CLAIMS

1. A method for an encoder to process audio data, comprising:

obtaining a current noise frame of an audio signal, wherein the current noise frame includes a current noise low-band signal and a current noise high-band signal;

determining, according to a log-domain energy of the current noise low-band signal, a log-domain energy of the current noise high-band signal, a log-domain energy of a previous noise low-band signal of a previous noise frame of the audio signal, and a log-domain energy of a previous noise high-band signal of the previous noise frame, whether to encode a first silence insertion descriptor frame (SID) corresponding to the current noise frame or a second SID corresponding to the current noise frame, wherein the first SID comprises a noise low-band parameter of the current noise low-band signal and a noise high-band parameter of the current noise high-band signal, wherein the second SID comprises the noise low-band parameter of the current noise low-band signal, the second SID not comprising the noise high-band parameter of the current noise high-band signal, wherein the previous noise frame is prior to the current noise frame in the audio signal, wherein the previous noise frame corresponding to a SID comprising a noise high-band parameter of the previous noise high-band signal and a noise low-band parameter of the previous noise low-band signal was transmitted, wherein when the previous noise frame is not adjacent to the current noise frame, no SID comprising a noise high-band parameter and a noise low-band parameter was transmitted between the previous noise frame and the current noise frame; and

encoding the first SID or the second SID according to the determination.

2. The method according to claim 1, wherein the log-domain energy of the current noise low-band signal is represented by a log-domain smoothed average energy of the current noise low-band signal, wherein the log-domain energy of the current noise high-band signal is represented by a log-domain smoothed average energy of the current noise high-band signal, wherein the log-domain energy of the previous noise low-band signal is represented by a log-domain smoothed average energy of the previous noise low-band signal, and wherein the log-domain energy of the previous noise high-band signal is represented by a log-domain smoothed average energy of the previous noise high-band signal.

3. The method according to claim 2, wherein the log-domain smoothed average energy of the current noise low-band signal is obtained according to the log-domain smoothed

average energy of the previous noise low-band signal and a log-domain average energy of the current noise low-band signal; and

wherein the log-domain smoothed average energy of the current noise high-band signal is obtained according to the log-domain smoothed average energy of the previous noise high-band signal and a log-domain average energy of the current noise high-band signal.

4. The method according to claim 1, wherein the determining whether to encoding a first SID corresponding to the current noise frame or a second SID corresponding to the current noise frame comprises:

obtaining a first difference between the log-domain energy of the current noise low-band signal and the log-domain energy of the current noise high-band signal;

obtaining a second difference between the log-domain energy of the previous noise low-band signal and the log-domain energy of the previous noise high-band signal;

obtaining a third difference between the first difference and the second difference; and

comparing an absolute value of the third difference with a preset threshold,

wherein the first SID is encoded when the absolute value of the third difference is greater than the preset threshold, and wherein

the second SID is encoded when the absolute value of the third difference is less than or equal to the preset threshold.

5. A method for processing an audio signal, comprising:

receiving, by a decoder, a current silence insertion descriptor frame (SID) of the audio signal, wherein the current SID comprises a noise low-band parameter;

determining that the current SID does not comprise a noise high-band parameter;

extrapolating a noise high-band parameter of the current SID according to the noise low-band parameter of the current SID and a ratio of an energy of a previous noise high-band signal of a previous noise frame of the audio signal to an energy of a previous noise low-band signal of the previous noise frame, wherein the previous noise frame is prior to the current SID in the audio signal, wherein the previous noise frame corresponding to a previous received SID comprising a noise high-band parameter and a noise low-band parameter, wherein when the previous received SID is not adjacent to the current SID, no SID comprising a noise high-band parameter and a noise low-band parameter was received between the previous received SID and the current SID; and

obtaining a current noise frame according to the noise low-band parameter of the current SID and the extrapolated noise high-band parameter of the current SID.

6. The method according to claim 5, wherein whether the current SID comprises a noise high-band parameter is determined based on a first identifier or a second identifier indicated by one bit of the current SID, wherein

the current SID comprises the noise high-band parameter when the current SID comprises the first identifier and wherein

the current SID does not comprise the noise high-band parameter when the current SID comprises the second identifier.

7. The method according to claim 5, wherein the noise high-band parameter of the current SID is extrapolated by:

obtaining, according to the noise low-band parameter of the current SID and the ratio, a weighted average energy of a current noise high-band signal corresponding to the current SID;

obtaining a synthesis filter coefficient of the current noise high-band signal; and

obtaining the noise high-band parameter of the current SID according to the obtained weighted average energy of the current noise high-band signal and the obtained synthesis filter coefficient of the current noise high-band signal.

8. The method according to claim 7, wherein obtaining the weighted average energy of the current noise high-band signal comprises:

obtaining an energy of a current low-band signal corresponding to the current SID according to the noise low-band parameter of the current SID;

obtaining, according to the energy of the current low-band signal and the ratio, an energy of the current noise high-band signal; and

obtaining, according to the energy of the current noise high-band signal, the weighted average energy of the noise high-band signal.

9. The method according to claim 5, wherein the ratio is obtained in log-domain, and

wherein the ratio is represented by a difference between a log-domain energy of the previous noise high-band signal and a log-domain energy of the previous noise low-band

signal.

10. The method according to claim 7, wherein the method further comprises:

multiplying noise high-band signals of subsequent L frames starting from the current SID by a smoothing factor to obtain a new weighted average energy of the extrapolated noise high-band signals, wherein history frames adjacent to the current SID are encoded speech frames, wherein the smoothing factor is greater than 0 and smaller than 1, wherein a part of high-band signals that are decoded from the encoded speech frames or an average energy of high-band signals is smaller than a part of the noise high-band signals that are extrapolated or an average energy of noise high-band signals, and wherein the current noise frame is obtained based on the decoded noise low-band parameter, the synthesis filter coefficient of the current noise high-band signal, and the new weighted average energy of the extrapolated noise high-band signals.

11. An encoder comprising:

a non-transitory memory for storing computer-executable instructions; and

a processor operatively coupled to the non-transitory memory, wherein the processor is configured to execute the computer-executable instructions to:

obtain a current noise frame of an audio signal, wherein the current noise frame includes a current noise low-band signal and a current noise high-band signal;

determine, according to a log-domain energy of the current noise low-band signal, a log-domain energy of the current noise high-band signal, a log-domain energy of a previous noise low-band signal of a previous noise frame of the audio signal, and a log-domain energy of a previous noise high-band signal of the previous noise frame, whether to encode a first silence insertion descriptor frame (SID) corresponding to the current noise frame or a second SID corresponding to the current noise frame, wherein the first SID comprises a noise low-band parameter of the current noise low-band signal and a noise high-band parameter of the current noise high-band signal, wherein the second SID comprises the noise low-band parameter of the current noise low-band signal, the second SID not comprising the noise high-band parameter of the current noise high-band signal, wherein the previous noise frame is prior to the current noise frame in the audio signal, wherein the previous noise frame corresponding to a SID comprising a noise high-band parameter of the previous noise high-band signal and a noise low-band parameter of the previous noise low-band

signal was transmitted, wherein when the previous noise frame is not adjacent to the current noise frame, no SID comprising a noise high-band parameter and a noise low-band parameter was transmitted between the previous noise frame and the current noise frame; and

encode the first SID or the second SID according to the determination.

12. The encoder according to claim 11, wherein the log-domain energy of the current noise low-band signal is represented by a log-domain smoothed average energy of the current noise low-band signal, wherein the log-domain energy of the current noise high-band signal is represented by a log-domain smoothed average energy of the current noise high-band signal, wherein the log-domain energy of the previous noise low-band signal is represented by a log-domain smoothed average energy of the previous noise low-band signal, and wherein the log-domain energy of the previous noise high-band signal is represented by a log-domain smoothed average energy of the previous noise high-band signal.

13. The encoder according to claim 12, wherein the log-domain smoothed average energy of the current noise low-band signal is obtained according to the log-domain smoothed average energy of the previous noise low-band signal and a log-domain average energy of the current noise low-band signal; and

wherein the log-domain smoothed average energy of the current noise high-band signal is obtained according to the log-domain smoothed average energy of the previous noise high-band signal and a log-domain average energy of the current noise high-band signal.

14. The encoder according to claim 11, wherein in determine whether to encoding a first SID corresponding to the current noise frame or a second SID corresponding to the current noise frame, the processor is further configured to execute the computer-executable instructions to:

obtain a first difference between the log-domain energy of the current noise low-band signal and the log-domain energy of the current noise high-band signal;

obtain a second difference between the log-domain energy of the previous noise low-band signal and the log-domain energy of the previous noise high-band signal;

obtain a third difference between the first difference and the second difference; and

compare an absolute value of the third difference with a preset threshold, wherein

determine the first SID is encoded when the absolute value of the third difference is greater than the preset threshold, and wherein

the second SID is encoded when the absolute value of the third difference is less than or equal to the preset threshold.

15. A decoder comprising:

a non-transitory memory for storing computer-executable instructions; and

a processor operatively coupled to the non-transitory memory, the processor being configured to execute the computer-executable instructions to:

receive a current silence insertion descriptor (SID) of the audio signal, wherein the current SID comprises a noise low-band parameter;

determine that the current SID does not comprise a noise high-band parameter;

extrapolate a noise high-band parameter of the current SID according to the noise low-band parameter of the current SID and a ratio of an energy of a previous noise high-band signal of a previous noise frame of the audio signal to an energy of a previous noise low-band signal of the previous noise frame, wherein the previous noise frame is prior to the current SID in the audio signal, wherein the previous noise frame corresponding to a previous received SID comprising a noise high-band parameter and a noise low-band parameter, wherein when the previous received SID is not adjacent to the current SID, no SID comprising a noise high-band parameter and a noise low-band parameter was received between the previous received SID and the current SID; and

obtain a current noise frame according to the noise low-band parameter of the current SID and the extrapolated noise high-band parameter of the current SID.

16. The decoder according to claim 15, wherein whether the current SID comprises the noise high-band parameter is determined based on a first identifier or a second identifier indicated by one bit of the current SID, wherein the current SID comprises the noise high-band parameter when the current SID comprises the first identifier and wherein

the current SID does not comprise the noise high-band parameter when the current SID comprises the second identifier.

17. The decoder according to claim 15, wherein in extrapolate the noise high-band

parameter of the current SID, the processor is further configured to execute the computer-executable instructions to:

obtain, according to the noise low-band parameter of the current SID and the ratio, a weighted average energy of a current noise high-band signal corresponding to the current SID;

obtain a synthesis filter coefficient of the current noise high-band signal; and

obtain the noise high-band parameter of the current SID according to the obtained weighted average energy of the current noise high-band signal and the obtained synthesis filter coefficient of the current noise high-band signal.

18. The decoder according to claim 17, wherein in obtain the weighted average energy of the current noise high-band signal, the processor is further configured to execute the computer-executable instructions to:

obtain an energy of a current low-band signal corresponding to the current SID according to the noise low-band parameter of the current SID;

obtain, according to the energy of the current low-band signal and the ratio, an energy of the current noise high-band signal; and

obtain, according to the energy of the current noise high-band signal, the weighted average energy of the noise high-band signal.

19. The decoder according to claim 18, wherein the ratio is obtained in log-domain, and

wherein the ratio is represented by a difference between a log-domain energy of the previous noise high-band signal and a log-domain energy of the previous noise low-band signal.

20. The decoder according to claim 17, wherein the processor is further configured to execute the computer-executable instructions to:

multiply noise high-band signals of subsequent L frames starting from the current SID by a smoothing factor to obtain a new weighted average energy of the extrapolated noise high-band signals when history frames adjacent to the current SID are encoded speech frames, wherein the smoothing factor is greater than 0 and smaller than 1 and when a part of high-band signals that are decoded from the encoded speech frames or an average energy of high-band signals is smaller than a part of the noise high-band signals that are extrapolated or an average energy of noise high-band signal, and wherein

the current noise frame is obtained based on the decoded noise low-band parameter, the synthesis filter coefficient of the current noise high-band signal, and the new weighted average energy of the extrapolated noise high-band signals.