PATENT N°: US 7106228 B2

Jurisdiction: US

<table>
<thead>
<tr>
<th>Names of the Evaluators</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lead Evaluator</td>
</tr>
<tr>
<td>Allen RUBENSTEIN</td>
</tr>
</tbody>
</table>

The above mentioned Evaluators hereby declare that the following claim(s):

- Claim 1
- Claim 31

in the above referenced patent, is(are) essential to making, using in, selling within, or importing into, the countries of registration, any 3GPP product (the applicable Product Categories are given below) that is or purports to be in compliance with the following parts of the Third Generation Partnership Program (3GPP) technical standards:

- Document 3GPP TS 26.445 V12.0.0 (2014-09): Sections 5.2.3.1.6, 5.2.3.1.6.1, 5.2.3.1.6.2, 5.2.3.1.6.9, 5.2.3.1.6.9.1.1, 5.2.3.1.6.9.1.2, 5.2.3.1.6.9.1.2.1, 5.2.3.1.6.9.1.2.2, 5.2.3.1.6.9.2.1, 5.2.3.1.6.9.2.2, 5.2.3.1.6.9.3 and 5.2.3.1.6.9.4; Figure 29

Claim 1 is relevant for 3GPP Terminal Products and 3GPP Base Station Products.
Claim 31 is relevant for 3GPP Terminal Products and 3GPP Base Station Products.

Authorized signature and date
December 12, 2017

Allen RUBENSTEIN
Gottlieb Rackman & Reisman, P.C.
METHOD AND SYSTEM FOR MULTI-RATE LATTICE VECTOR QUANTIZATION OF A SIGNAL

Inventors: Bruno Bessette, Rock Forest (CA); Stéphane Ragot, Sherbrooke (CA); Jean-Pierre Adoul, Castelnau le Lez (FR)

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 64 days.

Appl. No.: 10/515,550
PCT Filed: May 30, 2003
PCT No.: PCT/CA03/00829
§ 371 (c)(1), (2), (4) Date: Jun. 6, 2005
PCT Pub. No.: WO03/103151
PCT Pub. Date: Dec. 11, 2003
Prior Publication Data
US 2005/028576 A1 Dec. 29, 2005
Foreign Application Priority Data
May 31, 2002 (CA) 2388358
Int. Cl. H03M 7/00 (2006.01)
U.S. Cl. 341/106; 341/51
Field of Classification Search 341/106; 341/51; 341/65, 106; 375/242, 254, 240.02, 240.11; 382/100, 160, 162, 238, 240, 253
See application file for complete search history.

References Cited
U.S. PATENT DOCUMENTS
5,943,446 A * 8/1999 Pulsipher et al. ………… 382/253
6,128,346 A * 10/2000 Suzuer et al. …………. 375/254
6,154,572 A * 11/2000 Chaddha ………………… 382/253
6,205,256 B1 * 3/2001 Chaddha ………………… 382/253
6,516,297 B1 * 2/2003 Servetto et al. ………….. 704/222
6,807,312 B1 * 10/2004 Thomas et al. …………. 382/253

OTHER PUBLICATIONS

Primary Examiner—Lin H V. Nguyen
Attorney, Agent, or Firm—Kirkpatrick & Lockhart Nicholson Graham LLP

ABSTRACT
The present invention relates to a method and system for multi-rate lattice vector quantization of a source vector x representing a frame from a source signal to be used, for example, in digital transmission and storage systems. The multi-rate lattice quantization encoding method comprises the steps of associating to x a lattice point y in an unbounded lattice Λ; verifying if y is included in a base codebook C derived from the lattice Λ; if it is the case then indexing y in C so as to yield quantization indices if not then extending the base codebook using, for example a Voronoi based extension method, yielding an extended codebook; associating to y a codeword c from the extended codebook, and indexing y in the extended codebook C. The extension technique allows to obtain higher bit rate codebooks from the base codebooks compared to quantization method and system from the prior art.

34 Claims, 19 Drawing Sheets