WHAT IS CLAIMED IS:

1. A method comprising:

determining a first modeled high-band signal based on a low-band excitation signal of an audio signal, the audio signal including a high-band portion and a low-band portion;

determining a first set of one or more scaling factors based on energy of sub-frames of the first modeled high-band signal and energy of corresponding sub-frames of the high-band portion of the audio signal;

applying a second set of one or more scaling factors based on at least one among the first set of one or more scaling factors to a modeled high-band excitation signal to determine a scaled high-band excitation signal;

determining a second modeled high-band signal based on the scaled high-band excitation signal; and

determining gain parameters based on the second modeled high-band signal and the high-band portion of the audio signal.

2. The method of claim 1, wherein a particular sub-frame of the first modeled high-band signal is determined by applying a synthesis filter on a particular sub-frame of the modeled high-band excitation signal.

3. The method of claim 2, wherein the synthesis filter uses filter parameters corresponding to the particular sub-frame of the modeled high-band excitation signal.

4. The method of claim 3, wherein a filter memory or filter states are reset to zero before applying the synthesis filter on the particular sub-frame of the modeled high-band excitation signal.

5. The method of claim 3, wherein the filter parameters do not include information related to sub-frames preceding the particular sub-frame of the modeled high-band excitation signal.

6. The method of claim 1, wherein a particular sub-frame of the second modeled high-band signal is determined by applying a synthesis filter on a particular sub-frame of the scaled high-band excitation signal that corresponds to the particular sub-frame of the second modeled high-band signal.

7. The method of claim 6, wherein the synthesis filter uses a filter memory or updates filter states based on the particular sub-frame of the scaled high-band excitation signal and one or more preceding sub-frames.

8. The method of claim 7, wherein the filter memory or the filter states are not reset to zero and are carried over from a previous frame or sub-frame before applying the synthesis filter on the particular sub-frame of the scaled high-band excitation signal.

9. The method of claim 1, further comprising estimating the energy of one or more of the sub-frames of the first modeled high band signal that is synthesized based on all-pole synthesis filters, wherein the all-pole synthesis filters have filter coefficients that are interpolated based on a weighted sum of one or more line spectral pairs associated with a current frame and of one or more line spectral pairs associated with a preceding frame.

10. The method of claim 1, wherein determining a scaling factor for a particular sub-frame comprises:

determining an energy of the particular sub-frame of the high-band portion of the audio signal;

determining an energy of a corresponding sub-frame of the first modeled high-band signal;

dividing the energy of the particular sub-frame of the high-band portion of the audio signal by the energy of the corresponding sub-frame of the first modeled high-band signal; and

quantizing and transmitting the scaling factor.

11. The method of claim 10 wherein the first set of one or more scaling factors are determined over each sub-frame or over each frame constituting multiple sub-frames.

12. The method of claim 1, wherein the gain parameters include a gain shape and a gain frame.

13. The method of claim 1, further comprising determining the modeled high-band excitation signal by combining a transformed low-band excitation signal with a shaped noise signal.

14. The method of claim 13, further comprising determining the low-band excitation signal based on linear prediction coding of the low-band portion of the audio signal.

15. The method of claim 1, further comprising determining high-band side information, the high-band side information including data representing high-band line spectral pairs, data representing the gain parameters, data representing a scaling factor, or a combination thereof.

16. An apparatus comprising:

a first synthesis filter configured to determine a first modeled high-band signal based on a low-band excitation signal of an audio signal, the audio signal including a high-band portion and a low-band portion;

a scaling module configured to determine scaling factors based on energy of sub-frames of the first modeled high-band signal and energy of corresponding sub-frames of the high-band portion of the audio signal and to apply the scaling factors to a modeled high-band excitation signal to determine a scaled high-band excitation signal;

a second synthesis filter configured to determine a second modeled high-band signal based on the scaled high-band excitation signal; and

a gain estimator configured to determine gain parameters based on the second modeled high-band signal and the high-band portion of the audio signal.

17. The apparatus of claim 16, wherein the first synthesis filter determines a particular sub-frame of the first modeled high-band signal by applying a synthesis filter on a particular sub-frame of the modeled high-band excitation signal, wherein the synthesis filter uses filter parameters corresponding to the particular sub-frame of the modeled high-band excitation signal, and wherein a filter memory or filter states are reset to zero before applying the synthesis filter on the particular sub-frame of the modeled high-band excitation signal.

18. The apparatus of claim 17, wherein the filter parameters do not include information related to sub-frames preceding the particular sub-frame of the modeled high-band excitation signal.

19. The apparatus of claim 16, wherein the second synthesis filter determines a particular sub-frame of the second modeled high-band signal by applying a synthesis filter on a particular sub-frame of the scaled high-band excitation signal that corresponds to the particular sub-frame of the second modeled high-band signal, wherein the synthesis filter uses a filter memory or updates filter states based on the particular sub-frame of the scaled high-band excitation signal and one or more preceding sub-frames, and wherein the filter memory or the filter states are not reset to zero and are carried over from a previous frame or sub-frame before applying the synthesis filter on the particular sub-frame of the scaled high-band excitation signal.

20. The apparatus of claim 16, further comprising a low-band analysis module configured to determine a low-band bit stream, the low-band bit stream including linear prediction code data representing the low-band portion of the audio signal.

21. The apparatus of claim 16, wherein the scaling module comprises:

a first energy estimator configured to determine an energy of a particular sub-frame of the high-band portion of the audio signal;

a second energy estimator configured to determine an energy of a corresponding sub-frame of the first modeled high-band signal; and

a combiner configured to determine a ratio of the energy of the particular sub-frame of the high-band portion of the audio signal to the energy of the corresponding sub-frame of the first modeled high-band signal.

22. The apparatus of claim 16, wherein the gain parameters include a gain shape and a gain frame.

23. The apparatus of claim 16, further comprising a high-band excitation generator configured to determine the modeled high-band excitation signal by combining a transformed low-band excitation signal with a shaped noise signal.

24. The apparatus of claim 23, further comprising a low-band encoder configured to determine the low-band excitation signal based on linear prediction coding of the low-band portion of the audio signal.

25. The apparatus of claim 16, further comprising a high-band analysis module configured to determine high-band side information, the high-band side information including: data representing high-band line spectral pairs, data representing the gain parameters, and data representing the scaling factor.

26. The apparatus of claim 25, further comprising a multiplexer configured to generate a data stream including a low-band bit stream representing the low-band portion of the audio signal and including the high-band side information.

27. A device comprising:

means for determining a first modeled high-band signal based on a low-band excitation signal of an audio signal, the audio signal including a high-band portion and a low-band portion;

means for determining scaling factors based on energy of sub-frames of the first modeled high-band signal and energy of corresponding sub-frames of the high-band portion of the audio signal;

means for applying the scaling factors to a modeled high-band excitation signal to determine a scaled high-band excitation signal;

means for determining a second modeled high-band signal based on the scaled high-band excitation signal; and

means for determining gain parameters based on the second modeled high-band signal and the high-band portion of the audio signal.

28. The device of claim 27, wherein the means for determining the first modeled high-band signal determines a particular sub-frame of the first modeled high-band signal by applying a synthesis filter on a particular sub-frame of the modeled high-band excitation signal, wherein the synthesis filter uses filter parameters corresponding to the particular sub-frame of the modeled high-band excitation signal, and wherein a filter memory or filter states are reset to zero before applying the synthesis filter on the particular sub-frame of the modeled high-band excitation signal such that the filter parameters do not include information related to sub-frames preceding the particular sub-frame of the modeled high-band excitation signal, and wherein the means for determining the second modeled high-band signal determines a particular sub-frame of the second modeled high-band signal by applying a second synthesis filter on a particular sub-frame of the scaled high-band excitation signal that corresponds to the particular sub-frame of the second modeled high-band signal, wherein the synthesis filter uses the filter memory or updates filter states based on the particular sub-frame of the scaled high-band excitation signal and one or more preceding sub-frames, and wherein the filter memory or the filter states are not reset to zero and are carried over from a previous frame or sub-frame before applying the synthesis filter on the particular sub-frame of the scaled high-band excitation signal.

29. A non-transitory computer-readable medium storing instructions that are executable by a processor to cause the processor to perform operations comprising:

determining a first modeled high-band signal based on a low-band excitation signal of an audio signal, the audio signal including a high-band portion and a low-band portion;

determining scaling factors based on energy of sub-frames of the first modeled high-band signal and energy of corresponding sub-frames of the high-band portion of the audio signal;

applying the scaling factors to a modeled high-band excitation signal to determine a scaled high-band excitation signal;

determining a second modeled high-band signal based on the scaled high-band excitation signal; and

determining gain parameters based on the second modeled high-band signal and the high-band portion of the audio signal.

30. The non-transitory computer-readable medium of claim 29, wherein a particular sub-frame of the first modeled high-band signal is determined by applying a synthesis filter on a particular sub-frame of the modeled high-band excitation signal, wherein the synthesis filter uses filter parameters corresponding to the particular sub-frame of the modeled high-band excitation signal, and wherein a filter memory or filter states are reset to zero before applying the synthesis filter on the particular sub-frame of the modeled high-band excitation signal.

CLAIMS

1. A method of signal processing, the method comprising:

determining a first modeled high-band signal based on a low-band excitation signal of an audio signal, the audio signal including a high-band portion and a low-band portion;

determining a first set of one or more scaling factors based on energy of sub-frames of the first modeled high-band signal and energy of corresponding sub-frames of the high-band portion of the audio signal;

applying a second set of one or more scaling factors based on at least one among the first set of one or more scaling factors to a modeled high-band excitation signal to determine a scaled high-band excitation signal;

determining a second modeled high-band signal based on the scaled high-band excitation signal;

determining gain parameters based on the second modeled high-band signal and the high-band portion of the audio signal; and

outputting a data stream based on the determined gain parameters.

2. The method of signal processing of claim 1, wherein a particular sub-frame of the first modeled high-band signal is determined by applying a synthesis filter on a particular sub-frame of the modeled high-band excitation signal.

3. The method of signal processing of claim 2, wherein the synthesis filter uses filter parameters corresponding to the particular sub-frame of the modeled high-band excitation signal.

4. The method of signal processing of claim 3, wherein a filter memory or filter states are reset to zero before applying the synthesis filter on the particular sub-frame of the modeled high-band excitation signal.

5. The method of signal processing of claim 3, wherein the filter parameters do not include information related to sub-frames preceding the particular sub-frame of the modeled high-band excitation signal.

6. The method of signal processing of claim 1, wherein a particular sub-frame of the second modeled high-band signal is determined by applying a synthesis filter on a particular sub-frame of the scaled high-band excitation signal that corresponds to the particular sub-frame of the second modeled high-band signal.

7. The method of signal processing of claim 6, wherein the synthesis filter uses a filter memory or updates filter states based on the particular sub-frame of the scaled high-band excitation signal and one or more preceding sub-frames.

8. The method of signal processing of claim 7, wherein the filter memory or the filter states are not reset to zero and are carried over from a previous frame or sub-frame before applying the synthesis filter on the particular sub-frame of the scaled high-band excitation signal.

9. The method of signal processing of claim 1, further comprising estimating the energy of one or more of the sub-frames of the first modeled high band signal that is synthesized based on all-pole synthesis filters, wherein the all-pole synthesis filters have filter coefficients that are interpolated based on a weighted sum of one or more line spectral pairs associated with a current frame and of one or more line spectral pairs associated with a preceding frame.

10. The method of signal processing of claim 1, wherein determining a scaling factor for a particular sub-frame comprises:

determining an energy of the particular sub-frame of the high-band portion of the audio signal;

determining an energy of a corresponding sub-frame of the first modeled high-band signal;

dividing the energy of the particular sub-frame of the high-band portion of the audio signal by the energy of the corresponding sub-frame of the first modeled high-band signal; and

quantizing and transmitting the scaling factor.

11. The method of signal processing of claim 10 wherein the first set of one or more scaling factors are determined over each sub-frame or over each frame constituting multiple sub-frames.

12. The method of signal processing of claim 1, wherein the gain parameters include a gain shape and a gain frame, and further comprising determining the modeled high-band excitation signal by combining a transformed low-band excitation signal with a shaped noise signal.

13. The method of signal processing of claim 12, further comprising determining the low-band excitation signal based on linear prediction coding of the low-band portion of the audio signal.

14. The method of signal processing of claim 1, further comprising determining high-band side information, the high-band side information including data representing high-band line spectral pairs, data representing the gain parameters, data representing a scaling factor, or a combination thereof.

15. The method of signal processing of claim 1, wherein:

determining the first modeled high-band signal; determining the first set of the one or more scaling factors;

applying the second set of the one or more scaling factors;

determining the second modeled high-band signal;

determining the gain parameters; and

outputting the data stream are performed within a device that comprises a mobile communication device or a fixed communication unit.

16. An apparatus comprising:

a first synthesis filter configured to determine a first modeled high-band signal based on a low-band excitation signal of an audio signal, the audio signal including a high-band portion and a low-band portion;

a scaling module configured to determine scaling factors based on energy of sub-frames of the first modeled high-band signal and energy of corresponding sub-frames of the high-band portion of the audio signal and to apply the scaling factors to a modeled high-band excitation signal to determine a scaled high-band excitation signal;

a second synthesis filter configured to determine a second modeled high-band signal based on the scaled high-band excitation signal;

a gain estimator configured to determine gain parameters based on the second modeled high-band signal and the high-band portion of the audio signal; and

a multiplexer configured to output a data stream based on the determined gain parameters.

17. The apparatus of claim 16, wherein the first synthesis filter determines a particular sub-frame of the first modeled high-band signal by applying a synthesis filter on a particular sub-frame of the modeled high-band excitation signal, wherein the synthesis filter uses filter parameters corresponding to the particular sub-frame of the modeled high-band excitation signal, and wherein a filter memory or filter states are reset to zero before applying the synthesis filter on the particular sub-frame of the modeled high-band excitation signal.

18. The apparatus of claim 17, wherein the filter parameters do not include information related to sub-frames preceding the particular sub-frame of the modeled high-band excitation signal.

19. The apparatus of claim 16, wherein the second synthesis filter determines a particular sub-frame of the second modeled high-band signal by applying a synthesis filter on a particular sub-frame of the scaled high-band excitation signal that corresponds to the particular sub-frame of the second modeled high-band signal, wherein the synthesis filter uses a filter memory or updates filter states based on the particular sub-frame of the scaled high-band excitation signal and one or more preceding sub-frames, and wherein the filter memory or the filter states are not reset to zero and are carried over from a previous frame or sub-frame before applying the synthesis filter on the particular sub-frame of the scaled high-band excitation signal.

20. The apparatus of claim 16, further comprising a low-band analysis module configured to determine a low-band bit stream, the low-band bit stream including linear prediction code data representing the low-band portion of the audio signal.

21. The apparatus of claim 16, wherein the scaling module comprises:

a first energy estimator configured to determine an energy of a particular sub-frame of the high-band portion of the audio signal;

a second energy estimator configured to determine an energy of a corresponding sub-frame of the first modeled high-band signal; and

a combiner configured to determine a ratio of the energy of the particular sub-frame of the high-band portion of the audio signal to the energy of the corresponding sub-frame of the first modeled high-band signal.

22. The apparatus of claim 16, wherein the gain parameters include a gain shape and a gain frame, and further comprising:

a high-band excitation generator configured to determine the modeled high-band excitation signal by combining a transformed low-band excitation signal with a shaped noise signal;

a low-band encoder configured to determine the low-band excitation signal based on linear prediction coding of the low-band portion of the audio signal; and

a high-band analysis module configured to determine high-band side information, the high-band side information including: data representing high-band line spectral pairs, data representing the gain parameters, and data representing the scaling factor.

23. The apparatus of claim 16, wherein the data stream includes a low-band bit stream and high-band side information, the low-band bit stream representing the low-band portion of the audio signal.

24. The apparatus of claim 16, further comprising:

an antenna;

a transmitter;

a receiver;

a processor;

a decoder; and

an encoder comprising the first synthesis filter, the scaling module, the second synthesis filter, the gain estimator, and the multiplexer.

25. The apparatus of claim 24, wherein the antenna, the transmitter, the receiver, the processor, the decoder, and the encoder are integrated into a mobile communication device.

26. The apparatus of claim 24, wherein the antenna, the transmitter, the receiver, the processor, the decoder, and the encoder are integrated into a fixed communication unit.

27. A device comprising:

means for determining a first modeled high-band signal based on a low-band excitation signal of an audio signal, the audio signal including a high-band portion and a low-band portion;

means for determining scaling factors based on energy of sub-frames of the first modeled high-band signal and energy of corresponding sub-frames of the high-band portion of the audio signal;

means for applying the scaling factors to a modeled high-band excitation signal to determine a scaled high-band excitation signal;

means for determining a second modeled high-band signal based on the scaled high-band excitation signal;

means for determining gain parameters based on the second modeled high-band signal and the high-band portion of the audio signal; and

means for outputting a data stream responsive to the means for determining gain parameters.

28. The device of claim 27, wherein the means for determining the first modeled high-band signal determines a particular sub-frame of the first modeled high-band signal by applying

a synthesis filter on a particular sub-frame of the modeled high-band excitation signal, wherein the synthesis filter uses filter parameters corresponding to the particular sub-frame of the modeled high-band excitation signal, and wherein a filter memory or filter states are reset to zero before applying the synthesis filter on the particular sub-frame of the modeled high-band excitation signal such that the filter parameters do not include information related to sub-frames preceding the particular sub-frame of the modeled high-band excitation signal, and wherein the means for determining the second modeled high-band signal determines a particular sub-frame of the second modeled high-band signal by applying a second synthesis filter on a particular sub-frame of the scaled high-band excitation signal that corresponds to the particular sub-frame of the second modeled high-band signal, wherein the synthesis filter uses the filter memory or updates filter states based on the particular sub-frame of the scaled high-band excitation signal and one or more preceding sub-frames, and wherein the filter memory or the filter states are not reset to zero and are carried over from a previous frame or sub-frame before applying the synthesis filter on the particular sub-frame of the scaled high-band excitation signal.

29. The device of claim 27, wherein the means for determining the first modeled high-band signal, the means for determining the scaling factors, the means for applying the scaling factors, the means for determining the second modeled high-band signal, the means for determining the gain parameters, and the means for outputting the data stream are integrated into a mobile communication device or a fixed communication unit.

30. A computer-readable medium storing instructions that are executable by a processor to cause the processor to perform operations comprising:

determining a first modeled high-band signal based on a low-band excitation signal of an audio signal, the audio signal including a high-band portion and a low-band portion;

determining scaling factors based on energy of sub-frames of the first modeled high-band signal and energy of corresponding sub-frames of the high-band portion of the audio signal;

applying the scaling factors to a modeled high-band excitation signal to determine a scaled high-band excitation signal;

determining a second modeled high-band signal based on the scaled high-band excitation signal;

determining gain parameters based on the second modeled high-band signal and the high-band portion of the audio signal; and

outputting a data stream based on the determined gain parameters.

31. The computer-readable medium of claim 30, wherein a particular sub-frame of the first modeled high-band signal is determined by applying a synthesis filter on a particular sub-frame of the modeled high-band excitation signal, wherein the synthesis filter uses filter parameters corresponding to the particular sub-frame of the modeled high-band excitation signal, and wherein a filter memory or filter states are reset to zero before applying the synthesis filter on the particular sub-frame of the modeled high-band excitation signal.