Claims

1. A method for generating a reconstructed audio signal having a baseband portion and a highband portion, the method comprising:

deformatting an encoded audio signal into a first part and a second part;

extracting, from the first part, temporal envelope information, wherein the temporal envelope information includes coefficients representing a reconstruction filter;

extracting, from the first part, spectral components of the baseband portion, wherein the spectral components of the baseband portion do not include spectral components of the highband portion;

decoding the first part to obtain a decoded baseband audio signal, wherein the decoding includes filtering in a frequency domain at least some of the spectral components of the baseband portion with the reconstruction filter using the temporal envelope information to shape a temporal envelope of the baseband portion;

extracting, from the second part, a noise parameter and an estimated spectral envelope of the highband portion;

obtaining a plurality of subband signals by filtering the decoded baseband audio signal;

generating a high-frequency reconstructed signal by copying, in a circular manner, a number of consecutive subband signals of the plurality of subband signals;

obtaining an envelope adjusted high-frequency signal by adjusting, based on the estimated spectral envelope of the highband portion, a spectral envelope of the highfrequency reconstructed signal;

generating a noise component based on the noise parameter, wherein the noise parameter indicates a level of noise contained in the highband portion;

obtaining a combined high-frequency signal by adding the noise component to the envelope adjusted high-frequency signal; and

obtaining a time-domain reconstructed audio signal by combining the decoded baseband audio signal and the combined high-frequency signal;

wherein the method is implemented by an audio decoding device comprising one or more hardware elements.

2. The method of claim 1 wherein the plurality of subband signals is generated with one or more Quadrature Mirror Filters (QMF).

3. The method of claim 1 wherein the encoded audio signal is decoded using an inverse modified Discrete Cosine Transform (DCT).

4. The method of claim 1 wherein the noise parameter is represented in a form of a normalized ratio.

5. The method of claim 4 further comprising converting the normalized ratio to an amplitude value.

6. The method of claim 1 further comprising limiting an amount of envelope adjustment of the high-frequency reconstructed signal.

7. The method of claim 1 further comprising modulating, based on a parameter extracted from the encoded audio signal, an amount of envelope adjustment of the high-frequency reconstructed signal.

8. An audio decoding device comprising one or more hardware elements that implement the method of claim 1 by executing a sequence of instructions.

9. A non-transitory computer-readable medium containing instructions that when executed by an audio decoding device comprising one or more hardware elements, cause the audio decoding device to implement the method of claim 1.

10. An audio decoder generating a reconstructed audio signal having a baseband portion and a highband portion, the audio decoder comprising:

a deformatter for extracting a first part and a second part from an encoded audio signal;

an extractor for obtaining, from the first part, temporal envelope information, wherein the temporal envelope information includes coefficients representing a reconstruction filter;

an extractor for obtaining, from the first part, spectral components of the baseband portion, wherein the spectral components of the baseband portion do not include spectral components of the highband portion;

a decoder for obtaining a decoded baseband audio signal from the first part, wherein

the decoder includes a reconstruction filter for processing at least some of the spectral components of the baseband portion using the temporal envelope information to shape a temporal envelope of the baseband portion;

an extractor for obtaining, from the second part, a noise parameter and an estimated spectral envelope of the highband portion;

a filter for obtaining a plurality of subband signals from the decoded baseband audio signal;

a generator for creating a high-frequency reconstructed signal by copying, in a circular manner, a number of consecutive subband signals of the plurality of subband signals;

an envelope adjuster for obtaining an envelope adjusted high-frequency signal by adjusting, based on the estimated spectral envelope of the highband portion, a spectral envelope of the high-frequency reconstructed signal;

a noise generator for generating a noise component based on the noise parameter, wherein the noise parameter indicates a level of noise contained in the highband portion;

a combiner for obtaining a combined high-frequency signal by adding the noise component to the envelope adjusted high-frequency signal; and

a synthesizer for obtaining a time-domain reconstructed audio signal by combining the decoded baseband audio signal and the combined high-frequency signal;

wherein the audio decoder comprises one or more hardware elements.