Claims

1. An audio decoder, comprising:

an input interface for receiving a bitstream which depends on audio content comprising at least one of a plurality of audio objects and a plurality of audio channels; wherein a transport signal comprising two or more transport channels is encoded within the bitstream, and the audio content is encoded within the transport signal; or wherein information on a background noise is encoded within the bitstream instead of the transport signal, wherein the information on the background noise comprises information on a background noise of at least one of the two or more transport channels or information on a background noise of a derived signal which depends on at least one of the two or more transport channels; and

a renderer for generating one or more audio output signals depending on the audio content being encoded with the bitstream;

wherein, if the transport signal comprising the two or more transport channels is encoded within the bitstream, the renderer is configured to generate the one or more audio output signals depending on the two or more transport channels, and

wherein, if the information on the background noise is encoded within the bitstream instead of the transport signal, the renderer is configured to generate the one or more audio output signals depending on the information on the background noise.

2. An audio decoder according to claim 1,

wherein, if the audio content exhibits voice activity, the transport signal comprising the two or more transport channels is encoded within the bitstream; and

wherein, if the audio content does not exhibit voice activity, the information on the background noise is encoded within the bitstream instead of the transport signal.

3. An audio decoder according to claim 1 or 2,

wherein the audio decoder comprises a noise information determiner and a multi-channel generator,

wherein, if the information on the background noise is encoded within the bitstream, the noise information determiner is configured to determine the information on the background noise from the bitstream, the multi-channel generator is configured to generate the derived signal as an intermediate signal comprising two or more intermediate channels from the information on the background noise, and the renderer is configured to generate the one or more audio output signals depending on the two or more intermediate channels of the intermediate signal.

4. An audio decoder according to claim 3,

wherein the multi-channel generator comprises a random generator for generating random noise,

wherein the multi-channel generator is configured to generate the two or more intermediate channels depending on the random noise, being generated by the random generator.

5. An audio decoder according to claim 4,

wherein the multi-channel generator is configured to shape the random noise depending on the information on the background noise to obtain shaped noise,

wherein the multi-channel generator is configured to generate the two or more intermediate channels from the shaped noise.

6. An audio decoder according to claim 4 or 5,

wherein the multi-channel generator is configured to run the random generator at least twice with a different seed to obtain the random noise.

7. An audio decoder according to one of claims 4 to 6,

wherein the multi-channel generator is configured to generate the two or more intermediate channels depending on the random noise and depending on control parameters being encoded within the bitstream, for example wherein the control

parameters comprise, e.g., a scaling factor and/or, e.g., either a coherence or a correlation.

8. An audio decoder according to claim 7,

wherein at least one of the control parameters is encoded within the bitstream and comprises a plurality of parameter values for a plurality of subbands, and wherein the multi-channel generator is configured to generate each subband of a plurality of subbands of the two or more intermediate channels depending on a parameter value of the plurality of parameter values of the at least one of the control parameters being associated with said subband.

9. An audio decoder according to claim 7,

wherein the control parameters are encoded within the bitstream, wherein the control parameters are single broadband control parameters.

10. An audio decoder according to one of claims 4 to 9,

wherein the multi-channel generator is configured to generate the two or more intermediate channels by generating a first random noise portion of the random noise using the random generator with a first seed, and by generating a first one of the two or more intermediate channels depending on the first random noise portion, by generating a second random noise portion of the random noise using the random generator with a second seed being different from the first seed, and by generating a second one of the two or more intermediate channels depending on the second random noise portion.

11. An audio decoder according to one of claims 4 to 9, further depending on claim 7,

wherein the multi-channel generator is configured to generate a first one the two or more intermediate channels depending on a first random noise portion and depending on a third noise portion and depending on the control parameters, for example the scaling factor and the coherence and/or correlation,

wherein the multi-channel generator is configured to generate a second one of the two or more intermediate channels depending on a second random noise portion and depending on the third noise portion and depending on the control parameters,

wherein the multi-channel generator is configured to generate the first random noise portion of the random noise using the random generator with a first seed,

wherein the multi-channel generator is configured to generate the second random noise portion of the random noise using the random generator with a second seed, and

wherein the multi-channel generator is configured to generate the third random noise portion of the random noise using the random generator with a third seed,

wherein the second seed is different from the first seed, and wherein the third seed is different from the first seed and different from the second seed.

12. An audio decoder according to one of claims 4 to 9,

wherein the multi-channel generator is configured to generate the two or more intermediate channels by generating a first one of the two or more intermediate channels depending on the random noise, and by generating a second one of the two or more intermediate channels from the first one of the two or more intermediate channels.

13. An audio decoder according to claim 12,

wherein the multi-channel generator is configured to generate the second one of the two or more intermediate channels such that the second one of the two or more intermediate channels is identical to the first one of the two or more intermediate channels, or

wherein the multi-channel generator is configured to generate the second one of the two or more intermediate channels by modifying the first one of the two or more intermediate channels.

14. An audio decoder according to one of the preceding claims,

wherein the renderer is configured to generate the two or more audio output signals as the one or more audio output signals.

15. An audio decoder according to one of the preceding claims,

wherein the audio content comprises the plurality of audio objects,

wherein, if the audio content exhibits voice activity, a plurality of audio object indices being associated with the plurality of audio objects, a plurality of power ratios being associated with the plurality of audio objects for a plurality of subbands and broadband direction information for the plurality of audio objects are encoded within the bitstream, and the renderer is configured to generate the one or more audio output signals depending on the plurality of audio object indices, depending on the plurality of power ratios and depending on the broadband direction information for the plurality of audio objects.

16. An audio decoder according to one of the preceding claims, further depending on claim 7,

wherein the audio content comprises the plurality of audio objects,

wherein, if the audio content does not exhibit voice activity, broadband direction information for the plurality of audio objects and the control parameters are encoded within the bitstream, and the renderer is configured to generate the one or more audio output signals depending on the broadband direction information.

17. An audio decoder according to claim 15 and according to claim 16,

wherein, when the audio content exhibits voice activity, a first quantization resolution of the broadband direction information being encoded within the bitstream is different from a second quantization resolution of the broadband direction information, when the audio content does not exhibit voice activity.

18. An audio decoder according to one of the preceding claims,

wherein the renderer comprises a signal power computation unit for computing a reference power depending on the two or more transport channels for each of a plurality of time-frequency tiles,

wherein the renderer comprises a direct power computation unit, wherein, if the audio content does not exhibit voice activity, the direct power computation unit is configured for scaling the reference power to obtain a scaled reference power, using transmitted power ratios being encoded within the bitstream, if the audio content exhibits voice activity, and using a scaling factor being, wherein the scaling factor is encoded within the bitstream or wherein the scaling factor is a constant scaling factor, for example which depends on a number of transmitted objects,

wherein the renderer is configured to generate the one or more audio output signals depending on the scaled reference power.

19. An audio decoder according to claim 18,

wherein the renderer comprises a direct response computation unit for computing a direct response, wherein the renderer is configured to compute the direct response depending on quantized direction information of dominant objects being a proper subset of the plurality of audio objects of the audio content, if the audio content exhibits voice activity, wherein the renderer is configured to compute the direct response depending on quantized direction information of all audio objects of the audio content, if the audio content does not exhibit voice activity, wherein the quantized direction information is encoded within the bitstream,

wherein the renderer is configured to generate the one or more audio output signals depending on the direct response.

20. An audio decoder according to claim 19,

wherein the renderer comprises an input covariance matrix computation unit for computing an input covariance matrix depending on the two or more transport channels,

wherein the renderer comprises a target covariance matrix computation unit for computing a target covariance matrix depending on the direct response and depending on the scaled reference power,

wherein the renderer comprises a mixing matrix computation unit for computing a mixing matrix for rendering depending on the input covariance matrix and depending on the target covariance matrix,

wherein the renderer is configured to generate the one or more audio output signals depending on the mixing matrix.

21. An audio decoder according to one of the preceding claims,

the renderer is configured to generate one or more of the two or more transport channels by applying Code-Excited Linear Prediction or by applying a Modified Discrete Cosine Transform or an inverse of the Modified Discrete Cosine Transform or by applying a combination of the Code-Excited Linear Prediction and of the Modified Discrete Cosine Transform.

22. An audio decoder according to one of the preceding claims,

wherein, if the audio content comprises the plurality of audio channels, but not the plurality of audio objects, a number of the two or more transport channels is smaller than a number of the plurality of audio channels,

wherein, if the audio content comprises the plurality of audio objects, but not the plurality of audio channels, the number of the two or more transport channels is smaller than a number of the plurality of audio objects,

wherein, if the audio content comprises both the plurality of audio objects and the plurality of audio channels, the number of the two or more transport channels is smaller than a sum of the number of the plurality audio channels and the number of the plurality of audio objects;

or

wherein, if the audio content comprises the plurality of audio channels, but not the plurality of audio objects, a number of the two or more transport channels is smaller than or equal to a number of the plurality of audio channels,

wherein, if the audio content comprises the plurality of audio objects, but not the plurality of audio channels, the number of the two or more transport channels is smaller than or equal to a number of the plurality of audio objects,

wherein, if the audio content comprises both the plurality of audio objects and the plurality of audio channels, the number of the two or more transport channels is smaller than or equal to a sum of the number of the plurality audio channels and the number of the plurality of audio objects.

23. A system, comprising:

an audio encoder, and

an audio decoder according to one of the preceding claims,

wherein the audio encoder comprises:

a transport signal generator for generating two or more transport channels of a transport signal from audio input comprising at least one of a plurality of audio input objects and a plurality of audio input channels,

a voice activity determiner for determining a voice activity decision for the transport signal, which indicates whether or not the audio input within the transport signal exhibits voice activity, and

a bitstream generator for generating a bitstream depending on the audio input,

wherein, if the voice activity determiner has determined that the transport signal exhibits voice activity, the bitstream generator is adapted to encode the two or more transport channels within the bitstream,

wherein, if the voice activity determiner has determined that the transport signal does not exhibit voice activity, the bitstream generator is suitable to encode, instead of the two or more transport channels, information on a background noise, wherein the information on the background noise comprises information on a background noise of at least one of the two or more transport channels or information on a background noise of a derived signal which depends on at least one of the two or more transport channels,

wherein the audio encoder is configured to generate a bitstream from audio input, and

wherein the audio decoder is configured to generate one or more audio output signals from the bitstream.

24. A method for decoding, comprising:

receiving a bitstream which depends on audio content comprising at least one of a plurality of audio objects and a plurality of audio channels; wherein a transport signal comprising two or more transport channels is encoded within the bitstream, and the audio content is encoded within the transport signal; or wherein information on a background noise is encoded within the bitstream instead of the transport signal, wherein the information on the background noise comprises information on a background noise of at least one of the two or more transport channels or information on a background noise of a derived signal which depends on at least one of the two or more transport channels; and

generating one or more audio output signals depending on the audio content being encoded with the bitstream;

wherein, if the transport signal comprising the two or more transport channels is encoded within the bitstream, generating the one or more audio output signals is conducted depending on the two or more transport channels, and

wherein, if the information on the background noise is encoded within the bitstream instead of the transport signal, generating the one or more audio output signals is conducted depending on the information on the background noise.

25. A computer program for implementing the method of claim 24 when being executed on a computer or signal processor.