CLAIMS

1. A method of decoding an encoded audio bitstream and generating frequency bandwidth extension at a decoder, the method comprising:

decoding the audio bitstream to produce a decoded low band audio signal and generate a low band excitation spectrum corresponding to a low frequency band;

selecting a sub-band area from within the low frequency band using a parameter which indicates energy information of a spectral envelope of the decoded low band audio signal; wherein the selected sub-band area is within a region where an energy peak of the spectral envelope is located;

generating a high band excitation spectrum for a high frequency band by copying a sub-band excitation spectrum from the selected sub-band area to a high sub-band area within the high frequency band;

using the generated high band excitation spectrum to generate an extended high band audio signal by applying a high band spectral envelope; and

adding the extended high band audio signal to the decoded low band audio signal to generate an audio output signal having an extended frequency bandwidth.

2. The method of claim 1, wherein selecting a sub-band area from within the low frequency band using the parameter which indicates energy information of the spectral envelope comprises identifying the highest quality sub band within the low frequency band by searching an highest energy point of the spectral envelope and selecting the identified highest quality sub band.

3. The method of claim 1, wherein selecting a sub-band area from within the low frequency band using the parameter which indicates energy information of the spectral envelope comprises selecting the sub-band area corresponding to highest spectral envelope energy.

4. The method of claim 1, wherein selecting a sub-band area from within the low frequency band using the parameter which indicates energy information of the spectral envelope comprises identifying a sub band from within the low band by using parameters reflecting an highest energy of the spectral envelope or spectral formant peak and selecting the identified sub band.

5. The method of any one of claims 1 to 4, wherein the method of decoding applies a bandwidth extension technology to generate the high frequency band.

6. The method of any one of claims 1 to 5, wherein applying the high band spectral envelope comprises applying a predicted high band filter representing the high band spectral envelope.

7. The method of any one of claims 1 to 6, further comprising:

generating the audio output signal by inverse transforming the frequency domain audio spectrum into time domain.

8. The method of any one of claims 1 to 7, wherein copying the sub-band excitation spectrum from the selected sub-band area to the high sub-band area corresponding to the high frequency band comprises copying low frequency band coefficients of an output from a filter bank analysis to the high sub-band area.

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9. A decoder for decoding an encoded audio bitstream and generating frequency bandwidth, the decoder comprising:

a low band decoding unit configured to decode the audio bitstream to produce a decoded low band audio signal and to generate a low band excitation spectrum corresponding to a low frequency band; and

a band width extension unit coupled to the low band decoding unit and comprising a sub band selection unit and a copying unit, wherein the sub band selection unit is configured to select a sub-band area from within the low frequency band using a parameter which indicates energy information of a spectral envelope of the decoded low band audio signal, wherein the selected sub-band area is within a region where an energy peak of the spectral envelope is located; wherein the copying unit is configured to generate a high band excitation spectrum for a high frequency band by copying a sub-band excitation spectrum from the selected sub-band area to a high sub-band area within the high frequency band.

10. The decoder of claim 9, wherein selecting a sub-band area from within the low frequency band using energy information of the spectral envelope comprises identifying the highest quality sub band within the low frequency band.

11. The decoder of claim 9, wherein the sub band selection unit is configured to select the sub-band area corresponding to the highest spectral envelope energy.

12. The decoder of claim 9, wherein the sub band selection unit is configured to identify a sub band from within the low band by using parameters reflecting a highest energy of the spectral envelope or spectral formant peak.

13. The decoder of any one of claims 9 to 12, further comprising:

a high band signal generator coupled to the copying unit, the high band signal generator configured to apply a predicted high band spectral envelope to generate a high band time domain signal; and

an output generator coupled to the high band signal generator and the low band decoding unit, wherein the output generator is configured to generate an audio output signal by combining a low band time domain signal obtained by decoding the audio bitstream with the high band time domain signal.

14. The decoder of claim 13, wherein the high band signal generator is configured to apply a predicted high band filter representing the predicted high band spectral envelope.

15. The decoder of any one of claims 9 to 14, further comprising:

a high band spectrum generator coupled to the copying unit, the high band spectrum generator configured to apply an estimated high band spectral envelope to generate a high band spectrum for the high frequency band using the high band excitation spectrum; and

an output spectrum generator coupled to the high band spectrum generator and the low band decoding unit, wherein the output spectrum generator is configured to generate a frequency domain audio spectrum by combining a low band spectrum obtained by decoding the audio bitstream with the high band spectrum.

16. The decoder of claim 15, further comprising:

an inverse transform signal generator configured to generate a time domain audio signal by inverse transforming the frequency domain audio spectrum into time domain.

17. A decoder for speech processing comprising:

a processor; and

a computer readable storage medium storing programming for execution by the processor, the programming including instructions to:

decode the audio bitstream to produce a decoded low band audio signal and generate a low band excitation spectrum corresponding to a low frequency band,

select a sub-band area from within the low frequency band using a parameter which indicates energy information of a spectral envelope of the decoded low band audio signal, wherein the selected sub-band area is within a region where an energy peak of the spectral envelope is located;

generate a high band excitation spectrum for a high frequency band by copying a sub-band excitation spectrum from the selected sub-band area to a high sub-band area within the high frequency band,

use the generated high band excitation spectrum to generate an extended high band audio signal by applying a high band spectral envelope, and

add the extended high band audio signal to the decoded low band audio signal to generate an audio output signal having an extended frequency bandwidth.