Audio Decoder, ~~Audio Encoder,~~ Method for Providing a Decoded Audio Signal~~, Method for Providing an Encoded Audio Signal, Audio Stream, Audio Stream Provider~~ and Computer Program ~~Using a Stream Identifier~~for Providing a Decoded Audio Signal

Description

Technical Field

Embodiments according to the invention are related to an audio decoder for providing a decoded audio signal representation on the basis of an encoded audio signal representation.

Further embodiments according to the invention are related to an audio encoder for providing an encoded audio signal representation.

Further embodiments according to the invention are related to a method for providing a decoded audio signal representation.

Further embodiments according to the invention are related to a method for providing an encoded audio signal representation.

Further embodiments according to the invention are related to an audio stream.

Further embodiments according to the invention are related to an audio stream provider.

Further embodiments according to the invention are related to a computer program for performing one of the methods.

Background of the Invention

In the following, problems underlying aspects of the invention and possible use scenarios for embodiments according to the invention will be described.

dependence on a configuration information. The audio decoder is configured to decode one or more audio frames using a current configuration (for example, using a currently active configuration information). Moreover, the audio decoder is configured to compare a configuration information in a configuration structure associated with one or more frames to be decoded and included in an extension element of the one or more frames, with the current configuration information, and to make a transition to perform a decoding using the configuration information in the configuration structure associated with the one or more frames to be decoded as a new configuration information if the configuration information in the configuration structure associated with the one or more frames to be decoded, or a relevant portion (for example, up to and including the stream identifier) of the configuration information in the configuration structure associated with the one or more frames to be decoded, is different from the current configuration information. The audio decoder is configured to consider a stream identifier information included in the configuration structure when comparing the configuration information, such that a difference between a stream identifier previously acquired by the audio decoder and a stream identifier represented by the stream identifier information in the configuration structure associated with the one or more frames to be decoded causes to make the transition.

This embodiment according to the invention is based on the idea that the presence and evaluation of a stream identifier information, which is included in the configuration structure, allows for a distinction of different streams at the side of an audio decoder, and consequently the execution of a transition, even in the case that the actual decoding configuration (which may, for example, be described by the rest of the configuration information in the configuration structure), is identical for both the streams. Accordingly, the stream identifier can be used as a criterion to distinguish between different streams between which a transition can be made. Since the stream identifier information is included in the configuration structure (for example, together with other configuration information adjusting decoding parameters of the audio decoder) it is not necessary to evaluate any information from a different protocol layer when deciding whether a transition should be made. For example, the stream identifier information is included in a sub-data structure of a data structure which defines the decoding parameters (the “configurations structure”), such that it is not necessary to forward any information from a packet level to the actual audio decoder. By including into the configuration structure the stream identifier information, which allows the audio decoder to recognize a transition from a first stream to a second stream, but which does not have any impact on decoding parameters when decoding a contiguous portion of a single stream, it is possible to recognize, at the side of

the configuration information in the configuration structure associated with the one or more frames to be decoded as a new configuration if the configuration information in the configuration structure associated with the one or more frames to be decoded, or a relevant portion (for example, up to and including the stream identifier) of the configuration information in the configuration structure associated with the one or more frames to be decoded is different from the current configuration information. The method also comprises considering a stream identifier information included in the configuration structure when comparing the configuration information, such that a difference between a stream identifier previously acquired in the audio decoding and a stream identifier represented by the stream identifier information in the configuration structure associated with the one or more frames to be decoded causes to make the transition and wherein the configuration structure is included in an extension element of an audio frame. This method is based on the same considerations as the above mentioned audio decoder.

The method can be supplemented by any of the features and functionalities and details described herein, either individually or taken in combination.

Another embodiment according to the invention creates a method for providing an encoded audio signal representation. The method comprises encoding overlapping or non-overlapping frames of an audio signal using encoding parameters, to obtain the encoded audio signal representation. The method comprises providing a configuration structure describing the encoding parameters (or, equivalently, decoding parameters to be used by an audio decoder), wherein the configuration structure comprises a stream identifier. This method is based on the same considerations as the above mentioned audio encoder.

Moreover, it should be noted that the methods described here can be supplemented by any of the features and functionalities described above with respect to the corresponding audio decoder and audio encoder. Moreover, the methods can be supplemented by any of the features, functionalities and details described herein, individually or in combination.

Embodiments according to the invention create an audio stream. The audio stream comprises an encoded representation of overlapping or non-overlapping frames of an audio signal. The audio stream also comprises a configuration structure describing encoding parameters (or, equivalently, decoding parameters to be used by an audio

decoder). The configuration structure comprises a stream identifier information representing a stream identifier (for example, in the form of an integer value).

Claims

1. An audio decoder for providing a decoded audio signal representation on the basis of an encoded audio signal representation,

wherein the audio decoder is configured to adjust decoding parameters in dependence on a configuration information,

wherein the audio decoder is configured to decode one or more audio frames using a current configuration information, and

wherein the audio decoder is configured to compare a configuration information in a configuration structure associated with one or more frames to be decoded, with the current configuration information, and to make a transition to perform a decoding using the configuration information in the configuration structure associated with the one or more frames to be decoded as a new configuration information if the configuration information in the configuration structure associated with the one or more frames to be decoded, or a relevant portion of the configuration information in the configuration structure associated with the one or more frames to be decoded, is different from the current configuration information;

wherein the audio decoder is configured to consider a stream identifier information included in the configuration structure when comparing the configuration information, such that a difference between a stream identifier previously acquired by the audio decoder and a stream identifier represented by the stream identifier information in the configuration structure associated with the one or more frames to be decoded causes to make the transition;

wherein the configuration structure is included in an extension element of an audio frame.

2. The audio decoder according to claim 1, wherein the audio decoder is configured to check whether the configuration structure comprises the stream identifier information, and to selectively consider the stream identifier information in the

comparison if the stream identifier information is included in the configuration structure.

3. The audio decoder according to claim 1 or 2, wherein the audio decoder is configured to check whether the configuration structure comprises a configuration extension structure, and to check whether the configuration extension structure comprises the stream identifier information, and

wherein the audio decoder is configured to selectively consider the stream identifier information in the comparison if the stream identifier information is included in the configuration extension structure.

4. The audio decoder according to claim 3, wherein the audio decoder is configured to accept a variable ordering of configuration information items in the configuration extension structure, and

wherein the audio decoder is configured to consider configuration information items arranged in the configuration extension structure before the stream identifier information when comparing the configuration information in the configuration structure associated with one or more frames to be decoded with the current configuration information, and

wherein the audio decoder is configured to leave configuration information items arranged in the configuration extension structure after the stream identifier information unconsidered when comparing the configuration information in the configuration structure associated with one or more frames to be decoded with the current configuration information.

5. The audio decoder according to claim 4,

wherein the audio decoder is configured to identify one or more configuration information items in the configuration extension structure on the basis of one or more configuration extension type identifiers preceding the respective configuration information items.

6. The audio decoder according to one of claim 3 to 5, wherein the configuration extension structure is a sub-data-structure of the configuration structure, wherein a presence of the configuration extension structure is indicated by a bit of the configuration structure which is evaluated by the audio decoder, and

wherein the stream identifier information is an sub-data-item of the configuration extension structure,

wherein a presence of the stream identifier information is indicated by a configuration extension type identifier associated with the stream identifier information which is evaluated by the audio decoder.

7. The audio decoder according to one of claims 1 to 6,

wherein the audio decoder is configured to obtain and process an audio frame representation which comprises a random access information,

wherein the random access information comprises a configuration structure and information for bringing a state of a processing chain of the audio decoder to a desired state,

wherein the audio decoder is configured to cross-fade between an audio information represented by an audio frame processed before arriving at the audio frame representation which comprises the random access information and an audio information derived on the basis of the audio frame representation which comprises the random access information after an initialization of the audio decoder using the configuration structure of the random access information and after adjusting a state of the audio decoder using the information for bringing a state of the processing chain to a desired state if the audio decoder finds that the configuration information in the configuration structure of the random access information, or a relevant portion of the configuration information in the configuration structure of the random access information, is different from the current configuration information.

8. The audio decoder according to claim 7, wherein the audio decoder is configured to continue decoding without performing a initialization of the audio decoder and without using the information for bringing a state of the processing chain of the audio

decoder to a desired state if the audio decoder has decoded an audio frame directly preceding an audio frame represented by the audio frame representation which comprises the random access information and if the audio decoder finds that the relevant portion of the configuration information in the configuration structure of the random access information is equal to the current configuration information.

9. The audio decoder according to claim 7 or claim 8, wherein the audio decoder is configured to perform an initialization of the audio decoder using the configuration structure of the random access information and to adjust a state of the audio decoder using the information for bringing a state of the processing chain to a desired state if the audio decoder has not decoded an audio frame directly preceding an audio frame represented by the an audio frame representation which comprises the random access information.

~~10. An audio encoder for providing an encoded audio signal representation,~~

~~wherein the audio encoder is configured to encode overlapping or non-overlapping frames of an audio signal using encoding parameters, to obtain the encoded audio signal representation,~~

~~wherein the audio encoder is configured to provide a configuration structure describing the encoding parameters or decoding parameters to be used by an audio decoder,~~

~~wherein the configuration structure comprises a stream identifier.~~

~~11. The audio encoder according to claim 10, wherein the audio encoder is configured to include the stream identifier in a configuration extension structure of the configuration structure, wherein the configuration extension structure comprising the stream identifier can be enabled and disabled by the audio encoder.~~

~~12. The audio encoder according to claim 11, wherein the audio encoder is configured to include into the configuration extension structure a configuration extension type identifier designating the stream identifier to signal the presence of the stream identifier in the configuration extension structure.~~

~~13. The audio encoder according to one of claims 10 to 12, wherein the audio encoder is configured to provide at least one configuration structure comprising the stream identifier and at least one configuration structure not comprising the stream identifier.~~

~~14. The audio encoder according to one of claims 10 to 13, wherein the audio encoder is configured to switch between a provision of a first encoded audio information which is represented by a first sequence of audio frames, and a second encoded audio information which is represented by a second sequence of audio frames,~~

~~wherein a proper rendering of a first audio frame of the second sequence of audio frames after a rendering of a last frame of the first sequence of audio frames requires a re-initialization of an audio decoder;~~

~~wherein the audio encoder is configured to include into an audio frame representation representing the first frame of the second sequence of audio frames a configuration structure comprising a stream identifier associated with the second sequence of audio frames,~~

~~wherein the stream identifier associated with the second sequence of audio frames is different from a stream identifier associated with the first sequence of audio frames.~~

~~15. The audio encoder according to one of claims 10 to 14, wherein the audio encoder does not provide any other signaling information indicating the switching from the first sequence of audio frames information to the second sequence of audio frames except for the stream identifier.~~

~~16. The audio encoder according to one of claims 14 or 15, wherein the audio encoder is configured to provide the first sequence of audio frames and the second sequence of audio frames using different bitrates, and~~

~~wherein the audio encoder is configured to signal to an audio decoder identical decoder configuration information for the decoding of the first sequence of audio frames and for the decoding of the second sequence of audio frames, except for different bitstream identifiers.~~

~~17~~10. A method for providing a decoded audio signal representation on the basis of an encoded audio signal representation,

wherein the method comprises adjusting decoding parameters in dependence on a configuration information,

wherein the method comprises decoding one or more audio frames using a current configuration information, and

wherein the method comprises comparing a configuration information in a configuration structure associated with one or more frames to be decoded, with the current configuration information, and wherein the method comprises making a transition to perform a decoding using the configuration information in the configuration structure associated with the one or more frames to be decoded as a new configuration information if the configuration information in the configuration structure associated with the one or more frames to be decoded, or a relevant portion of the configuration information in the configuration structure associated with the one or more frames to be decoded, is different from the current configuration information;

wherein the method comprises considering a stream identifier information included in the configuration structure when comparing the configuration information, such that a difference between a stream identifier previously acquired in the audio decoding and a stream identifier represented by the stream identifier information in the configuration structure associated with the one or more frames to be decoded causes to make the transition;

wherein the configuration structure is included in an extension element of an audio frame.

~~18. A method for providing an encoded audio signal representation,~~

~~wherein the method comprises encoding overlapping or non-overlapping frames of an audio signal using encoding parameters, to obtain the encoded audio signal representation,~~

~~wherein the method comprises providing a configuration structure describing the encoding parameters or decoding parameters to be used by an audio decoder,~~

~~wherein the configuration structure comprises a stream identifier.~~

~~19. An audio stream, comprising:~~

~~an encoded representation of overlapping or non-overlapping frames of an audio signal; and~~

~~a configuration structure describing encoding parameters or decoding parameters to be used by an audio decoder,~~

~~wherein the configuration structure comprises a stream identifier information representing a stream identifier.~~

~~20. The audio stream according to claim 19,~~

~~wherein the stream identifier information is included in a configuration extension structure, and~~

~~wherein the configuration extension structure is a sub-data-structure of a configuration structure, wherein a presence of the configuration extension structure is indicated by a bit of the configuration structure, and~~

~~wherein the stream identifier information is a sub-data-item of the configuration extension structure,~~

~~wherein a presence of the stream identifier information is indicated by a configuration extension type identifier associated with the stream identifier information.~~

~~21. The audio stream according to claim 19 or 20, wherein the stream identifier is embedded in a sub-data-structure of a representation of an audio frame.~~

22. The audio stream according to one of claims 19 to 21, wherein the stream identifier is only embedded in a sub-data structure of a representation of an audio frame comprising a configuration structure.

23. An audio stream provider for providing an encoded audio signal representation,

wherein the audio stream provider is configured provide encoded versions of overlapping or non-overlapping frames of an audio signal, encoded using encoding parameters, as a part of the encoded audio signal representation,

wherein the audio stream provider is configured to provide a configuration structure describing the encoding parameters or decoding parameters to be used by an audio decoder as a part of the encoded audio signal representation,

wherein the configuration structure comprises a stream identifier.

24. The audio stream provider according to claim 23, wherein the audio stream provider is configured to provide the encoded audio signal representation such that the stream identifier is included in a configuration extension structure of the configuration structure, wherein the configuration extension structure comprising the stream identifier can be enabled and disabled by one or more bits in the configuration structure.

25. The audio stream provider according to claim 24, wherein the audio stream provider is configured to provide the encoded audio signal representation such that the configuration extension structure comprises a configuration extension type identifier designating the stream identifier to signal the presence of the stream identifier in the configuration extension structure.

26. The audio stream provider according to one of claims 23 to 25, wherein the audio stream provider is configured to provide the encoded audio signal representation such that the encoded audio signal representation comprises at least one configuration structure comprising the stream identifier and at least one configuration structure not comprising the stream identifier.

~~27. The audio stream provider according to one of claims 23 to 26, wherein the audio stream provider is configured to switch between a provision of a first portion information of an encoded audio information, which is represented by a first sequence of audio frames, and a second portion of the encoded audio information, which is represented by a second sequence of audio frames,~~

~~wherein a proper rendering of a first audio frame of the second sequence of audio frames after a rendering of a last frame of the first sequence of audio frames requires a re-initialization of an audio decoder;~~

~~wherein the audio stream provider is configured to provide the encoded audio signal representation such that an audio frame representation representing the first frame of the second sequence of audio frames includes a configuration structure comprising a stream identifier associated with the second sequence of audio frames,~~

~~wherein the stream identifier associated with the second sequence of audio frames is different from a stream identifier associated with the first sequence of audio frames.~~

~~28. The audio stream provider according to one of claims 23 to 27, wherein the audio stream provider is configured to provide the encoded audio signal representation such that the encoded audio signal representation does not provide any other signaling information indicating the switching from the first sequence of audio frames to the second sequence of audio frames except for the stream identifier.~~

~~29. The audio stream provider according to one of claims 27 or 28, wherein the audio stream provider is configured to provide the encoded audio signal representation such that the first sequence of audio frames and the second sequence of audio frames are encoded using different bitrates, and~~

~~wherein the audio stream provider is configured to provide the encoded audio signal representation such that the encoded audio signal representation signals to an audio decoder identical decoder configuration information for the decoding of the first sequence of audio frames and for the decoding of the second sequence of audio frames, except for different bitstream identifiers.~~

30. The audio stream provider according to one of claims 23 to 29, wherein the audio stream provider is configured to switch between a provision of a first sequence of audio frames and a second sequence of audio frames to an audio decoder,

wherein the first sequence of audio frames and the second sequence of audio frames are encoded using different bitrates,

wherein the audio stream provider is configured to selectively switch between the provision of the first sequence of audio frames and the provision of the second sequence of audio frames at an audio frame for which the audio frame representation comprises a random access information while avoiding to switch between sequences at audio frames which do not comprise a random access information,

wherein the audio stream provider is configured to provide the encoded audio signal representation such that a stream identifier is included in a configuration structure of an audio frame which is provided when switching from the first sequence of audio frames to the second sequence of audio frames.

31. The audio stream provider according to claim 30, wherein the audio stream provider is configured to obtain a plurality of parallel sequences of audio frames encoded using different bitrates, and wherein the audio stream provider is configured to switch between a provision of frames from different of the sequences to an audio decoder, wherein the audio stream provider is configured to signal to the audio decoder to which of the sequences one or more frames are associated using the stream identifier which is included in the configuration structure of a first audio frame representation provided after a switching.

32. A method for providing an encoded audio signal representation,

wherein the method comprises providing encoded versions of overlapping or non-overlapping frames of an audio signal, encoded using encoding parameters, as a part of the encoded audio signal representation,

~~wherein the method comprises providing a configuration structure describing the encoding parameters or decoding parameters to be used by an audio decoder as a part of the encoded audio signal representation,~~

~~wherein the configuration structure comprises a stream identifier.~~

~~33~~11. A computer program for performing the method according to claim ~~17 or claim 18 or 32~~10 when the computer program runs on a computer.