

CLAIMS

1. A method of frame-wise encoding metadata for an input signal, the metadata comprising a plurality of at least partially interrelated parameters calculable from the input signal, the method comprising, for each frame:

- 5 iteratively performing, by using a looping process, steps of:
 determining a processing strategy from a plurality of processing strategies for calculating and quantizing the parameters;
 calculating and quantizing the parameters based on the determined processing strategy to obtain quantized parameters; and
10 encoding the quantized parameters,
 wherein each of the plurality of processing strategies comprises a respective first indication indicative of an ordering related to the calculation and quantization of individual parameters; and
 wherein the processing strategy is determined based on at least one bitrate threshold.

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2. The method according to claim 1, wherein the processing strategy is determined such that a bit rate of the encoded quantized parameters is equal to or less than the bitrate threshold.

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3. The method according to claim 1 or 2, wherein each of the plurality of processing strategies further comprises a respective second indication indicative of information for performing the quantization of the parameters.

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4. The method according to claim 3, wherein the information for performing the quantization of the parameters comprises respective quantization ranges and/or quantization levels for the plurality of parameters.

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5. The method according to any one of the preceding claims, wherein the encoding of the parameters involves time and/or frequency-differential coding.

6. The method according to any one of the preceding claims, wherein the processing strategy determined for a current frame is different from the processing strategy determined

for a previous frame; and wherein the encoding of the parameters involves time-differential coding across the different processing strategies.

7. The method according to any one of the preceding claims, wherein the first
5 indication comprises information indicating that all of the parameters are calculated before being quantized.

8. The method according to any one of the claims 1 to 6, wherein the first indication
comprises information indicating that the parameters are individually calculated and then
10 quantized one after another in sequence, and wherein at least one parameter of the plurality of parameters is calculated based on another one or more quantized parameters of the plurality of parameters.

9. The method according to any one of the claims 1 to 6, wherein the first indication
15 comprises information indicating that all of the parameters are calculated before any parameter is quantized; and wherein at least one of the parameters is recalculated, based on another quantized parameter, and the recalculated parameter is quantized.

10. The method according to claim 6 or any one of claims 7 to 9 when depending on
20 claim 6, wherein the method further comprises, before encoding the quantized parameters:
mapping indices of the quantized parameters from the previous frame to that of the current frame.

11. The method according to any one of the preceding claims, wherein the at least one
25 bitrate threshold comprises a target bitrate threshold, and wherein the looping process involves steps of:

quantizing and encoding the parameters in a non-differential and/or frequency-differential manner with an entropy coder in accordance with the processing strategy;

estimating a first parameter bitrate for the encoded parameters; and

30 if the first parameter bitrate is less than or equal to the target bitrate threshold, exiting the looping process.

12. The method according to claim 11, wherein the looping process further involves steps of:

if the first parameter bitrate is larger than the target bitrate threshold:

quantizing and encoding the parameters in a non-differential manner with no entropy in accordance with the processing strategy;

estimating a second parameter bitrate for the encoded parameters; and

if the second parameter bitrate is less than or equal to the target bitrate threshold, exiting the looping process.

13. The method according to claim 12, wherein the looping process further involves steps of:

if the second parameter bitrate is larger than the target bitrate threshold:

quantizing and encoding the parameters in a time-differential manner with the entropy coder in accordance with the processing strategy;

estimating a third parameter bitrate for the encoded parameters; and

if the third parameter bitrate is less than or equal to the target bitrate threshold, exiting the looping process.

14. The method according claim 13, wherein the time-differential quantization and encoding is performed on a subset of the parameters in a frequency interleaved manner with respect to a previous frame.

15. The method according claim 13 or 14, wherein the time-differential quantization and encoding is performed by cycling through a number of frequency interleaved time-differential coding schemes, such that, for each cycle, a different subset of the parameters is quantized and encoded time-differentially while the rest parameters are quantized and encoded non-differentially.

16. The method according to any one of claims 13 to 15, wherein the determined processing strategy is a first processing strategy, and wherein the looping process further involves:

if the third parameter bitrate is larger than the target bitrate threshold:

- 5 determining, from the plurality of processing strategies, a second processing strategy, such that a bitrate by applying the second processing strategy is expected to be less than that of using the first processing strategy; and
- repeating the steps of the looping process of claims 11 to 13.

10 17. The method according to any one of claims 13 to 15, wherein the parameters are represented in a first number of frequency bands, and wherein the looping process further involves steps of:

if the third parameter bitrate is larger than the target bitrate threshold:

- reducing the number of frequency bands representing the parameters to a
- 15 second number smaller than the first number, such that a total number of the parameters to be quantized and encoded is reduced; and
- repeating the steps of the looping process of claims 11 to 13.

18. The method according to any one of claims 13 to 15, wherein the parameters are

20 represented in a first number of frequency bands, and wherein the looping process further involves steps of:

if the third parameter bitrate is larger than the target bitrate threshold:

- reusing parameters in one or more frequency bands from the previous frame in the current frame; and
- 25 repeating the steps of the looping process of claims 11 to 13.

19. The method according to any one of claims 16 to 18, wherein the at least one bitrate threshold further comprises a maximum bitrate threshold larger than the target bitrate threshold, and wherein the looping process further involves steps of:

- 30 before determining the second processing strategy, or reducing the number of frequency bands, or reusing the parameters:
- obtaining a minimum of the first, second and third parameter bitrates; and
- if the minimum is less than or equal to the maximum bitrate threshold, exiting the looping process.

20. The method according to any one of the preceding claims, wherein the parameters comprise one or more of prediction parameters, cross-prediction parameters, and decorrelation parameters.

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21. The method according to claim 20 when depending on claim 8, wherein the prediction parameters are calculated and quantized first, the cross-prediction parameters are calculated from the quantized prediction parameters and then quantized, and the decorrelation parameters are calculated from the quantized cross-prediction parameters and the quantized prediction parameters, and then quantized.

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22. The method according to claim 20 when depending on claim 9, wherein the parameters are first calculated, then the decorrelation parameters and the prediction parameters are quantized, and, from the quantized prediction parameters, the cross-prediction parameters are recalculated and then quantized.

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23. The method according to any one of the preceding claims, wherein the method is applied to metadata encoding of an immersive voice and audio services, IVAS, codec or an Ambisonics codec.

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24. The method according to any one of the preceding claims, wherein the frame size is less than 40 ms, in particular equal to or less than 20 ms.

25. An apparatus comprising a processor and a memory coupled to the processor, wherein the processor is adapted to cause the apparatus to carry out the method according to any one of the preceding claims.

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26. A program comprising instructions that, when executed by a processor, cause the processor to carry out the method according to any one of claims 1 to 24.

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27. A computer-readable storage medium storing the program according to claim 26.