

PATENT N°: US 9,852,741 B2

Jurisdiction: US

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

- Claim 1
- Claim 17

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:

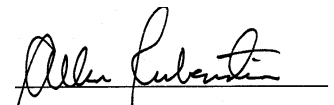
- Document 3GPP TS 26.445 V12.1.0 (2014-12): Sections 4.1, 4.3, 4.4, 4.4.1.1, 4.4.2, 5.2.5.2.1, 5.4.4, 5.4.4.2, 5.5.4.1.1, 5.5.4.1.2 and 5.5.4.1.

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

Claim 17 is relevant for 3GPP Terminal Products and 3GPP Base Station Products.

Authorized signature and date

April 9, 2018



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

(10) **Patent No.:** **US 9,852,741 B2**
(45) **Date of Patent:** **Dec. 26, 2017**

(54) **METHODS, ENCODER AND DECODER FOR LINEAR PREDICTIVE ENCODING AND DECODING OF SOUND SIGNALS UPON TRANSITION BETWEEN FRAMES HAVING DIFFERENT SAMPLING RATES**

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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 89 days.

(21) Appl. No.: **14/677,672**

(22) Filed: **Apr. 2, 2015**

(65) **Prior Publication Data**

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Related U.S. Application Data

(60) Provisional application No. 61/980,865, filed on Apr. 17, 2014.

(51) **Int. Cl.**
G10L 19/06 (2013.01)
G10L 19/16 (2013.01)
(Continued)

(52) **U.S. Cl.**
CPC **G10L 19/167** (2013.01); **G10L 19/06** (2013.01); **G10L 19/12** (2013.01); **G10L 19/173** (2013.01); **G10L 19/26** (2013.01); **G10L 19/24** (2013.01)

(58) **Field of Classification Search**
None
See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

7,529,660 B2 5/2009 Bessette et al.
8,315,863 B2 11/2012 Oshikiri
(Continued)

FOREIGN PATENT DOCUMENTS

WO 2008/049221 5/2009

OTHER PUBLICATIONS

Bessette et al., "The Adaptive Multirate Wideband Speech Codec (AMR-WB)", IEEE Transactions on Speech and Audio Processing, vol. 10, No. 8, Nov. 2002, pp. 620-636.

(Continued)

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(57) **ABSTRACT**

Methods, an encoder and a decoder are configured for transition between frames with different internal sampling rates. Linear predictive (LP) filter parameters are converted from a sampling rate S1 to a sampling rate S2. A power spectrum of a LP synthesis filter is computed, at the sampling rate S1, using the LP filter parameters. The power spectrum of the LP synthesis filter is modified to convert it from the sampling rate S1 to the sampling rate S2. The modified power spectrum of the LP synthesis filter is inverse transformed to determine autocorrelations of the LP synthesis filter at the sampling rate S2. The autocorrelations are used to compute the LP filter parameters at the sampling rate S2.

26 Claims, 5 Drawing Sheets

