

**PATENT N°: US 7693710 B2**

Jurisdiction: US

<b>Names of the Evaluators</b>		
<b>Lead Evaluator</b>	<b>Assistant Evaluator #1</b>	<b>Assistant Evaluator #2</b>
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The above mentioned Evaluators hereby declare that the following claim(s):

- Claim 4
- Claim 16

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 4.1, 4.3, 4.4, 4.4.2, 5.5, 5.5.1, 5.5.2, and 5.5.3

Claim 4 is relevant for 3GPP Terminal Products and 3GPP Base Station Products.

Claim 16 is relevant for 3GPP Terminal Products and 3GPP Base Station Products.

**Authorized signature and date**

June 21, 2017



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US007693710B2

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

(10) **Patent No.:** **US 7,693,710 B2**  
(45) **Date of Patent:** **Apr. 6, 2010**

(54) **METHOD AND DEVICE FOR EFFICIENT FRAME ERASURE CONCEALMENT IN LINEAR PREDICTIVE BASED SPEECH CODECS**

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(\* ) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 1294 days.

(21) Appl. No.: **10/515,569**

(22) PCT Filed: **May 30, 2003**

(86) PCT No.: **PCT/CA03/00830**

§ 371 (c)(1),  
(2), (4) Date: **Nov. 23, 2004**

(87) PCT Pub. No.: **WO03/102921**

PCT Pub. Date: **Dec. 11, 2003**

(65) **Prior Publication Data**

US 2005/0154584 A1 Jul. 14, 2005

(30) **Foreign Application Priority Data**

May 31, 2002 (CA) ..... 2388439

(51) **Int. Cl.**

**G10L 11/04** (2006.01)  
**G10L 11/06** (2006.01)  
**G10L 19/08** (2006.01)  
**G10L 19/14** (2006.01)  
**H04L 1/00** (2006.01)  
**H03M 13/00** (2006.01)

(52) **U.S. Cl.** ..... **704/207; 704/208; 704/219; 704/221; 704/225; 714/746; 714/747**

(58) **Field of Classification Search** ..... **704/206, 704/207, 208, 212, 214, 219, 221, 225; 714/746, 714/747**

See application file for complete search history.

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(57) **ABSTRACT**

The present invention relates to a method and device for improving concealment of frame erasure caused by frames of an encoded sound signal erased during transmission from an encoder (106) to a decoder (110), and for accelerating recovery of the decoder after non erased frames of the encoded sound signal have been received. For that purpose, concealment/recovery parameters are determined in the encoder or decoder. When determined in the encoder (106), the concealment/recovery parameters are transmitted to the decoder (110). In the decoder, erasure frame concealment and decoder recovery is conducted in response to the concealment/recovery parameters. The concealment/recovery parameters may be selected from the group consisting of: a signal classification parameter, an energy information parameter and a phase information parameter. The determination of the concealment/recovery parameters comprises classifying the successive frames of the encoded sound signal as unvoiced, unvoiced transition, voiced transition, voiced, or onset, and this classification is determined on the basis of at least a part of the following parameters: a normalized correlation parameter, a spectral tilt parameter, a signal-to-noise ratio parameter, a pitch stability parameter, a relative frame energy parameter, and a zero crossing parameter.

**25 Claims, 7 Drawing Sheets**

