## Claims

1. A decoder being configured for processing an encoded audio bitstream ~~(BS)~~, wherein the decoder ~~(1)~~ comprises:

a bitstream decoder ~~(2)~~ configured to derive a decoded audio signal ~~(DS)~~ from the bitstream ~~(BS)~~, wherein the decoded audio signal ~~(DS)~~ comprises at least one decoded frame;

a noise estimation device ~~(3)~~ configured to produce a noise estimation signal ~~(NE)~~ containing an estimation of the level and/or the spectral shape of a noise ~~(N)~~ in the decoded audio signal ~~(DS)~~;

a comfort noise generating device ~~(4)~~ configured to derive a comfort noise signal ~~(CN)~~ from the noise estimation signal ~~(NE)~~; and

a combiner ~~(5)~~ configured to combine the decoded frame of the decoded audio signal ~~(DS)~~ and the comfort noise signal ~~(CN)~~ in order to obtain an audio output signal ~~(OS)~~, in such way that the decoded frame in the audio output signal ~~(OS)~~ comprises artificial noise.

2. A decoder according to the preceding claim, wherein the decoded frame is an active frame.

3. A decoder according to one of the preceding claims, wherein the decoded frame is an inactive frame.

4. A decoder according to one of the preceding claims, wherein the noise estimating device ~~(3)~~ comprises a spectral analysis device ~~(6)~~ configured to create an analysis signal ~~(AS)~~ containing the level and the

spectral shape of the noise (N) in the decoded audio signal (DS) and a noise estimation producing device (7) configured to produce the noise estimation signal (NE) based on the analysis signal (AS).

5. A decoder according to one of the preceding claims, wherein the comfort noise generating device (4) comprises a noise generator (8) configured to create a frequency domain comfort noise signal (FD) based on the noise estimation signal (NE) and a spectral synthesizer (9) configured to create the comfort noise signal (CN) based on the frequency domain comfort noise signal (FD).

6. A decoder according to one of the preceding claims, wherein the decoder (1) comprises a switch device (10) configured to switch the decoder alternatively to a first mode of operation or to a second mode of operation, wherein in the first mode of operation the comfort noise signal (CN) is fed to the combiner (5), whereas the comfort noise signal (CN) is not fed to the combiner (5) in the second mode of operation.

7. A decoder according to the preceding claim, wherein the decoder (1) comprises a control device (11) configured to control the switch device (10) automatically, wherein the control device (11) comprises a noise detector (12) and configured to control the switch device (11) depending on a signal-to-noise ratio of the decoded audio signal (DS), wherein under low-signal-to-noise-ratio-conditions the decoder (1) is switched to the first mode of operation and under high-signal-to-noise-ratio-conditions to the second mode of operation.

8. A decoder according to the preceding claim, wherein the control device (11) comprises a side information receiver (13) configured to receive side information contained in the bitstream (BS), which corresponds to the signal-to-noise ratio of the decoded audio signal (DS), and configured to create a noise detection signal (ND), wherein the noise

detector (12) switches the switch device (11) depending on the noise detection signal (ND).

9. A decoder according to the preceding claim, wherein the side information corresponding to the signal-to-noise ratio of the decoded audio signal (DS) consists of at least one dedicated bit in the bitstream (BS).

10. A decoder according to one of the claims 7 to 9, wherein the control device (11) comprises a wanted signal energy estimator (14) configured to determine an energy of a wanted signal (WS) of the decoded audio signal (DS), a noise energy estimator (15) configured to determine an energy of a noise (N) of the decoded audio signal (DS) and a signal-to-noise ratio estimator (16) configured to determine the signal-to-noise ratio of the decoded audio signal (DS) based on the energy of wanted signal (WS) and based on the energy of the noise (N), wherein the switch device (11) is switched depending on the signal-to-noise ratio determined by the control device (11).

11. A decoder according to one of the claims 7 to 10, wherein the bitstream comprises active frames and inactive frames, wherein the control device (11) is configured to determine the energy of the wanted signal (WS) of the decoded audio signal (DS) during the active frames and to determine the energy of the noise (N) of the decoded audio signal (DS) during inactive frames.

12. A decoder according to one of the preceding claims, wherein the bitstream comprises active frames and inactive frames, wherein the decoder (1) comprises a side information receiver (17) configured to discriminate between the active frames and the inactive frames based on side information in the bitstream (BS) indicating whether the present frame is active or inactive.

13. A decoder according to the preceding claim, wherein the side information indicating whether the present frame is active or inactive consists of at least one dedicated bit in the bitstream ~~(BS)~~.

14. A decoder according to claim 4 and according to one of the claims 7 to 13, wherein the control device is ~~(11)~~ configured to determine the energy of the wanted signal ~~(WS)~~ of the decoded audio ~~(DS)~~ signal based on the analysis signal ~~(AS)~~.

15. A decoder according to one of the claims 7 to 14, wherein the control device ~~(11)~~ is configured to determine the energy of the noise ~~(N)~~ of the decoded audio signal ~~(DS)~~ based on the noise estimation signal ~~(NE)~~.

16. A decoder according to one of the preceding claims, wherein the comfort noise generating device ~~(4)~~ is configured to create the comfort noise signal ~~(CN)~~ based on a target comfort noise level signal ~~(TNL)~~.

17. A decoder according to the preceding claim, wherein the target comfort noise level signal ~~(TNL)~~ is adjusted depending on a bit-rate of the bitstream ~~(BS)~~.

18. A decoder according to claim 15 or 17, wherein the target comfort noise level signal ~~(TNL)~~ is adjusted depending on a noise attenuation level caused by a noise reduction method applied to the bitstream ~~(BS)~~.

19. A decoder according to one of the claims 16 to 18, wherein an energy $E_{\mathrm{w}}(k)$ of a frequency band $k$ of the frequency domain comfort noise signal ~~(FD)~~ is adjusted depending on the target comfort noise level signal ~~(TNL)~~, which indicates a target comfort noise level $g_{\mathrm{tar}}$, for each frequency band $k$ as $E_{\mathrm{w}}(k) = \max\{(g_{\mathrm{tar}} - 1)\,\hat{E}_{\mathrm{n}}(k)\,;0\}$, wherein $\hat{E}_{\mathrm{n}}(k)$

refers to an estimate of the energy of the noise (N) of the decoded audio signal (DS) at the frequency band $k$, as delivered by the noise estimation producing device (7).

20. A decoder according to one of the preceding claims, wherein the decoder (1) comprises a further bitstream decoder, wherein the bitstream decoder (2) and the further bitstream decoder are of different types, wherein the decoder (1) comprises a switch configured to feed either the decoded signal (DS) from the bitstream decoder (2) or the decoded signal from the further bitstream decoder to the noise estimation device (3) and to the combiner (5).

21. An encoder being configured for producing an audio bitstream (BS), wherein the encoder (18) comprises:

a bitstream encoder (20) configured to produce an encoded audio signal (ES) corresponding to an audio input signal (IS) and to derive the bitstream (BS) from the encoded audio signal (ES);

an signal analyzer (30) having a signal-to-noise ratio estimator (33) configured to determine the signal-to-noise ratio of the audio input signal (IS) based on an energy of a wanted signal (WS) of the audio input signal (IS) determined by a wanted signal energy estimator (31) and based on an energy of a noise (N) of the audio input signal (IS) determined by noise energy estimator (32);

a noise reduction device (27, 28) configured to produce a noise reduced audio signal (TS); and

a switch device (35) configured to feed, depending on the determined signal-to-noise ratio of the audio input signal (IS), either the audio input signal (IS) or the noise reduced audio signal (TS) to the bitstream

encoder ~~(20)~~ for the purpose of encoding the respective signal ~~(IS, TS)~~, wherein the bitstream encoder ~~(20)~~ is configured to transmit a side information ~~(NF)~~, which indicates whether the audio input signal ~~(IS)~~ or the noise reduced audio signal ~~(TS)~~ is encoded, within in the bitstream ~~(BS)~~.

22. A system comprising a decoder ~~(1)~~ and an encoder ~~(18)~~, wherein the decoder ~~(1)~~ is designed according to one of the claims 1 to 19 and/or the encoder ~~(18)~~ is designed according to claim 21.

23. A method of decoding an audio bitstream ~~(BS)~~, wherein the method comprises:

deriving a decoded audio signal ~~(DS)~~ from the bitstream ~~(BS)~~, wherein the decoded audio signal ~~(DS)~~ comprises at least one decoded frame;

producing a noise estimation signal ~~(NE)~~ containing an estimation of the level and/or the spectral shape of a noise ~~(N)~~ in the decoded audio signal ~~(DS)~~;

deriving a comfort noise signal ~~(CN)~~ from the noise estimation signal ~~(NE)~~; and

combining the decoded frame of the decoded audio signal ~~(DS)~~ and the comfort noise signal ~~(CN)~~ in order to obtain an audio output signal ~~(OS)~~, in such way that the decoded frame in the audio output signal ~~(OS)~~ comprises artificial noise.

24. A method of audio signal encoding for producing an audio bitstream ~~(BS)~~, wherein the method comprises:

determining the signal-to-noise ratio of an audio input signal ~~(IS)~~ based

on a determined energy of a wanted signal ~~(WS)~~ of the audio input signal ~~(IS)~~ and a determined energy of a noise ~~(N)~~ of the audio input signal ~~(IS)~~;

producing an noise reduced audio signal ~~(TS)~~;

producing an encoded audio signal ~~(ES)~~ corresponding to the audio input signal ~~(IS)~~, wherein, depending on the determined signal-to-noise ratio of the audio input signal ~~(IS)~~, either the audio input signal ~~(IS)~~ or the noise reduced audio signal ~~(TS)~~ is encoded;

deriving the bitstream ~~(BS)~~ from the encoded audio signal ~~(ES)~~; and

transmitting a side information ~~(NF)~~, which indicates whether the audio input signal ~~(IS)~~ or the noise reduced audio signal ~~(TS)~~ is encoded, within the bitstream ~~(BS)~~.

25. A bitstream produced according to the method of claim 24.

26. Computer program for performing, when running on a computer or a processor, the method of claim 23 or 24.