03M0007	H03M000736
H04B000162	H	H04	H04B	H04B0001	H04B000162
H04B001404	H	H04	H04B	H04B0014	H04B001404
H04B000726	H	H04	H04B	H04B0007	H04B000726
H04J000316	H	H04	H04J	H04J0003	H04J000316
H04J000324	H	H04	H04J	H04J0003	H04J000324
H04Q000722	H	H04	H04Q	H04Q0007	H04Q000722
H04Q000732	H	H04	H04Q	H04Q0007	H04Q000732
H04W007204	H	H04	H04W	H04W0072	H04W007204
H04W007212	H	H04	H04W	H04W0072	H04W007212
H04W007408	H	H04	H04W	H04W0074	H04W007408
G10L002102	G	G10	G10L	G10L0021	G10L002102
G10L001914	G	G10	G10L	G10L0019	G10L001914

Assignee/Applicant: VOICEAGE CORP
Assignee - Current US:
JP F Terms: | 5D045DA11 | 5D045DA20 | 5J044 | 5K041AA01 | 5K041BB02 | 5K041CC01 | 5K041DD01 | 5K041EE01 | 5K041EE19 | 5K041EE24 | 5K041FF11 | 5K041FF27 | 5K041JJ14 | 5K067AA13 | 5K067BB02 | 5K067BB21 | 5K067EE02 | 5K067EE10 | 5K067HH24 | 5K067KK13 | 5K067KK15
JP FI Codes: | G10L000914-J | G10L000914-S | G10L000918-E | G10L001104 | G10L001106 | G10L001912 | G10L001912-Z | G10L001914-520B | G10L001926-B | G10L002102-202B | G10L00210272-100B | G10L002590 | G10L002593 | H03H001706-633A | H04B000726-M | H04B001404-Z | H04Q000700-643 | H04W008802-120
Assignee - Original: VOICEAGE CORP
Any CPC Table:

Type	Invention	Additional	Version	Office
Current	**G10L 19/26**	-	20130101	EP

ECLA: G10L001926
Abstract:

The present invention relates to a method and device for enhancing periodicity of an excitation signal produced in relation to a pitch codevector and an innovative codevector for supplying a

signal synthesis filter in view of producing a synthesized wideband signal. In this periodicity enhancing device and method, a factor generator is responsive to the adaptive and innovative codevectors for calculating a periodicity factor. An innovation filter subsequently processes the innovative codevector in relation to this periodicity factor to reduce energy of a low frequency portion of the innovative codevector and enhance periodicity of a low frequency portion of the excitation signal. As an example, the innovation filter has a transfer function of the form: F(z)=-(z)+1-(z)-1 where is a periodicity factor, and the factor generator calculates the periodicity factor using the relation: = qR_p bounded by < q where q is an enhancement factor set for example to 0.25, and where R_p is represented by formula (I) where v_T is the pitch codevector, b is a pitch gain, N is a subframe length, and u is the excitation signal.

The present invention relates to a method and device for enhancing periodicity of an excitation signal produced in relation to a pitch codevector and an innovative codevector for supplying a signal synthesis filter in view of producing a synthesized wideband signal. In this periodicity enhancing device and method, a factor generator is responsive to the adaptive and innovative codevectors for calculating a periodicity factor. An innovation filter subsequently processes the innovative codevector in relation to this periodicity factor to reduce energy of a low frequency portion of the innovative codevector and enhance periodicity of a low frequency portion of the excitation signal. As an example, the innovation filter has a transfer function of the form: F(z)=-alpha (z)+1- alpha (z)<-1> where alpha is a periodicity factor, and the factor generator calculates the periodicity factor alpha using the relation: alpha = qR?p? bounded by alpha < q where q is an enhancement factor set for example to 0.25, and where R?p? is represented by formula (I) where v?T? is the pitch codevector, b is a pitch gain, N is a subframe length, and u is the excitation signal.

La présente invention concerne un procédé et un dispositif destinés à améliorer la périodicité d'un signal d'excitation produit par rapport à un vecteur de code de hauteur et un vecteur de code innovant permettant d'obtenir un filtre de synthèse de signal en vue de produire un signal synthétisé à large bande. Dans ce dispositif et ce procédé d'amélioration de la périodicité, un générateur de facteurs répond aux vecteurs de code adaptatifs et innovants pour calculer un facteur de périodicité. Un filtre d'innovation traite ensuite le vecteur de code innovant par rapport à ce facteur de périodicité pour réduire l'énergie d'une partie basse fréquence du vecteur de code innovant et améliorer la périodicité d'une partie basse fréquence du signal d'excitation. A titre d'exemple, le filtre d'innovation présente une fonction de transfert ayant la forme: F(z)=(z)+1-(z)-1 dans laquelle représente un facteur de périodicité, et le générateur de facteur calcule le facteur de périodicité à l'aide de la relation: = qR_p limitée par < q dans laquelle q représente un facteur d'amélioration fixé par exemple à 0,25, et dans laquelle R_p est représenté par la formule (I) où V_t représente le vecteur de code de hauteur, b représente un gain de hauteur, N représente une longueur de sous-bloc et u représente le signal d'excitation.

La présente invention concerne un procédé et un dispositif destinés à améliorer la périodicité d'un signal d'excitation produit par rapport à un vecteur de code de hauteur et un vecteur de code innovant permettant d'obtenir un filtre de synthèse de signal en vue de produire un signal synthétisé à large bande. Dans ce dispositif et ce procédé d'amélioration de la périodicité, un générateur de facteurs répond aux vecteurs de code adaptatifs et innovants pour calculer un facteur de périodicité. Un filtre d'innovation traite ensuite le vecteur de code innovant par rapport à ce facteur de périodicité pour réduire l'énergie d'une partie basse fréquence du vecteur de code innovant et améliorer la périodicité d'une partie basse fréquence du signal d'excitation. A titre d'exemple, le filtre d'innovation présente une fonction de transfert ayant la forme: F(z)= alpha (z)+1- alpha (z)<-1> dans laquelle alpha représente un facteur de périodicité, et le générateur de facteur calcule le facteur alpha de périodicité à l'aide de la relation: alpha = qR?p? limitée par alpha < q dans laquelle q représente un facteur d'amélioration fixé par exemple à 0,25, et dans laquelle Rp est représenté par la formule (I) où V?t? représente le vecteur de code de hauteur, b représente un gain de hauteur, N représente une longueur de sous-bloc et u représente le signal d'excitation.

Language of Publication: JA

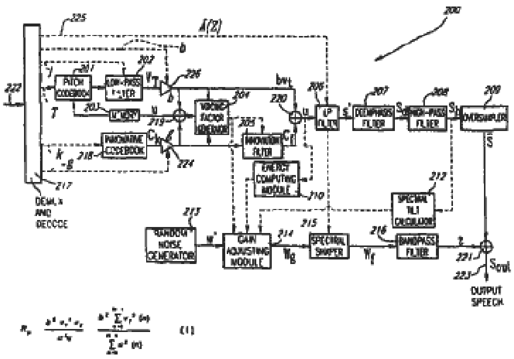
INPADOC Legal Status Table:

Gazette Date	Code	INPADOC Legal Status Impact
2015-10-06	R250	+
Description: RECEIPT OF ANNUAL FEES JAPANESE INTERMEDIATE CODE: R250		
2014-10-14	R250	+
Description: RECEIPT OF ANNUAL FEES JAPANESE INTERMEDIATE CODE: R250		
2013-10-08	R250	+
Description: RECEIPT OF ANNUAL FEES JAPANESE INTERMEDIATE CODE: R250		
2012-10-09	FPAY	+
Description: RENEWAL FEE PAYMENT (PRS DATE IS RENEWAL DATE OF DATABASE) PAYMENT UNTIL: 20131020		
2012-10-04	FPAY	+
Description: RENEWAL FEE PAYMENT (PRS DATE IS RENEWAL DATE OF DATABASE) PAYMENT UNTIL: 20121020		
2011-10-11	FPAY	+
Description: RENEWAL FEE PAYMENT (PRS DATE IS RENEWAL DATE OF DATABASE) PAYMENT UNTIL: 20121020		
2011-10-06	FPAY	+
Description: RENEWAL FEE PAYMENT (PRS DATE IS RENEWAL DATE OF DATABASE) PAYMENT UNTIL: 20111020		
2010-10-26	FPAY	+
Description: RENEWAL FEE PAYMENT (PRS DATE IS RENEWAL DATE OF DATABASE) PAYMENT UNTIL: 20111020		
2009-10-27	FPAY	+
Description: RENEWAL FEE PAYMENT (PRS DATE IS RENEWAL DATE OF DATABASE) PAYMENT UNTIL: 20101020		

2006-10-20	R150	+
Description: CERTIFICATE OF PATENT (=GRANT) OR REGISTRATION OF UTILITY MODEL JAPANESE INTERMEDIATE CODE: R150		
2006-10-19	A61	+
Description: FIRST PAYMENT OF ANNUAL FEES (DURING GRANT PROCEDURE) JAPANESE INTERMEDIATE CODE: A61 2006-10-12		
2006-09-13	A01	+
Description: WRITTEN DECISION TO GRANT A PATENT OR TO GRANT A REGISTRATION (UTILITY MODEL) JAPANESE INTERMEDIATE CODE: A01 2006-09-12		
2006-09-07	TRDD	+
Description: DECISION OF GRANT OR REJECTION WRITTEN		
2006-08-12	A521	-
Description: WRITTEN AMENDMENT JAPANESE INTERMEDIATE CODE: A523 2006-08-11		
2006-05-17	A131	-
Description: NOTIFICATION OF REASONS FOR REFUSAL JAPANESE INTERMEDIATE CODE: A131 2006-05-16		
2005-06-16	A521	-
Description: WRITTEN AMENDMENT JAPANESE INTERMEDIATE CODE: A523 2005-06-15		
2005-06-16	A521	-
Description: WRITTEN AMENDMENT JAPANESE INTERMEDIATE CODE: A523 2005-06-15		
2005-04-19	A602	-
Description: WRITTEN PERMISSION OF EXTENSION OF TIME JAPANESE INTERMEDIATE CODE: A602 2005-04-18		
2005-04-19	A602	-
Description: WRITTEN PERMISSION OF EXTENSION OF TIME JAPANESE INTERMEDIATE CODE: A602 2005-04-18		
2005-03-22	A601	-
Description: WRITTEN REQUEST FOR EXTENSION OF TIME JAPANESE INTERMEDIATE CODE: A601 2005-03-18		
2005-03-22	A601	-

Description: WRITTEN REQUEST FOR EXTENSION OF TIME JAPANESE INTERMEDIATE CODE: A601 2005-03-18		
2004-12-22	A131	-
Description: NOTIFICATION OF REASONS FOR REFUSAL JAPANESE INTERMEDIATE CODE: A131 2004-12-21		

Post-Issuance (US):
Reassignment (US) Table:
Maintenance Status (US):
Litigation (US):
Opposition (EP):
License (EP):
EPO Procedural Status:
Front Page Drawing:



Record 64/70 JP03936139B2 The method and apparatus of high frequency component recovery|restoration of the over-sampled synthetic|combination wideband|broadband signal

Publication Number: JP03936139B2 20070627
JP2002528777A 20020903

Title: The method and apparatus of high frequency component recovery|restoration of the over-sampled synthetic|combination wideband|broadband signal
Title - DWPI: Periodicity enhancing device of excitation signal, reduces energy of low frequency portion of innovative code vector in relation to periodicity factor related to wideband signal
Priority Number: CA2252170A | WO1999CA990A
Priority Date: 1998-10-27 | 1999-10-27
Application Number: JP2000578812A
Application Date: 1999-10-27
Publication Date: 2007-06-27
IPC Class Table:

IPC	Section	Class	Subclass	Class Group	Subgroup
H03M000730	H	H03	H03M	H03M0007	H03M000730
G01L001104	G	G01	G01L	G01L0011	G01L001104
G01L002102	G	G01	G01L	G01L0021	G01L002102
G10L001300	G	G10	G10L	G10L0013	G10L001300
G10L001912	G	G10	G10L	G10L0019	G10L001912
H03H001706	H	H03	H03H	H03H0017	H03H001706
H03M000736	H	H03	H03M	H03M0007	H03M000736
H04B000162	H	H04	H04B	H04B0001	H04B000162
H04B000726	H	H04	H04B	H04B0007	H04B000726
H04B001404	H	H04	H04B	H04B0014	H04B001404
H04Q000722	H	H04	H04Q	H04Q0007	H04Q000722
H04Q000732	H	H04	H04Q	H04Q0007	H04Q000732

IPC Class Table - DWPI:

IPC - DWPI	Section - DWPI	Class - DWPI	Subclass - DWPI	Class Group - DWPI	Subgroup - DWPI
G01L001104	G	G01	G01L	G01L0011	G01L001104
G01L002102	G	G01	G01L	G01L0021	G01L002102
G10L001300	G	G10	G10L	G10L0013	G10L001300

G10L001912	G	G10	G10L	G10L0019	G10L001912
H03H001706	H	H03	H03H	H03H0017	H03H001706
H03M000730	H	H03	H03M	H03M0007	H03M000730
H03M000736	H	H03	H03M	H03M0007	H03M000736
H04B000162	H	H04	H04B	H04B0001	H04B000162
H04B001404	H	H04	H04B	H04B0014	H04B001404
H04B000726	H	H04	H04B	H04B0007	H04B000726
H04J000316	H	H04	H04J	H04J0003	H04J000316
H04J000324	H	H04	H04J	H04J0003	H04J000324
H04Q000722	H	H04	H04Q	H04Q0007	H04Q000722
H04Q000732	H	H04	H04Q	H04Q0007	H04Q000732
H04W007204	H	H04	H04W	H04W0072	H04W007204
H04W007212	H	H04	H04W	H04W0072	H04W007212
H04W007408	H	H04	H04W	H04W0074	H04W007408
G10L002102	G	G10	G10L	G10L0021	G10L002102
G10L001914	G	G10	G10L	G10L0019	G10L001914

Assignee/Applicant: VOICEAGE CORP
Assignee - Current US:
JP F Terms: | 5D045CA01 | 5D045DA11 | 5J064AA01 | 5J064AA02 | 5J064BA13 | 5J064BB03 | 5J064BB12 | 5J064BC01 | 5J064BC08 | 5J064BC12 | 5J064BC16 | 5J064BC18 | 5J064BC25 | 5J064BD02
JP FI Codes: | G10L000702-D | G10L000914-M | G10L000914-S | G10L001106 | G10L001912 | G10L001912-Z | G10L00210388 | G10L002104-130A | G10L002593 | H03M000730-B | H03M000736
Assignee - Original: VOICEAGE CORP
Any CPC Table:

Type	Invention	Additional	Version	Office
Current	**G10L 19/26**	-	20130101	EP

ECLA: G10L001926
Abstract:

In a method and device for recovering the high frequency content of a wideband signal previously down-sampled during encoding, and for injecting, during decoding, this high frequency content in an over-sampled synthesized version of the wideband signal to produce a full-spectrum

synthesized wideband signal, a white noise generator produces a white noise sequence. Serially interconnected gain adjustment unit, spectral shaper and band-pass filter spectrally shapes the white noise sequence in relation to a set of shaping parameters representative of the down-sampled wideband signal such as a voicing factor, an energy scaling factor, a tilt scaling factor, and linear prediction filter coefficients. A signal injection circuit finally injects the spectrally-shaped white noise sequence in the over-sampled synthesized signal version to thereby produce the full-spectrum synthesized wideband signal.

Dans un procédé et un dispositif pour la récupération du contenu à haute fréquence d'un signal à large bande préalablement sous-échantillonné pendant le codage, et pour l'injection, pendant le décodage, de ce contenu à haute fréquence dans une version synthétisée suréchantillonée du signal à large bande, de manière qu'un signal à large bande synthétisé en spectre continu soit produit, un générateur de bruits blancs produit une séquence de bruits blancs. Une unité d'ajustement de gain un circuit de mise en forme spectrale et un filtre passe-bande, interconnectés en série, mettent en forme la séquence de bruits blancs par rapport à un ensemble de paramètres de mise en forme représentatifs du signal à large bande sous-échantillonné, tel qu'un facteur de verbalisation, un facteur de mise à l'échelle d'énergie, un facteur de mise à l'échelle de basculement et des coefficients de filtre de prédiction linéaire. Un circuit d'injection de signal injecte finalement la séquence de bruits blancs mise en forme spectralement dans la version de signal synthétisé suréchantillonné de sorte que le signal à large bande synthétisé en spectre continu soit produit.

Language of Publication: JA

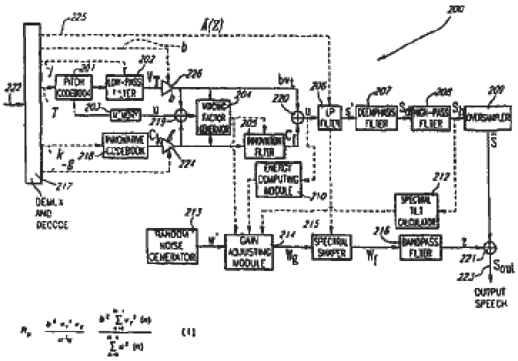
INPADOC Legal Status Table:

Gazette Date	Code	INPADOC Legal Status Impact
2015-03-17	R250	+
Description: RECEIPT OF ANNUAL FEES JAPANESE INTERMEDIATE CODE: R250		
2014-04-08	R250	+
Description: RECEIPT OF ANNUAL FEES JAPANESE INTERMEDIATE CODE: R250		
2013-03-19	FPAY	+
Description: RENEWAL FEE PAYMENT (PRS DATE IS RENEWAL DATE OF DATABASE) PAYMENT UNTIL: 20140330		
2013-03-14	FPAY	+
Description: RENEWAL FEE PAYMENT (PRS DATE IS RENEWAL DATE OF DATABASE) PAYMENT UNTIL: 20130330		
2012-03-13	FPAY	+
Description: RENEWAL FEE PAYMENT (PRS DATE IS RENEWAL DATE OF DATABASE) PAYMENT UNTIL: 20130330		
2011-03-03	FPAY	+

Description: RENEWAL FEE PAYMENT (PRS DATE IS RENEWAL DATE OF DATABASE) PAYMENT UNTIL: 20110330		
2010-03-09	FPAY	+
Description: RENEWAL FEE PAYMENT (PRS DATE IS RENEWAL DATE OF DATABASE) PAYMENT UNTIL: 20110330		
2007-03-30	R150	+
Description: CERTIFICATE OF PATENT (=GRANT) OR REGISTRATION OF UTILITY MODEL JAPANESE INTERMEDIATE CODE: R150		
2007-03-29	A61	+
Description: FIRST PAYMENT OF ANNUAL FEES (DURING GRANT PROCEDURE) JAPANESE INTERMEDIATE CODE: A61 2007-03-22		
2005-05-02	A912	-
Description: REMOVAL OF RECONSIDERATION BY EXAMINER BEFORE APPEAL (ZENCHI) JAPANESE INTERMEDIATE CODE: A912 2005-04-28		
2005-03-02	A911	-
Description: TRANSFER OF RECONSIDERATION BY EXAMINER BEFORE APPEAL (ZENCHI) JAPANESE INTERMEDIATE CODE: A911 2005-03-01		
2004-11-18	A521	-
Description: WRITTEN AMENDMENT JAPANESE INTERMEDIATE CODE: A523 2004-11-17		
2004-07-21	A02	-
Description: DECISION OF REFUSAL JAPANESE INTERMEDIATE CODE: A02 2004-07-20		
2004-03-03	A602	-
Description: WRITTEN PERMISSION OF EXTENSION OF TIME JAPANESE INTERMEDIATE CODE: A602 2004-03-02		
2004-02-25	A601	-
Description: WRITTEN REQUEST FOR EXTENSION OF TIME JAPANESE INTERMEDIATE CODE: A601 2004-02-24		
2003-11-26	A131	-
Description: NOTIFICATION OF REASONS FOR REFUSAL JAPANESE INTERMEDIATE CODE: A131 2003-11-25		

Post-Issuance (US):

Reassignment (US) Table:
Maintenance Status (US):
Litigation (US):
Opposition (EP):
License (EP):
EPO Procedural Status:
Front Page Drawing:



Record 65/70 US7260521B1 Method and device for adaptive bandwidth pitch search in coding wideband signals

Publication Number: US7260521B1 20070821

Title: Method and device for adaptive bandwidth pitch search in coding wideband signals
Title - DWPI: Pitch analysis device for digitally encoding wideband signal, chooses signal path having lowest calculated pitch prediction error
Priority Number: CA2252170A | WO1999CA1008A
Priority Date: 1998-10-27 | 1999-10-27
Application Number: US2001830114A
Application Date: 2001-06-20
Publication Date: 2007-08-21
IPC Class Table:

IPC	Section	Class	Subclass	Class Group	Subgroup
G01L001104	G	G01	G01L	G01L0011	G01L001104
G01L002102	G	G01	G01L	G01L0021	G01L002102
G10L001300	G	G10	G10L	G10L0013	G10L001300
G10L001912	G	G10	G10L	G10L0019	G10L001912
H03H001706	H	H03	H03H	H03H0017	H03H001706
H03M000730	H	H03	H03M	H03M0007	H03M000730
H03M000736	H	H03	H03M	H03M0007	H03M000736
H04B000162	H	H04	H04B	H04B0001	H04B000162
H04B000726	H	H04	H04B	H04B0007	H04B000726
H04B001404	H	H04	H04B	H04B0014	H04B001404
H04Q000722	H	H04	H04Q	H04Q0007	H04Q000722
H04Q000732	H	H04	H04Q	H04Q0007	H04Q000732

IPC Class Table - DWPI:

IPC - DWPI	Section - DWPI	Class - DWPI	Subclass - DWPI	Class Group - DWPI	Subgroup - DWPI
G01L001104	G	G01	G01L	G01L0011	G01L001104
G01L002102	G	G01	G01L	G01L0021	G01L002102
G10L001104	G	G10	G10L	G10L0011	G10L001104
G10L001300	G	G10	G10L	G10L0013	G10L001300

G10L001900	G	G10	G10L	G10L0019	G10L001900
G10L001904	G	G10	G10L	G10L0019	G10L001904
G10L001906	G	G10	G10L	G10L0019	G10L001906
G10L001912	G	G10	G10L	G10L0019	G10L001912
G10L001914	G	G10	G10L	G10L0019	G10L001914
G10L002102	G	G10	G10L	G10L0021	G10L002102
H03H001706	H	H03	H03H	H03H0017	H03H001706
H03M000730	H	H03	H03M	H03M0007	H03M000730
H03M000736	H	H03	H03M	H03M0007	H03M000736
H04B000162	H	H04	H04B	H04B0001	H04B000162
H04B001404	H	H04	H04B	H04B0014	H04B001404
H04B000726	H	H04	H04B	H04B0007	H04B000726
H04Q000722	H	H04	H04Q	H04Q0007	H04Q000722
H04Q000732	H	H04	H04Q	H04Q0007	H04Q000732
A61K0031585	A	A61	A61K	A61K0031	A61K0031585

Assignee/Applicant: Voiceage Corporation,Quebec,CA
Assignee - Current US: SAINT LAWRENCE COMMUNICATIONS LLC
JP F Terms:
JP FI Codes:
Assignee - Original: Voiceage Corporation
Any CPC Table:

Type	Invention	Additional	Version	Office
Current	**G10L 19/26**	-	20130101	EP

ECLA: G10L001926
Abstract:

An improved pitch search method and device for digitally encoding a wideband signal, in particular but not exclusively a speech signal, in view of transmitting, or storing, and synthesizing this wideband sound signal. The new method and device which achieve efficient modeling of the harmonic structure of the speech spectrum uses several forms of low pass filters applied to a pitch codevector, the one yielding higher prediction gain (i.e. the lowest pitch prediction error) is selected and the associated pitch codebook parameters are forwarded.

L'invention concerne un procédé amélioré de recherche de hauteur et un dispositif de codage

numérique d'un signal à large bande, en particulier mais pas exclusivement un signal vocal, en vue de transmettre ou de stocker, et de synthétiser ce signal sonore à large bande. Le procédé et le dispositif nouveaux, lesquels permettent une modélisation efficace de la structure harmonique du spectre de la parole, utilisent plusieurs formes de filtres passe-bas appliqués à un vecteur de code de hauteur, celui permettant d'obtenir le gain de prédiction le plus haut (c'est-à-dire l'erreur de prédiction de hauteur la plus faible) est sélectionné et les paramètres de code de hauteur associés sont retransmis.

Language of Publication: EN

INPADOC Legal Status Table:

Gazette Date	Code	INPADOC Legal Status Impact
2011-02-09	FPAY	+
Description: FEE PAYMENT		
2001-06-20	AS	-
Description: ASSIGNMENT VOICEAGE CORP., CANADA ASSIGNMENT OF ASSIGNORS INTEREST; ASSIGNORS:BESSETTE, BRUNO; SALAMI, REDWAN; LEFEBVRE, ROCH; REEL/FRAME:011913/0560 2001-06-06		

Post-Issuance (US):

Reassignment (US) Table:

Assignee	Assignor	Date Signed	Reel/Frame	Date
SAINT LAWRENCE COMMUNICATIONS LLC,PLANO,TX,US	VOICEAGE CORPORATION	2013-12-29	032032/0113	2014-01-23
Conveyance: ASSIGNMENT OF ASSIGNORS INTEREST (SEE DOCUMENT FOR DETAILS).				
Corresponent: JENNIFER GRAFF 2400 DALLAS PARKWAY SUITE 200 PLANO, TX 75093				
VOICEAGE CORP.,QUEBEC, QUEBEC,CA	BESSETTE, BRUNO	2001-06-06	011913/0560	2001-06-20
	SALAMI, REDWAN	2001-06-06		
	LEFEBVRE, ROCH	2001-06-06		
Conveyance: ASSIGNMENT OF ASSIGNORS INTEREST (SEE DOCUMENT FOR DETAILS).				
Corresponent: BIRCH, STEWART, KOLASCH & BIRCH, LLP F. PRINCE BUTLER P.O. BOX 747 FALLS CHURCH, VA 22040-0747				

Maintenance Status (US):

Litigation (US): 2016-01-27 2016 Saint Lawrence Communications LLC Apple Inc. AT&T Mobility LLC Cellco Partnership d/b/a Verizon Wireless E.D. Texas 2:16cv00082 **|** 2015-09-11 2015 HTC Corporation HTC America Inc Acacia Research Corporation Saint Lawrence Communications LLC

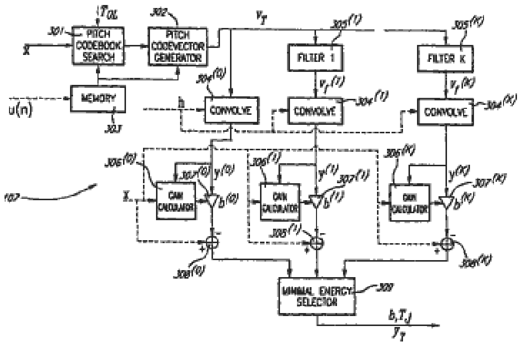
E.D. Texas 2:15cv01510 | 2015-06-02 2015 Saint Lawrence Communications LLC HTC Corporation HTC America, Inc. E.D. Texas 2:15cv00919 | 2015-03-10 2015 Saint Lawrence Communications LLC ZTE Corporation ZTE USA, Inc. ZTE (TX) Inc. E.D. Texas 2:15cv00349 | 2015-03-10 2015 Saint Lawrence Communications LLC Sony Mobile Communications (USA) Inc. Sony Electronics, Inc. E.D. Texas 2:15cv00350 | 2015-03-10 2015 Saint Lawrence Communications LLC Motorola Mobility LLC E.D. Texas 2:15cv00351 | 2015-03-09 2015 HTC Corporation HTC America, Inc. Acacia Research Corporation Saint Lawrence Communications LLC C.D. California 8:15cv00378 | 2014-11-18 2014 Saint Lawrence Communications LLC LG Electronics, Inc. LG Electronics USA, Inc. LG Electronics Alabama, Inc E.D. Texas 2:14cv01055 | 2014-04-02 2014 Saint Lawrence communications LLC Samsung Electronics Co. Ltd. Samsung Electronics America, Inc. Samsung Telecommunications America, LLC Samsung Austin Semiconductor, LLC E.D. Texas 2:14cv00293

Opposition (EP):

License (EP):

EPO Procedural Status:

Front Page Drawing:



Record 66/70 CA2347735C HIGH FREQUENCY CONTENT RECOVERING METHOD AND DEVICE FOR OVER-SAMPLED SYNTHESIZED WIDEBAND SIGNAL | PROCEDE DE RECUPERATION DU CONTENU A HAUTE FREQUENCE ET DISPOSITIF POUR SIGNAL A LARGE BANDE SYNTHETISE SUR-ECHANTILLONNE

Publication Number: CA2347735C 20080108
CA2347735A1 20000504

Title: HIGH FREQUENCY CONTENT RECOVERING METHOD AND DEVICE FOR OVER-SAMPLED SYNTHESIZED WIDEBAND SIGNAL | PROCEDE DE RECUPERATION DU CONTENU A HAUTE FREQUENCE ET DISPOSITIF POUR SIGNAL A LARGE BANDE SYNTHETISE SUR-ECHANTILLONNE
Title - DWPI: High frequency content recovery device for use in audio video teleconferencing, performs summation of spectrally shaped noise sequence in oversampled synthesized signal version to produce full spectrum synthesized wide band signal
Priority Number: CA2252170A | WO1999CA990A
Priority Date: 1998-10-27 | 1999-10-27
Application Number: CA2347735A
Application Date: 1999-10-27
Publication Date: 2008-01-08
IPC Class Table:

IPC	Section	Class	Subclass	Class Group	Subgroup
G01L001104	G	G01	G01L	G01L0011	G01L001104
G01L002102	G	G01	G01L	G01L0021	G01L002102
G10L001300	G	G10	G10L	G10L0013	G10L001300
G10L001912	G	G10	G10L	G10L0019	G10L001912
H03H001706	H	H03	H03H	H03H0017	H03H001706
H03M000730	H	H03	H03M	H03M0007	H03M000730
H03M000736	H	H03	H03M	H03M0007	H03M000736
H04B000162	H	H04	H04B	H04B0001	H04B000162
H04B000726	H	H04	H04B	H04B0007	H04B000726
H04B001404	H	H04	H04B	H04B0014	H04B001404
H04Q000722	H	H04	H04Q	H04Q0007	H04Q000722
H04Q000732	H	H04	H04Q	H04Q0007	H04Q000732

IPC Class Table - DWPI:

IPC - DWPI	Section - DWPI	Class - DWPI	Subclass - DWPI	Class Group - DWPI	Subgroup - DWPI

G10L001100	G	G10	G10L	G10L0011	G10L001100
G10L001300	G	G10	G10L	G10L0013	G10L001300
G10L001900	G	G10	G10L	G10L0019	G10L001900
G10L002100	G	G10	G10L	G10L0021	G10L002100
H03H001706	H	H03	H03H	H03H0017	H03H001706
H03M000730	H	H03	H03M	H03M0007	H03M000730
H03M000736	H	H03	H03M	H03M0007	H03M000736
H04B000162	H	H04	H04B	H04B0001	H04B000162
H04B001404	H	H04	H04B	H04B0014	H04B001404
H04B000726	H	H04	H04B	H04B0007	H04B000726
H04L002700	H	H04	H04L	H04L0027	H04L002700
G10L001104	G	G10	G10L	G10L0011	G10L001104
G10L001902	G	G10	G10L	G10L0019	G10L001902
G10L001904	G	G10	G10L	G10L0019	G10L001904
G10L001906	G	G10	G10L	G10L0019	G10L001906
G10L001912	G	G10	G10L	G10L0019	G10L001912
G10L002102	G	G10	G10L	G10L0021	G10L002102
G10L	G	G10	G10L	G10L	G10L

Assignee/Applicant: VOICEAGE CORPORATION,MONTREAL,Q1,CA
Assignee - Current US:
JP F Terms:
JP FI Codes:
Assignee - Original: VOICEAGE CORPORATION
Any CPC Table:

Type	Invention	Additional	Version	Office
Current	**G10L 19/26**	-	20130101	EP

ECLA: G10L001926
Abstract:

In a method and device for recovering the high frequency content of a wideband signal previously down-sampled during encoding, and for injecting, during decoding, this high frequency content in an oversampled synthesized version of the wideband signal to produce a full-spectrum synthesized wideband signal, a white noise generator produces a white noise sequence. Serially

interconnected gain adjustment unit, spectral shaper and band-pass filter spectrally shapes the white noise sequence in relation to a set of shaping parameters representative of the down-sampled wideband signal such as a voicing factor, an energy scaling factor, a tilt scaling factor, and linear prediction filter coefficients. A signal injection circuit finally injects the spectrally-shaped white noise sequence in the over-sampled synthesized signal version to thereby produce the full-spectrum synthesized wideband signal.

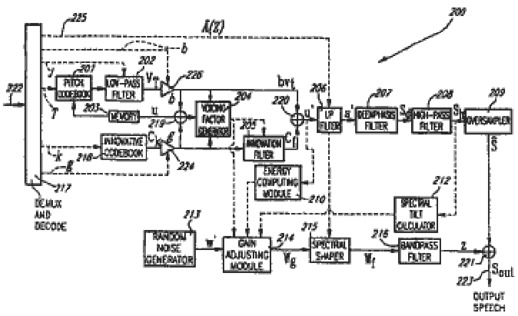
In a method and device for recovering the high frequency content of a wideba nd signal previously down-sampled during encoding, and for injecting, during decoding, this high frequency content in an over- sampled synthesized version of the wideband signal to produce a full-spectrum synthesized wideband signal, a white noise generator produces a white noise sequence. Serially interconnected gain adjustment unit, spectral shaper and band-pass filter spectrally shapes the white noise sequence in relation to a set of shaping parameters representative of the down-sampled wideband signal such as a voicing factor, an energy scaling factor, a tilt scaling factor, and linear prediction filter coefficients. A signal injection circuit finally injects the spectrally-shap ed white noise sequence in the over-sampled synthesized signal version to thereby produce the full-spectrum synthesized wideband signal.</S DOAB>

Language of Publication: EN

INPADOC Legal Status Table:

Gazette Date	Code	INPADOC Legal Status Impact
2002-03-06	EEER	+
Description: EXAMINATION REQUEST		

Post-Issuance (US):
Reassignment (US) Table:
Maintenance Status (US):
Litigation (US):
Opposition (EP):
License (EP):
EPO Procedural Status: EX-RQ 2002-03-06 2002 Request for examination
Front Page Drawing:



Record 67/70 US7672837B2 Method and device for adaptive bandwidth pitch search in coding wideband signals

Publication Number: US7672837B2 20100302
US20060277036A1 20061207

Title: Method and device for adaptive bandwidth pitch search in coding wideband signals
Title - DWPI: Pitch analysis device for digitally encoding wideband signal, chooses signal path having lowest calculated pitch prediction error
Priority Number: CA2252170A | WO1999CA1008A | US2001830114A
Priority Date: 1998-10-27 | 1999-10-27 | 2001-06-20
Application Number: US2006498771A
Application Date: 2006-08-04
Publication Date: 2010-03-02
IPC Class Table:

IPC	Section	Class	Subclass	Class Group	Subgroup
G01L001104	G	G01	G01L	G01L0011	G01L001104
G01L002102	G	G01	G01L	G01L0021	G01L002102
G10L001300	G	G10	G10L	G10L0013	G10L001300
G10L001912	G	G10	G10L	G10L0019	G10L001912
H03H001706	H	H03	H03H	H03H0017	H03H001706
H03M000730	H	H03	H03M	H03M0007	H03M000730
H03M000736	H	H03	H03M	H03M0007	H03M000736
H04B000162	H	H04	H04B	H04B0001	H04B000162
H04B000726	H	H04	H04B	H04B0007	H04B000726
H04B001404	H	H04	H04B	H04B0014	H04B001404
H04Q000722	H	H04	H04Q	H04Q0007	H04Q000722
H04Q000732	H	H04	H04Q	H04Q0007	H04Q000732

IPC Class Table - DWPI:

IPC - DWPI	Section - DWPI	Class - DWPI	Subclass - DWPI	Class Group - DWPI	Subgroup - DWPI
G01L001104	G	G01	G01L	G01L0011	G01L001104
G01L002102	G	G01	G01L	G01L0021	G01L002102
G10L001104	G	G10	G10L	G10L0011	G10L001104

G10L001300	G	G10	G10L	G10L0013	G10L001300
G10L001900	G	G10	G10L	G10L0019	G10L001900
G10L001904	G	G10	G10L	G10L0019	G10L001904
G10L001906	G	G10	G10L	G10L0019	G10L001906
G10L001912	G	G10	G10L	G10L0019	G10L001912
G10L001914	G	G10	G10L	G10L0019	G10L001914
G10L002102	G	G10	G10L	G10L0021	G10L002102
H03H001706	H	H03	H03H	H03H0017	H03H001706
H03M000730	H	H03	H03M	H03M0007	H03M000730
H03M000736	H	H03	H03M	H03M0007	H03M000736
H04B000162	H	H04	H04B	H04B0001	H04B000162
H04B001404	H	H04	H04B	H04B0014	H04B001404
H04B000726	H	H04	H04B	H04B0007	H04B000726
H04Q000722	H	H04	H04Q	H04Q0007	H04Q000722
H04Q000732	H	H04	H04Q	H04Q0007	H04Q000732
A61K0031585	A	A61	A61K	A61K0031	A61K0031585

Assignee/Applicant: Voiceage Corporation,Quebec,CA
Assignee - Current US: SAINT LAWRENCE COMMUNICATIONS LLC
JP F Terms:
JP FI Codes:
Assignee - Original: Voiceage Corporation
Any CPC Table:

Type	Invention	Additional	Version	Office
Current	**G10L 19/26**	-	20130101	EP

ECLA: G10L001926
Abstract:

A pitch search method and device for digitally encoding a wideband signal, in particular but not exclusively a speech signal, in view of transmitting, or storing, and synthesizing this wideband sound signal. The new method and device which achieve efficient modeling of the harmonic structure of the speech spectrum uses several forms of low pass filters applied to a pitch codevector, the one yielding higher prediction gain (i.e. the lowest pitch prediction error) is selected and the associated pitch codebook parameters are forwarded.
Language of Publication: EN

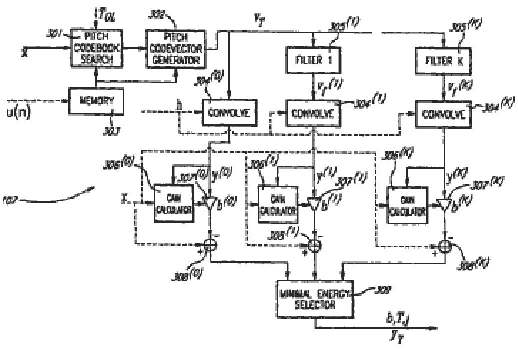
INPADOC Legal Status Table:

Gazette Date	Code	INPADOC Legal Status Impact
2014-01-23	AS	-
Description: ASSIGNMENT SAINT LAWRENCE COMMUNICATIONS LLC, TEXAS ASSIGNMENT OF ASSIGNORS INTEREST; ASSIGNOR:VOICEAGE CORPORATION; REEL/FRAME:032032/0113 2013-12-29		
2013-08-09	FPAY	+
Description: FEE PAYMENT		

Post-Issuance (US):
Reassignment (US) Table:

Assignee	Assignor	Date Signed	Reel/Frame	Date
SAINT LAWRENCE COMMUNICATIONS LLC,PLANO,TX,US	VOICEAGE CORPORATION	2013-12-29	032032/0113	2014-01-23
Conveyance: ASSIGNMENT OF ASSIGNORS INTEREST (SEE DOCUMENT FOR DETAILS).				
Corresponent: JENNIFER GRAFF 2400 DALLAS PARKWAY SUITE 200 PLANO, TX 75093				

Maintenance Status (US):
Litigation (US):
Opposition (EP):
License (EP):
EPO Procedural Status:
Front Page Drawing:



Record 68/70 US8036885B2 Method and device for adaptive bandwidth pitch search in coding wideband signals

Publication Number: US8036885B2 20111011
US20100174536A1 20100708

Title: Method and device for adaptive bandwidth pitch search in coding wideband signals
Title - DWPI: Periodicity enhancing device of excitation signal, reduces energy of low frequency portion of innovative code vector in relation to periodicity factor related to wideband signal
Priority Number: CA2252170A | WO1999CA1008A | US2001830114A | US2006498771A
Priority Date: 1998-10-27 | 1999-10-27 | 2001-06-20 | 2006-08-04
Application Number: US2009620394A
Application Date: 2009-11-17
Publication Date: 2011-10-11
IPC Class Table:

IPC	Section	Class	Subclass	Class Group	Subgroup
G01L001104	G	G01	G01L	G01L0011	G01L001104
G01L002102	G	G01	G01L	G01L0021	G01L002102
G10L001300	G	G10	G10L	G10L0013	G10L001300
G10L001912	G	G10	G10L	G10L0019	G10L001912
H03H001706	H	H03	H03H	H03H0017	H03H001706
H03M000730	H	H03	H03M	H03M0007	H03M000730
H03M000736	H	H03	H03M	H03M0007	H03M000736
H04B000162	H	H04	H04B	H04B0001	H04B000162
H04B000726	H	H04	H04B	H04B0007	H04B000726
H04B001404	H	H04	H04B	H04B0014	H04B001404
H04Q000722	H	H04	H04Q	H04Q0007	H04Q000722
H04Q000732	H	H04	H04Q	H04Q0007	H04Q000732

IPC Class Table - DWPI:

IPC - DWPI	Section - DWPI	Class - DWPI	Subclass - DWPI	Class Group - DWPI	Subgroup - DWPI
G01L001104	G	G01	G01L	G01L0011	G01L001104
G01L002102	G	G01	G01L	G01L0021	G01L002102
G10L001300	G	G10	G10L	G10L0013	G10L001300

G10L001912	G	G10	G10L	G10L0019	G10L001912
H03H001706	H	H03	H03H	H03H0017	H03H001706
H03M000730	H	H03	H03M	H03M0007	H03M000730
H03M000736	H	H03	H03M	H03M0007	H03M000736
H04B000162	H	H04	H04B	H04B0001	H04B000162
H04B001404	H	H04	H04B	H04B0014	H04B001404
H04B000726	H	H04	H04B	H04B0007	H04B000726
H04J000316	H	H04	H04J	H04J0003	H04J000316
H04J000324	H	H04	H04J	H04J0003	H04J000324
H04Q000722	H	H04	H04Q	H04Q0007	H04Q000722
H04Q000732	H	H04	H04Q	H04Q0007	H04Q000732
H04W007204	H	H04	H04W	H04W0072	H04W007204
H04W007212	H	H04	H04W	H04W0072	H04W007212
H04W007408	H	H04	H04W	H04W0074	H04W007408
G10L002102	G	G10	G10L	G10L0021	G10L002102
G10L001914	G	G10	G10L	G10L0019	G10L001914

Assignee/Applicant: Voiceage Corp.,Quebec,CA
Assignee - Current US: SAINT LAWRENCE COMMUNICATIONS LLC
JP F Terms:
JP FI Codes:
Assignee - Original: Voiceage Corp.
Any CPC Table:

Type	Invention	Additional	Version	Office
Current	**G10L 19/26**	-	20130101	EP

ECLA: G10L001926
Abstract:

A pitch search method and device for digitally encoding a wideband signal, in particular but not exclusively a speech signal, in view of transmitting, or storing, and synthesizing this wideband sound signal. The new method and device which achieve efficient modeling of the harmonic structure of the speech spectrum uses several forms of low pass filters applied to a pitch codevector, the one yielding higher prediction gain (i.e. the lowest pitch prediction error) is selected and the associated pitch codebook parameters are forwarded.
Language of Publication: EN

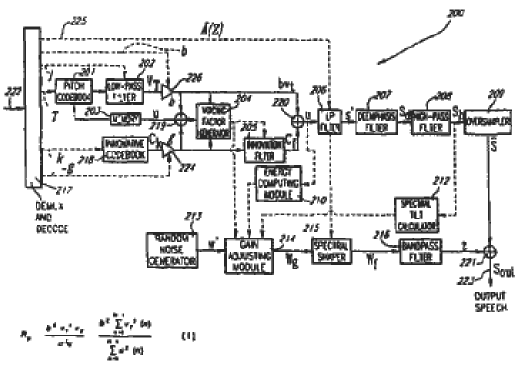
INPADOC Legal Status Table:

Gazette Date	Code	INPADOC Legal Status Impact
2015-03-11	FPAY	+
Description: FEE PAYMENT		
2014-01-23	AS	-
Description: ASSIGNMENT SAINT LAWRENCE COMMUNICATIONS LLC, TEXAS ASSIGNMENT OF ASSIGNORS INTEREST; ASSIGNOR:VOICEAGE CORPORATION; REEL/FRAME:032032/0113 2013-12-29		

Post-Issuance (US):
Reassignment (US) Table:

Assignee	Assignor	Date Signed	Reel/Frame	Date
SAINT LAWRENCE COMMUNICATIONS LLC,PLANO,TX,US	VOICEAGE CORPORATION	2013-12-29	032032/0113	2014-01-23
Conveyance: ASSIGNMENT OF ASSIGNORS INTEREST (SEE DOCUMENT FOR DETAILS).				
Corresponent: JENNIFER GRAFF 2400 DALLAS PARKWAY SUITE 200 PLANO, TX 75093				

Maintenance Status (US):
Litigation (US):
Opposition (EP):
License (EP):
EPO Procedural Status:
Front Page Drawing:



Record 69/70 BRPI9914889B1 DISPOSITIVO E MÉTODO DE PONDERAÇÃO DE PERCEPÇÃO PARA CODIFICAÇÃO EFICIENTE DE SINAIS EM BANDA LARGA | DEVICE AND METHOD OF DISTRIBUTING PERCEPTION FOR EFFICIENT ENCODING OF BROADBAND SIGNALS IN

Publication Number: BRPI9914889B1 20130730
BR199914889A 20010717

Title: DISPOSITIVO E MÉTODO DE PONDERAÇÃO DE PERCEPÇÃO PARA CODIFICAÇÃO EFICIENTE DE SINAIS EM BANDA LARGA | DEVICE AND METHOD OF DISTRIBUTING PERCEPTION FOR EFFICIENT ENCODING OF BROADBAND SIGNALS IN
Title - DWPI: Perceptual weighting device in digital wideband speech-audio encoder, filters preemphasized signal in relation to synthesis filter coefficient, to produce perceptually weighted signal
Priority Number: CA2252170A | WO1999CA1010A
Priority Date: 1998-10-27 | 1999-10-27
Application Number: BR199914889A
Application Date: 1999-10-27
Publication Date: 2013-07-30
IPC Class Table:

IPC	Section	Class	Subclass	Class Group	Subgroup
G10L002102	G	G10	G10L	G10L0021	G10L002102
G01L001104	G	G01	G01L	G01L0011	G01L001104
G01L002102	G	G01	G01L	G01L0021	G01L002102
G10L001300	G	G10	G10L	G10L0013	G10L001300
G10L001912	G	G10	G10L	G10L0019	G10L001912
H03H001706	H	H03	H03H	H03H0017	H03H001706
H03M000730	H	H03	H03M	H03M0007	H03M000730
H03M000736	H	H03	H03M	H03M0007	H03M000736
H04B000162	H	H04	H04B	H04B0001	H04B000162
H04B000726	H	H04	H04B	H04B0007	H04B000726
H04B001404	H	H04	H04B	H04B0014	H04B001404
H04Q000722	H	H04	H04Q	H04Q0007	H04Q000722
H04Q000732	H	H04	H04Q	H04Q0007	H04Q000732

IPC Class Table - DWPI:

IPC - DWPI	Section - DWPI	Class - DWPI	Subclass - DWPI	Class Group - DWPI	Subgroup - DWPI

G01L001104	G	G01	G01L	G01L0011	G01L001104
G01L002102	G	G01	G01L	G01L0021	G01L002102
G10L001104	G	G10	G10L	G10L0011	G10L001104
G10L001300	G	G10	G10L	G10L0013	G10L001300
G10L001900	G	G10	G10L	G10L0019	G10L001900
G10L001904	G	G10	G10L	G10L0019	G10L001904
G10L001906	G	G10	G10L	G10L0019	G10L001906
G10L001912	G	G10	G10L	G10L0019	G10L001912
G10L001914	G	G10	G10L	G10L0019	G10L001914
G10L002102	G	G10	G10L	G10L0021	G10L002102
H03H001706	H	H03	H03H	H03H0017	H03H001706
H03M000730	H	H03	H03M	H03M0007	H03M000730
H03M000736	H	H03	H03M	H03M0007	H03M000736
H04B000162	H	H04	H04B	H04B0001	H04B000162
H04B001404	H	H04	H04B	H04B0014	H04B001404
H04B000726	H	H04	H04B	H04B0007	H04B000726
H04Q000722	H	H04	H04Q	H04Q0007	H04Q000722
H04Q000732	H	H04	H04Q	H04Q0007	H04Q000732

Assignee/Applicant: Voiceage Corporation,CA
Assignee - Current US:
JP F Terms:
JP FI Codes:
Assignee - Original: Voiceage Corporation
Any CPC Table:

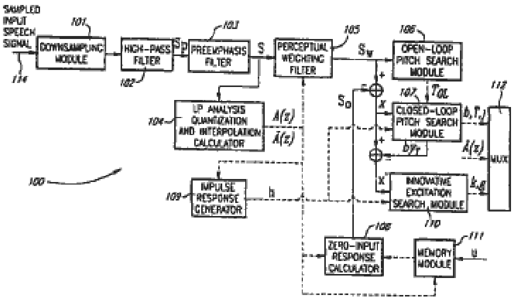
Type	Invention	Additional	Version	Office
Current	**G10L 19/26**	-	20130101	EP

ECLA:
Abstract:
Language of Publication: PT
INPADOC Legal Status Table:

Gazette Date	Code	INPADOC Legal Status Impact

2013-07-30	B16A	+
Description: PATENT OR CERTIFICATE OF ADDITION OF INVENTION GRANTED PRAZO DE VALIDADE: 10 (DEZ) ANOS CONTADOS A PARTIR DE 30/07/2013, OBSERVADAS AS CONDICOES LEGAIS.		
2013-05-07	B09A	-
Description: DECISION: GRANTING		
2012-09-11	B06A	-
Description: NOTIFICATION TO APPLICANT TO REPLY TO THE REPORT FOR NON-PATENTABILITY OR INADEQUACY OF THE APPLICATION ACCORDING ART. 36 INDUSTRIAL PATENT LAW		

Post-Issuance (US):
Reassignment (US) Table:
Maintenance Status (US):
Litigation (US):
Opposition (EP):
License (EP):
EPO Procedural Status:
Front Page Drawing:



Record 70/70 BRPI9914890B1 MÉTODO E DISPOSITIVO PARA BUSCA ADAPTATIVA DE PITCH DE LARGURA DE BANDA NA CODIFICAÇÃO DE SINAIS DE BANDA LARGA | SEARCH METHOD AND DEVICE FOR ADAPTIVE BANDWIDTH PITCH IN CODING WIDEBAND SIGNALS

Publication Number: BRPI9914890B1 20130924
BR199914890A 20010717

Title: MÉTODO E DISPOSITIVO PARA BUSCA ADAPTATIVA DE PITCH DE LARGURA DE BANDA NA CODIFICAÇÃO DE SINAIS DE BANDA LARGA | SEARCH METHOD AND DEVICE FOR ADAPTIVE BANDWIDTH PITCH IN CODING WIDEBAND SIGNALS
Title - DWPI: Pitch analysis device for digitally encoding wideband signal, chooses signal path having lowest calculated pitch prediction error
Priority Number: CA2252170A | WO1999CA1008A
Priority Date: 1998-10-27 | 1999-10-27
Application Number: BR199914890A
Application Date: 1999-10-27
Publication Date: 2013-09-24
IPC Class Table:

IPC	Section	Class	Subclass	Class Group	Subgroup
G01L001104	G	G01	G01L	G01L0011	G01L001104
G01L002102	G	G01	G01L	G01L0021	G01L002102
G10L001300	G	G10	G10L	G10L0013	G10L001300
G10L001912	G	G10	G10L	G10L0019	G10L001912
H03H001706	H	H03	H03H	H03H0017	H03H001706
H03M000730	H	H03	H03M	H03M0007	H03M000730
H03M000736	H	H03	H03M	H03M0007	H03M000736
H04B000162	H	H04	H04B	H04B0001	H04B000162
H04B000726	H	H04	H04B	H04B0007	H04B000726
H04B001404	H	H04	H04B	H04B0014	H04B001404
H04Q000722	H	H04	H04Q	H04Q0007	H04Q000722
H04Q000732	H	H04	H04Q	H04Q0007	H04Q000732

IPC Class Table - DWPI:

IPC - DWPI	Section - DWPI	Class - DWPI	Subclass - DWPI	Class Group - DWPI	Subgroup - DWPI
G01L001104	G	G01	G01L	G01L0011	G01L001104

G01L002102	G	G01	G01L	G01L0021	G01L002102
G10L001104	G	G10	G10L	G10L0011	G10L001104
G10L001300	G	G10	G10L	G10L0013	G10L001300
G10L001900	G	G10	G10L	G10L0019	G10L001900
G10L001904	G	G10	G10L	G10L0019	G10L001904
G10L001906	G	G10	G10L	G10L0019	G10L001906
G10L001912	G	G10	G10L	G10L0019	G10L001912
G10L001914	G	G10	G10L	G10L0019	G10L001914
G10L002102	G	G10	G10L	G10L0021	G10L002102
H03H001706	H	H03	H03H	H03H0017	H03H001706
H03M000730	H	H03	H03M	H03M0007	H03M000730
H03M000736	H	H03	H03M	H03M0007	H03M000736
H04B000162	H	H04	H04B	H04B0001	H04B000162
H04B001404	H	H04	H04B	H04B0014	H04B001404
H04B000726	H	H04	H04B	H04B0007	H04B000726
H04Q000722	H	H04	H04Q	H04Q0007	H04Q000722
H04Q000732	H	H04	H04Q	H04Q0007	H04Q000732
A61K0031585	A	A61	A61K	A61K0031	A61K0031585

Assignee/Applicant: Voiceage Corporation,CA
Assignee - Current US:
JP F Terms:
JP FI Codes:
Assignee - Original: Voiceage Corporation
Any CPC Table:

Type	Invention	Additional	Version	Office
Current	**G10L 19/26**	-	20130101	EP

ECLA:
Abstract:
Language of Publication: PT
INPADOC Legal Status Table:

Gazette Date	Code	INPADOC Legal Status Impact

2013-09-24	B16A	+
Description: PATENT OR CERTIFICATE OF ADDITION OF INVENTION GRANTED PRAZO DE VALIDADE: 10 (DEZ) ANOS CONTADOS A PARTIR DE 24/09/2013, OBSERVADAS AS CONDICOES LEGAIS.		
2013-07-09	B09A	-
Description: DECISION: GRANTING		
2012-09-11	B06A	-
Description: NOTIFICATION TO APPLICANT TO REPLY TO THE REPORT FOR NON-PATENTABILITY OR INADEQUACY OF THE APPLICATION ACCORDING ART. 36 INDUSTRIAL PATENT LAW		

Post-Issuance (US):

Reassignment (US) Table:

Maintenance Status (US):

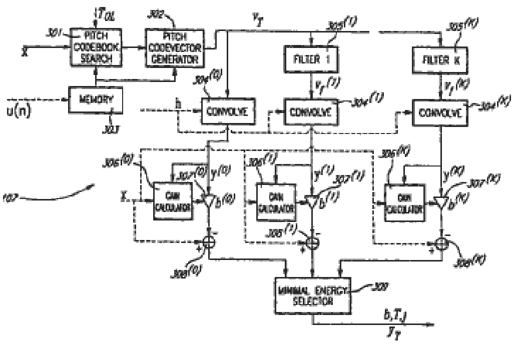
Litigation (US):

Opposition (EP):

License (EP):

EPO Procedural Status:

Front Page Drawing:



G01L002102	G	G01	G01L	G01L0021	G01L002102
G10L001104	G	G10	G10L	G10L0011	G10L001104
G10L001300	G	G10	G10L	G10L0013	G10L001300
G10L001900	G	G10	G10L	G10L0019	G10L001900
G10L001904	G	G10	G10L	G10L0019	G10L001904
G10L001906	G	G10	G10L	G10L0019	G10L001906
G10L001912	G	G10	G10L	G10L0019	G10L001912
G10L001914	G	G10	G10L	G10L0019	G10L001914
G10L002102	G	G10	G10L	G10L0021	G10L002102
H03H001706	H	H03	H03H	H03H0017	H03H001706
H03M000730	H	H03	H03M	H03M0007	H03M000730
H03M000736	H	H03	H03M	H03M0007	H03M000736
H04B000162	H	H04	H04B	H04B0001	H04B000162
H04B001404	H	H04	H04B	H04B0014	H04B001404
H04B000726	H	H04	H04B	H04B0007	H04B000726
H04Q000722	H	H04	H04Q	H04Q0007	H04Q000722
H04Q000732	H	H04	H04Q	H04Q0007	H04Q000732
A61K0031585	A	A61	A61K	A61K0031	A61K0031585

Assignee/Applicant: Voiceage Corporation,CA
JP F Terms:
JP FI Codes:
Assignee - Original: Voiceage Corporation
Any CPC Table:

Type	Invention	Additional	Version	Office
Current	**G10L 19/26**	-	20130101	EP

ECLA:
Abstract:
Language of Publication: PT
INPADOC Legal Status Table:

Gazette Date	Code	INPADOC Legal Status Impact
2013-09-24	B16A	+

Description: PATENT OR CERTIFICATE OF ADDITION OF INVENTION GRANTED PRAZO DE VALIDADE: 10 (DEZ) ANOS CONTADOS A PARTIR DE 24/09/2013, OBSERVADAS AS CONDICOES LEGAIS.		
2013-07-09	B09A	-
Description: DECISION: GRANTING		
2012-09-11	B06A	-
Description: NOTIFICATION TO APPLICANT TO REPLY TO THE REPORT FOR NON-PATENTABILITY OR INADEQUACY OF THE APPLICATION ACCORDING ART. 36 INDUSTRIAL PATENT LAW		

Post-Issuance (US):

Reassignment (US) Table:

Maintenance Status (US):

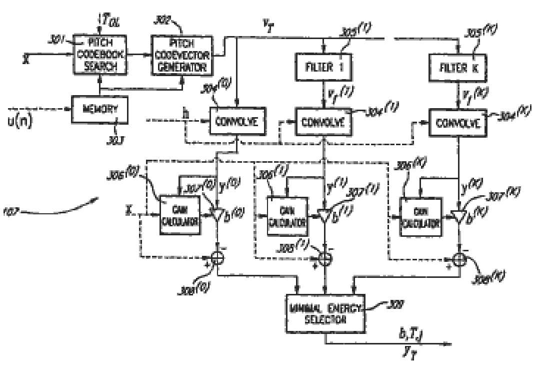
Litigation (US):

Opposition (EP):

License (EP):

EPO Procedural Status:

Front Page Drawing:



Assignee - Current US:

USPTO Maintenance Report

Patent Bibliographic Data			02/05/2016 12:59 PM		
Patent Number:	6807524		Application Number:	09830276	
Issue Date:	10/19/2004		Filing Date:	06/20/2001	
Title:	PERCEPTUAL WEIGHTING DEVICE AND METHOD FOR EFFICIENT CODING OF WIDEBAND SIGNALS				
Status:	12th year fee window opens: 10/19/2015			Entity:	LARGE
Window Opens:	10/19/2015	Surcharge Date:	04/20/2016	Expiration:	N/A
Fee Amt Due:	$7,400.00	Surchg Amt Due:	$0.00	Total Amt Due:	$7,400.00
Fee Code:	1553	MAINTENANCE FEE DUE AT 11.5 YEARS			
Surcharge Fee Code:					
Most recent events (up to 7):	03/16/2012 06/12/2008 03/17/2008	Payment of Maintenance Fee, 8th Year, Large Entity. Payor Number Assigned. Payment of Maintenance Fee, 4th Year, Large Entity. --- End of Maintenance History ---			
Address for fee purposes:	BCF LLP 1100 RENE-LEVESQUE BLVD. WEST 25TH FLOOR MONTREAL QC H3B-5C9 CANADA				