

CLAIMS

1. Audio data processor, comprising:

a receiver interface for receiving encoded audio data and metadata related to the encoded audio data;

a metadata parser for parsing the metadata to determine an audio data manipulation possibility;

an interaction interface for receiving an interaction input and for generating, from the interaction input, interaction control data related to the audio data manipulation possibility; and

a data stream generator for obtaining the interaction control data and the encoded audio data and the metadata and for generating an output data stream, the output data stream comprising the encoded audio data, the metadata and the interaction control data,

wherein the data stream generator is configured to process an input data stream comprising the encoded audio data and the metadata received by the receiver interface without decoding the encoded audio data for generating the output data stream, or to copy the encoded audio data and at least a portion of the metadata without changes in the output data stream, and

to embed the interaction control data as an additional data portion in the output data stream.

2. Audio data processor of claim 1, wherein the encoded audio data comprises separate encoded audio objects, wherein at least a portion of the metadata is related to a corresponding audio object,

wherein the metadata parser is configured to parse the corresponding portion for the encoded audio objects to determine, for at least an audio object, the object manipulation possibility,

wherein the interaction interface is configured to generate, for the at least one encoded audio object, the interaction control data from the interaction input related to the at least one encoded audio object.

3. Audio data processor of claim 1 or 2, wherein the interaction interface is configured to present, to a user, the audio data manipulation possibility derived from the metadata by the metadata parser, and to receive, from the user, a user input on the specific data manipulation of the data manipulation possibility.

4. Audio data processor of one of the preceding claims,

wherein the interaction interface is configured to generate the interaction control data so that the interaction control data is represented by changed metadata values or by an amount of manipulation with respect to the metadata.

5. Audio data processor of one of the preceding claims,

wherein the data stream generator is configured to generate, in the output data stream, the interaction control data in the same format as the metadata.

6. Audio data processor of one of the preceding claims,

wherein the data stream generator is configured to associate, with the interaction control data, an identifier in the output data stream, the identifier being different from an identifier associated with the metadata.

7. Audio data processor of one of the preceding claims,

wherein the data stream generator is configured to add, to the interaction control data, signature data, the signature data indicating information on an application, a device or a user performing an audio data manipulation or providing the interaction input.

8. Audio data processor of one of the preceding claims,

wherein the metadata parser is configured to identify a disabling possibility for one or more audio objects represented by the encoded audio data,

wherein the interaction interface is configured for receiving a disabling information for the one or more audio objects, and

wherein the data stream generator is configured for marking the one or more audio objects as disabled in the interaction control data .

9. Audio data processor of one of the preceding claims, wherein the data stream generator is configured to dynamically generate the output data stream, wherein in response to a new interaction input, the interaction control data is updated to match the new interaction input, and wherein the data stream generator is configured to include the updated interaction control data in the output data stream.

10. Audio data processor of one of the preceding claims, wherein the receiver interface is configured to receive a main audio data stream comprising the encoded audio data and metadata related to the encoded audio data, and to additionally receive optional audio data comprising an optional audio object,

wherein the metadata related to said optional audio object is contained in said main audio data stream.

11. Audio data processor of one of the preceding claims,

wherein the metadata parser is configured to determine the audio manipulation possibility for an optional audio object not included in the encoded audio data,

wherein the interaction interface is configured to receive an interaction input for the optional audio object, and

wherein the receiver interface is configured to request audio data for the optional audio object from an audio data provider or to receive the audio data for the optional audio object from a different substream contained in a broadcast stream or an internet protocol connection.

12. Audio data processor of one of the preceding claims,

wherein the data stream generator is configured to assign, in the output data stream, a further packet type to the interaction control data, the further packet type being different from packet types for the encoded audio data and the metadata, or

wherein the data stream generator is configured to add, into the output data stream, fill data in a fill data packet type, wherein an amount of fill data is determined based on a data rate requirement determined by an output interface of the audio data processor.

13. Audio data processor of one of the preceding claims being implemented as a separate first device that is separated from a second device which is configured to receive the processed, but still encoded, audio data from the first device for decoding said audio data, wherein the receiver interface forms an input to the separate first device via a wired or wireless connection, wherein the audio data processor further comprises an output interface connected to the data stream generator, the output interface being configured for outputting the output data stream, wherein the output interface performs an output of the separate first device and comprises a wireless interface or a wire connector.

14. Method for processing audio data, the method comprising:

receiving encoded audio data and metadata related to the encoded audio data;

parsing the metadata to determine an audio data manipulation possibility;

receiving an interaction input and generating, from the interaction input, interaction control data related to the audio data manipulation possibility; and

obtaining the interaction control data and the encoded audio data and the metadata and generating an output data stream, the output data stream comprising the encoded audio data, at least a portion of the metadata, and the interaction control data),

processing an input data stream comprising the encoded audio data and the metadata without decoding the encoded audio data for generating the output data

stream, or copying the encoded audio data and at least a portion of the metadata without changes in the output data stream, and

embedding the interaction control data as an additional data portion in the output data stream.

15. Computer program for performing, when running on a computer or a processor, the method of processing audio data of claim 14.

CLAIMS

1. Audio data processor (1), comprising:

a receiver interface (2) for receiving encoded audio data (3) and metadata (4) related to the encoded audio data (3);

a metadata parser (5) for parsing the metadata (4) to determine an audio data manipulation possibility;

an interaction interface (6) for receiving an interaction input (7) and for generating, from the interaction input (7), interaction control data (8) related to the audio data manipulation possibility; and

a data stream generator (9) for obtaining the interaction control data (8) and the encoded audio data (3) and the metadata (4) and for generating an output data stream (10), the output data stream (10) comprising the encoded audio data (3), at least a portion of the metadata (4), and the interaction control data (8), wherein

the audio data processor (1) is configured to store the interaction control data (8) into the encoded audio data input stream (15) so that the output data stream (10) is again a valid encoded audio stream (10),

wherein the original metadata (4) and the encoded audio data (3) are not modified, and

wherein the original metadata (4) remains in the output data stream (10) to allow a second device (33) to get all information about the default values as intended by a content creator.

2. The audio data processor (1) of claim 1 which is configured to either write changed values or the amount of manipulation of the interaction control data (8), in particular offset values and multiplication factor, back to the meta-data part (4) or a dedicated part of the encoded audio data stream (3).

3. The audio data processor (1) according to claim 1 or 2, wherein the audio data processor (1) does not have a functionality to decode the encoded audio data (3).
4. The audio data processor (1) according to one of the preceding claims, wherein the audio data processor (1) is configured to process an MPEG-H 3D conformant data stream (3, 4, 8, 10).
5. Audio data processor of claim 4, wherein the encoded audio data (3) comprises separate encoded audio objects (11; 12), wherein at least a portion (13; 14) of the metadata (4) is related to a corresponding audio object (11; 12),

wherein the metadata parser (5) is configured to parse the corresponding portion (13; 14) for the encoded audio objects (11; 12) to determine, for at least an audio object (11), the object manipulation possibility,

wherein the interaction interface (6) is configured to generate, for the at least one encoded audio object (11), the interaction control data (8) from the interaction input (7) related to the at least one encoded audio object (11).

6. Audio data processor of one of the preceding claims, wherein the interaction interface (6) is configured to present, to a user, the audio data manipulation possibility derived from the metadata (4) by the metadata parser (5), and to receive, from the user, a user input (7) on the specific data manipulation of the data manipulation possibility.
7. Audio data processor of one of the preceding claims,

wherein the data stream generator (9) is configured to process a data stream (15) comprising the encoded audio data (3) and the metadata (4) received by the receiver interface (2) without decoding the encoded audio data (3),

or to copy the encoded audio data (3) and at least a portion of the metadata (4) without changes in the output data stream (10),

wherein the data stream generator (9) is configured to add an additional data portion containing the interaction control data (8) to the encoded audio data (3) and/or the metadata (4) in the output data stream (10).

8. Audio data processor of one of the preceding claims,

wherein the data stream generator (9) is configured to generate, in the output data stream (10), the interaction control data (8) in the same data format as the metadata (4).

9. Audio data processor of one of claims 4 to 8,

wherein the data stream generator (9) is configured to associate, with the interaction control data (8), an identifier in the output data stream (10), the identifier being different from an identifier associated with the metadata (4).

10. Audio data processor of one of claims 4 to 9,

wherein the data stream generator (9) is configured to add, to the interaction control data (8), signature data, the signature data indicating information on an application, a device or a user performing an audio data manipulation or providing the interaction input.

11. Audio data processor of one of claims 4 to 10,

wherein the metadata parser (5) is configured to identify a disabling possibility for one or more audio objects (11, 12) represented by the encoded audio data (3),

wherein the interaction interface (6) is configured for receiving a disabling information for the one or more audio objects (11, 12), and

wherein the data stream generator (9) is configured for marking the one or more audio objects (11, 12) as disabled in the interaction control data (8) or for removing the disabled one or more audio objects (11, 12) from the encoded audio data (3) so that the output data stream (10) does not include encoded audio data (3) for the disabled one or more audio objects (11, 12).

12. Audio data processor of one of claims 4 to 11, wherein the data stream generator (9) is configured to dynamically generate the output data stream (10), wherein in response to a new interaction input (7), the interaction control data (8) is updated to match the

new interaction input (7), and wherein the data stream generator (9) is configured to include the updated interaction control data (8) in the output data stream (10).

13. Audio data processor of one of claims 4 to 12, wherein the receiver interface (2) is configured to receive a main audio data stream (15) comprising the encoded audio data (3) and metadata (4) related to the encoded audio data (3), and to additionally receive optional audio data (16) comprising an optional audio object (17),

wherein the metadata (4) related to said optional audio object (17) is contained in said main audio data stream (15).

14. Audio data processor of one of the preceding claims,

wherein the metadata parser (5) is configured to determine the audio manipulation possibility for an optionally available additional audio object (17) not included in the encoded audio data (3),

wherein the interaction interface (6) is configured to receive an interaction input (7) for the optionally available additional audio object (17), and

wherein the receiver interface (2) is configured to request audio data (16) for the optionally available additional audio object (17) from an audio data provider (35) or to receive the audio data (16) for the optionally available additional audio object (17) from a different substream contained in a broadcast stream (36) or an internet protocol connection (37).

15. Audio data processor of one of claims 4 to 14,

wherein the data stream generator (9) is configured to assign, in the output data stream (10), a further packet type to the interaction control data (8), the further packet type being different from packet types for the encoded audio data (3) and the metadata (4), or

wherein the data stream generator (9) is configured to add, into the output data stream (10), fill data (18) in a fill data packet type, wherein an amount of fill data (18) is determined based on a data rate requirement determined by an output interface of the audio data processor.

16. Audio data processor of one of the preceding claims being implemented as a separate first device (19) that is separated from a second device (28) which is configured to receive the processed, but still encoded, audio data from the first device (19) for decoding said audio data, wherein the receiver interface (2) forms an input (20) to the separate device (19) via a wired (21) or wireless (22) connection, wherein the audio data processor (1) further comprises an output interface (23) connected to the data stream generator (9), the output interface (23) being configured for outputting the output data stream (10), wherein the output interface (23) performs an output of the device (19) and comprises a wireless interface (24) or a wire connector (25).

17. An audio processing system comprising a first device (19) and a second device (33), wherein the first device (19) comprises an audio data processor (1) according to one of the preceding claims,

wherein the first device (19) is configured to read the metadata (4) from the incoming audio data stream (15), to parse the metadata (4) and to present information about the encoded audio data (3) in the interaction interface (6) from which the user can select and manipulate the audio data (3) to adapt the audio presentation to his personal preferences, wherein a user control data (8) describes the audio data selection and manipulation,

further wherein the first device (19) is configured to write this user control data (8) to the audio data stream (15) using a specific data type such that the output of the first device (19) is again a valid encoded audio stream (10),

wherein the presence of said specific data type enables the second device (33) to identify that a user input has happened,

wherein the original metadata (4) and the encoded audio data (3) are not modified, and

wherein the original metadata (4) remains in the output data stream (10) to allow the second device (33) to get all information about the default values as intended by a content creator.

18. Method for processing audio data, the method comprising:

receiving encoded audio data (3) and metadata (4) related to the encoded audio data (3);

parsing the metadata (4) to determine an audio data manipulation possibility;

receiving an interaction input (7) and generating, from the interaction input (7), interaction control data (8) related to the audio data manipulation possibility; and

obtaining the interaction control data (8) and the encoded audio data (3) and the metadata (4) and generating an output data stream (10), the output data stream (10) comprising the encoded audio data (3), at least a portion of the metadata (4), and the interaction control data (8), wherein the interaction control data (8) is stored into the encoded output data stream (10, 32) so that the output data stream (10) is again a valid encoded audio stream (10, 32), wherein the original metadata (4) and the encoded audio data (3) are not modified, and wherein the original metadata (4) remains in the output data stream (10) to allow a second device (33) to get all information about the default values as intended by a content creator.

19. Computer program for performing, when running on a computer or a processor, the method of processing audio data of claim 18.