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**(54) HEARING DEVICE WITH DYNAMIC MIRROR SERVICE AND RELATED METHOD**

HÖRGERÄT MIT DYNAMISCHEM SPIEGELDIENTST UND ZUGEHÖRIGES VERFAHREN

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**WO-A1-2009/153718 WO-A2-2007/039320**  
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## Description

**[0001]** The present disclosure relates to a hearing device configured for wireless communication with another hearing device. In particular, the hearing device is configured to perform mirror service between the hearing device and another hearing device. The hearing device comprises a processing unit; a wireless transceiver connected to the processing unit; and a receiver connected to the processing unit for converting an output signal into an audio output signal.

## BACKGROUND

**[0002]** Wireless communication between binaural hearing devices has increased with the developments within wireless technologies and user demands for increasingly advanced hearing devices. A hearing device has limited power resources given the demand for small hearing aids and the limited battery capacity of a hearing device battery.

**[0003]** WO 2009/153718 A1 discloses an earphone arrangement comprising a first and second earphone arranged to operate in a binaural arrangement. The first earphone comprises determining means for determining an audio environment characteristic in response to a signal from at least one microphone of the first earphone and control means for controlling a data rate of an audio data exchange between the first and second earphone in response to the audio environment characteristic. The audio data exchange supports a binaural processing of the earphone arrangement.

**[0004]** Wireless communication requires a lot of power compared to the capacity of a hearing device battery.

## SUMMARY

**[0005]** Accordingly, there is a need for power efficient transmission schemes in hearing devices. In particular, there is a need for reliable and power efficient communication between wirelessly connected binaural hearing devices.

**[0006]** Disclosed is a hearing device according to claim 1.

**[0007]** Also disclosed is a method of performing mirror service between a first hearing device and a second hearing device according to claim 11.

**[0008]** Further, a binaural hearing device system is disclosed. The binaural hearing device system comprises a first and a second hearing device, wherein the first and/or second hearing device is a hearing device presented in the present disclosure. Further embodiments are defined in the dependent claims.

**[0009]** A hearing device with one or more adaptive mirror service properties as disclosed herein enables power efficient communication between hearing devices and optimized or at least improved use of the limited power in the hearing device. At the same time, a sufficient sig-

nalling quality may be maintained, e.g. in order not to lose mirror service connection between two hearing devices. Thus, the hearing device as disclosed provides reduced risk of losing connectivity between two hearing devices in a binaural hearing device system.

## BRIEF DESCRIPTION OF THE DRAWINGS

**[0010]** The above and other features and advantages will become readily apparent to those skilled in the art by the following detailed description of exemplary embodiments thereof with reference to the attached drawings, in which:

- Fig. 1 schematically illustrates an exemplary hearing device
- Fig. 2 schematically illustrates an exemplary mirror service between a hearing device and another hearing device,
- Fig. 3 schematically illustrates exemplary mirror service packets,
- Fig. 4 schematically illustrates an exemplary flow chart of a method of performing mirror service between two hearing devices.

## DETAILED DESCRIPTION

**[0011]** Various embodiments are described hereinafter with reference to the figures. Like reference numerals refer to like elements throughout. Like elements will, thus, not be described in detail with respect to the description of each figure. It should also be noted that the figures are only intended to facilitate the description of the embodiments. They are not intended as an exhaustive description of the claimed invention or as a limitation on the scope of the claimed invention. In addition, an illustrated embodiment needs not have all the aspects or advantages shown. An aspect or an advantage described in conjunction with a particular embodiment is not necessarily limited to that embodiment and can be practiced in any other embodiments even if not so illustrated, or if not so explicitly described.

**[0012]** Throughout, the same reference numerals are used for identical or corresponding parts.

**[0013]** The hearing device is configured to perform mirror service between the hearing device and another hearing device. A mirror service is a transmission or communication channel in the wireless transmission between a first hearing device and a second hearing device of a binaural hearing system. The mirror service comprises transmitting mirror service packets with a packet format at a packet transmission rate between two hearing devices. A mirror service packet may comprise one or more hearing device operating parameters, e.g. including a first hearing device operating parameter and/or a second hearing device operating parameter of the hearing device transmitting the mirror service packet. By means of the mirror service functionality, the first hearing device is in-

formed about operating parameter(s) of the second hearing device and vice versa. Thereby, each of the two hearing devices are updated on and can adapt to the operating parameter(s) of the other hearing device. The mirror service may comprise ear-to-ear data service.

**[0014]** The hearing device may be a hearing aid, e.g. the processing unit may be configured for hearing loss compensation of a user's hearing loss.

**[0015]** The processing unit may be configured to determine if a change criterion is fulfilled. The change criterion may comprise one or more subcriteria, such as a first subcriterion and/or a second sub-criterion. The change criterion may be fulfilled if one or more subcriteria are fulfilled. For example, fulfillment of a first sub-criterion may be indicative of a possible reduction in the packet transmission rate. For example, fulfillment of a second sub-criterion may be indicative of a desired increase in the packet transmission rate, e.g. due to reduced signal quality. The processing unit may be configured to apply different sub-criteria of the change criterion depending on current mode of the hearing device and/or depending on current mirror service properties.

**[0016]** When the change criterion is fulfilled, one or more mirror service properties are changed. One or more mirror service properties may change when there are changes in one or more operating parameters, i.e. the change criterion may be fulfilled if a change in one or more of the operating parameters is determined/detected. The change criterion or a sub-criterion thereof may be based on the environment and/or settings of the hearing device and/or mode of the hearing device. The change criterion may be fulfilled when the hearing device operating parameters, e.g. data, between the two hearing devices changes from being stable, or there is no or only little change in the data, or the data is the same to that the data is not stable, or there are changes in the data. The change criterion may be fulfilled if the interface has been activated and/or if a mode shift has occurred.

**[0017]** By optimizing the mirror service and mirror service property or properties for communication between the hearing devices, power can be saved. Reducing the frequency with which mirror service is performed may save a lot of power or energy of the hearing device battery. Reducing the data size of the mirror service performed between the hearing device may also save some power or energy of the battery. At the same time an increase in packet transmission rate may ensure that the mirror service connection is not lost, which would require undesired reestablishment of the mirror service.

**[0018]** The hearing device and the other hearing device may have been paired, e.g. by pairing the identification or ID of the hearing device with the identification or ID of the other hearing device, before audio streaming is performed, and/or before transmission of data between the hearing devices is performed, and/or before the mirror service between the two hearing devices is performed.

**[0019]** The processing unit may be configured to

change one or more mirror service properties by changing the packet transmission rate from a first packet transmission rate to a second packet transmission rate. The packet transmission rate may be denoted a first mirror service property.

**[0020]** The first packet transmission rate may be larger than the second packet transmission rate, e.g. corresponding to the first mode (with first packet transmission rate) being an active or normal mode of the mirror service, and the second mode (with second packet transmission rate) being an idle mode, or inactive mode or sleep mode of the mirror service. The processing unit may be configured to change the packet transmission rate from a first packet transmission rate to a second packet transmission rate and/or vice versa when a default time period has passed without fulfillment of the change criterion, e.g. without any changes in one or more hearing device operating parameters. Alternatively or in combination, a subcriterion of the change criterion may comprise determining if a default time has passed without changes in one or more hearing device operating parameters. Thereby automatic switching to inactive mode is provided for.

**[0021]** The first packet transmission rate may for example be in the range from 5 packets/s to 20 packets/s, such as between 10 packets/s and 15 packets/s. Exemplary first packet transmission rates may be about 12.5 packets/s (corresponding to a time period of 80 ms between consecutive mirror service packets) or about 13.5 packets/s (corresponding to a time period of 74 ms between consecutive mirror service packets). The first packet transmission rate may correspond to a first mode, such as a normal mode or active mode of the mirror service transmission.

**[0022]** The second packet transmission rate may for example be in the range from 0.1 packets/s to 4 packets/s, such as between 0.3 packets/s and 2 packets/s. Exemplary second packet transmission rates may be about 0.5 packets/s (corresponding to a time period of 2 s between consecutive mirror service packets) or about 1 packets/s (corresponding to a time period of 1 s between consecutive mirror service packets). The second packet transmission rate may correspond to a second mode, such as an idle mode, or inactive mode or sleep mode of the mirror service. The second packet transmission rate may be used when there is no or only rare changes in the packet format or content of the transmitted packets, such that the mirror service transmission sends data less often, when the data does not change much.

**[0023]** The second packet transmission rate may be larger than the first packet transmission rate. This may correspond to changing the mode of the mirror service from a first mode being inactive/ idle/sleep mode to a second mode being active/normal mode. In such case or in general, the first packet transmission rate may for example be in the range from 0.1 packets/s to 4 packets/s, such as between 0.3 packets/s and 2 packets/s. Exemplary first packet transmission rates may be about

0.5 packets/s (corresponding to a time period of 2 s between consecutive mirror service packets) or about 1 packets/s (corresponding to a time period of 1 s between consecutive mirror service packets). The first packet transmission rate may correspond to a first mode, such as an idle mode, or inactive mode or sleep mode of the mirror service. The first packet transmission rate may be used when there is no or only rare changes in the packet format or content of the transmitted packets, such that the mirror service transmission sends data less often, when the data does not change much. In such case or in general, the second packet transmission rate may for example be in the range from 5 packets/s to 20 packets/s, such as between 10 packets/s and 15 packets/s. Exemplary second packet transmission rates may be about 12.5 packets/s (corresponding to a time period of 80 ms between consecutive mirror service packets) or about 13.5 packets/s (corresponding to a time period of 74 ms between consecutive mirror service packets). The second packet transmission rate may correspond to a second mode, such as a normal mode or active mode of the mirror service transmission.

**[0024]** The first hearing device operating parameter may be indicative of one or more of user interface activation, mode shift, and/or processing parameter(s) of the hearing device. The first hearing device operating parameter may be indicative of hearing device identifier or other identifier that enables the other hearing device to maintain a mirror service connection. The second and/or a third hearing device operating parameter may be indicative of one or more of user interface activation, mode shift, and/or processing parameter(s) of the hearing device. User interface activation may comprise the user pushing a button on the hearing device, the user changing the volume control on the hearing device, the user actively or physically changing the mode of the hearing device, or the user changing anything on the hearing device which is user controlled. Mode shift of the hearing device may include that the hearing device automatically changes the hearing device mode, for example when the user moves from a noisy environment to a quiet environment. Hearing device mode shift may include that the user changes the mode, for example when the user moves from one type of environment to another type of environment. Processing parameters may comprise algorithmic parameters, automatic mode shift etc.

**[0025]** The processing parameter(s) of the hearing device may comprise one or more of environment identifier; noise reduction parameter; compressor parameter; signal generator control; and/or auto phone detector. The environment identifier may be output from an environment classifier of the hearing device. The noise reduction parameter may comprise fine tuning, filter coefficients etc. The compressor parameter may be indicative of a gain, such as a gain selected for the specific hearing compensation of the user of the hearing device. The signal generator control may comprise tinnitus sound generation (TSG) for tinnitus relief. The signal generator may

comprise noise and/or feedback cancellation, occlusion cancellation etc.

**[0026]** The one or more hearing device operating parameters may comprise a mirror service identifier or indicator, e.g. as a part of the mirror service packets and/or in audio packet(s) of an audio stream received with the transceiver. A mirror service identifier may indicate current and/or future mirror service property or properties. The audio stream may be an ear-to-ear (E2E) audio stream, thus a mirror service indicator or flag may be present in the ear-to-ear audio stream in addition to the audio data. The mirror service indicator or flag may be a 1 bit data. Thus, the mirror service may utilize this channel to indicate which mirror mode the respective hearing device should use.

**[0027]** The audio stream may be a transmission between the two hearing devices, e.g. via an accessory device such as a smart phone, a mobile phone, a computer, a tablet etc. The audio stream may be transmitted wirelessly by 2.4 gigahertz Bluetooth connectivity between the two hearing devices, i.e. the binaural hearing devices, or between one or both hearing devices and an accessory device, such as a smart phone. The hearing devices may stream directly via the Bluetooth connectivity, or through a secondary streaming device, such as a neck- or pocket-worn streaming device, whereby this Bluetooth enabled secondary streaming device then streams wirelessly to the hearing device, and this may then be limited to work only over a short distance.

**[0028]** The processing unit may be configured to change the mirror service property by changing the packet format from a first packet format to a second packet format, e.g. different from the first packet format. The packet format may be determined or defined by its size and/or configuration. The packet format may be denoted a first mirror service property or a second mirror service property. The packet format may comprise a size and/or content of packet. A packet may comprise one or more fields or segments including a first field and/or a second field. The packet format may comprise a size identifier and/or a packet format identifier. For example a first field in the packet may comprise a header, where the header may comprise an identifier, e.g. an identifier of the hearing device and/or of the other hearing device. The header may comprise a time stamp and/or packet size. A second field of the packet may comprise a packet format identifier, e.g. indicative of the packet type and/or content of the packet, and/or a size identifier. A third field of the packet may comprise a time stamp and/or data of one or more hearing device operating parameters. Dynamically changing the packet format facilitates tailoring or selection of packets, such that redundant information is not sent between the hearing devices in turn reducing the amount of transmitted data thereby optimizing power consumption.

**[0029]** The first hearing device operating parameter may be a processing parameter of the hearing device, such as a compressor gain, and to determine if the

change criterion is fulfilled may comprise determining whether a change in the processing parameter of the hearing device is larger than a change threshold. Thus the change criterion or a subcriterion thereof may be fulfilled if one or more processing parameters changes significantly.

**[0030]** The first hearing device operating parameter may be a parameter indicative of user interface activation, such as push button activation, and to determine if the change criterion is fulfilled may comprise determining whether the user interface has been activated, i.e. the change criterion is fulfilled if the user interface has been activated.

**[0031]** A second hearing device operating parameter may be a parameter indicative of mode shift in the hearing device, and to determine if the change criterion is fulfilled may comprise determining whether a mode shift has occurred in the hearing device, i.e. the change criterion is fulfilled if a mode shift has occurred.

**[0032]** Fig. 1 schematically illustrates an exemplary hearing device 2 with dynamic mirror service as disclosed herein. The hearing device 2 comprises a processing unit 4, a wireless transceiver 6 connected to the processing unit 4, and a receiver 8 connected to the processing unit 4 for converting an output signal into an audio output signal. The wireless transceiver 6 may be part of a user interface, and optionally the hearing device comprises a push button or volume control 9 allowing a user to control operation of the hearing device 2. The hearing device 2 is configured to perform mirror service 10 between the hearing device 2 and another hearing device 14 according to mirror service properties. The hearing device 2 optionally comprises a signal generator 11 and/or an environment classifier 12. The signal generator 11 and/or the environment classifier 12 may form a part of the processing unit 4. The hearing device 2 and the other hearing device 14 may be a first and a second hearing device, respectively, in a binaural hearing device system. The mirror service 10 comprises transmitting mirror service packets with respective packet format at a packet transmission rate. The processing unit 4 is configured to obtain at least the first hearing device operating parameter, e.g. indicative of one or more of user interface activation, mode shift, environment conditions, and/or processing parameter(s) of the hearing device. Based on the first hearing device operating parameter and/or further hearing device operating parameters such as a second hearing device operating parameter, the processing unit 4 is configured to determine if a change criterion is fulfilled. If the change criterion is fulfilled, the processing unit is configured to change the mirror service properties by changing the packet format from a first packet format to a second packet format, and/or changing the packet transmission rate from a first packet transmission rate, e.g. in the range from 0.4 packets/s to 1.1 packets/s, to a second packet transmission rate, e.g. of 12.5 packets/s or about 13.5 packets/s.

**[0033]** Fig. 2 schematically illustrates an exemplary

mirror service 10 between a hearing device 2 and another hearing device 14. The hearing device 2 transmits (ref 16) mirror service packets 18 at a first packet transmission rate to the other (second) hearing device 14 in a first mode of the mirror service. Then, the processing unit determines that the change criterion is fulfilled, e.g. by a user activating the user interface 9 in the hearing device 2, hearing device operating mode is changed (automatically or invoked by a user), and/or the environment changes (thereby changing the transmission conditions). The processing unit 4 changes the mirror service properties by changing the packet transmission rate from the first packet transmission rate to a second packet transmission rate different from the first packet transmission rate, e.g. larger than the first packet transmission rate if the mirror service must go from sleep mode to active mode and/or if the transmission conditions have worsened. The processing unit 4 changes from the first packet transmission rate to a second packet transmission rate less than the first packet transmission rate, e.g. if evaluation of the change criterion indicates that the mirror service can go from active mode to sleep mode and/or if the transmission conditions have improved. According to the invention, the hearing device 2 and the other hearing device 14 exchange audio streams 20 via a separate audio channel.

**[0034]** Fig. 3 schematically illustrates an exemplary mirror service packet 18 with a first packet format and an exemplary mirror service packet 18' with a second mirror service packet format. The mirror service packet 18 has a first field 22 being a header field comprising hearing device identifier indicative of the hearing device transmitting the packet 18. A second field 24 of the packet 18 comprises a packet format identifier indicative of the packet type and content of the packet. Further, a third field 26 of the packet 18 comprises data of one or more hearing device operating parameters to be mirrored to the other hearing device 14. For example, a mirror service may be configured to use a plurality of different and predefined packet types. For example, the first packet format as illustrated in Fig. 3 may be used for mirroring changes in operating mode of the hearing device 2. Thus, the packet format identifier in the second field 24 is set to a value (e.g. 1) indicative of mirroring of mode shift, and the third field 26 indicates the actual operating mode of the hearing device, e.g. first mode (third field =1), second mode (third field =2), etc.. The mirror service packet 18' has a second packet format different from the first packet format in size and/or field configuration. The mirror service packet 18' has a first field 22 being a header field comprising hearing device identifier indicative of the hearing device transmitting the packet 18', a second field 24, a third field 26 and a fourth field 28. The second field 24 of the packet 18' comprises a packet format identifier indicative of the packet type and content of the packet. Further, a third field 26 and fourth field 28 of the packet 18' comprises data of one or more hearing device operating parameters to be mirrored to the other hearing de-

vice 14. For example, the second packet format as illustrated in Fig. 3 may be used for mirroring changes in volume of the hearing device 2. Thus, the packet format identifier in the second field 24 of mirror service packet 18' may be set to a value (e.g. 2) indicative of user interface activation, and the third field 26 indicates that the user has adjusted volume. Further, the fourth field 28 contains data on a hearing device operating parameter, namely the actual volume gain applied in the hearing device as a result of the user interface activation.

**[0035]** Fig. 4 schematically illustrates an exemplary flow chart of a method of performing mirror service between a first hearing device and a second hearing device. The method 400 comprises transmitting 401 mirror service packets according to mirror service properties (first mirror service properties) with a packet format at a packet transmission rate. The mirror service packet comprises one or more hearing device operating parameters including a first hearing device operating parameter. The method 400 may be performed with a hearing device as disclosed herein and comprises obtaining 402 the first hearing device operating parameter, e.g. with the processing unit 4. The method 400 then proceeds to determining 403 if a change criterion is fulfilled. The change criterion is based at least on the first hearing device operating parameter. If the change criterion is fulfilled, the method proceeds to changing 404 the mirror service properties, such as the packet transmission rate and/or the packet format, and subsequently transmitting 405 mirror service packets according to the changed mirror service properties (second mirror service properties). If the change criterion is not fulfilled in step 403, mirror service packets are transmitted according to the unchanged mirror service properties of step 401.

**[0036]** Although particular features have been shown and described, it will be understood that they are not intended to limit the claimed invention, and it will be made obvious to those skilled in the art that various changes and modifications may be made without departing from the scope of the claimed invention. The specification and drawings are, accordingly to be regarded in an illustrative rather than restrictive sense. The invention is defined by the following claims.

LIST OF REFERENCES

**[0037]**

- 2 hearing device
- 4 processing unit
- 6 wireless transceiver
- 8 receiver
- 9 push button/volume control
- 10 mirror service
- 14 another hearing device
- 16 transmission of mirror service packets
- 18 mirror service packet with first packet format
- 18' mirror service packet with second packet format

- 20 audio stream
- 22 first field
- 24 second field
- 26 third field
- 5 28 fourth field
- 400 method of performing mirror service
- 401 transmitting mirror service packets
- 402 obtaining the first hearing device operating parameter
- 10 403 determining if a change criterion is fulfilled
- 404 changing the mirror service properties
- 405 transmitting mirror service packets

15 **Claims**

1. A hearing device (2) comprising:
  - a processing unit (4);
  - a wireless transceiver (6) connected to the processing unit (4); and
  - a receiver (8) connected to the processing unit (4) for converting an output signal into an audio output signal;

20 wherein the hearing device (2) is configured to exchange audio streams (20) having audio packets with another hearing device (14); wherein the hearing device (2) is further configured to perform mirror service (10), being a transmission or communication channel, between the hearing device (2) and the another hearing device (14) according to one or more mirror service properties, wherein the mirror service (10) comprises transmitting mirror service packets (18, 18') with a packet format at a packet transmission rate; at least one of the mirror service packets comprising one or more hearing device operating parameters including a first hearing device operating parameter, wherein the processing unit (4) is configured to:

  - obtain the first hearing device operating parameter;
  - determine if a change criterion is fulfilled, wherein the change criterion is based on the first hearing device operating parameter; and
  - change a mirror service property, if the change criterion is fulfilled;

25 wherein the exchange of the audio streams (20) is performed via a separate channel.
2. Hearing device (2) according to claim 1, wherein the mirror service property comprises a packet transmission rate and/or packet format.
3. Hearing device (2) according to claim 2, wherein the

processing unit (4) is configured to change the mirror service property by changing the packet transmission rate from a first packet transmission rate to a second packet transmission rate.

4. Hearing device (2) according to claim 3, wherein the first packet transmission rate is larger than the second packet transmission rate.

5. Hearing device (2) according to claim 3, wherein the second packet transmission rate is larger than the first packet transmission rate.

6. Hearing device (2) according to any of the preceding claims, wherein the first hearing device operating parameter is indicative of one or more of a user interface activation, a mode shift, and/or processing parameter(s) of the hearing device.

7. Hearing device (2) according to claim 6, wherein the processing parameter(s) of the hearing device (2) comprises one or more of:

- environment identifier;
- noise reduction parameter;
- compressor parameter;
- signal generator control; and
- auto phone detector.

8. Hearing device (2) according to any of the preceding claims, wherein the one or more hearing device operating parameters comprises a mirror service identifier.

9. Hearing device (2) according to any of the preceding claims as dependent on claim 2, wherein the processing unit (4) is configured to change the mirror service property by changing the packet format from a first packet format to a second packet format.

10. Hearing device (2) according to any of the preceding claims, wherein the first hearing device operating parameter comprises a processing parameter of the hearing device (2); and wherein processing unit (4) is configured to determine if the change criterion is fulfilled (403) by determining whether a change in the processing parameter of the hearing device (2) is larger than a change threshold.

11. A method of performing mirror service (400), being a transmission or communication channel, between a first hearing device and a second hearing device, the method (400) comprising:

- exchanging audio streams (20) having audio packets;
- characterized in that** the method (400) further comprises:

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- transmitting (401) mirror service packets according to one or more mirror service properties with a packet format at a packet transmission rate, at least one of the mirror service packets comprising one or more hearing device operating parameters including a first hearing device operating parameter;

- obtaining (402) the first hearing device operating parameter;

- determining (403) if a change criterion is fulfilled, wherein the change criterion is based on the first hearing device operating parameter;

- changing (404) a mirror service property, if the change criterion is fulfilled; and

- transmitting (405) mirror service packets according to the changed mirror service property, wherein the exchange of the audio streams (20) is performed via a separate channel.

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12. Method (400) according to claim 11, wherein the act of changing (404) the mirror service properties comprises changing a packet transmission rate and/or packet format.

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13. A binaural hearing device system comprising a first and a second hearing device, wherein the first and/or second hearing device is a hearing device (2) according to any of claims 1-10.

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## Patentansprüche

1. Hörgerät (2) umfassend:

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- eine Verarbeitungseinheit (4);
- einen mit der Verarbeitungseinheit (4) verbundenen, drahtlosen Transceiver (6); und
- einen Empfänger (8), der mit der Verarbeitungseinheit (4) zum Umwandeln eines Ausgangssignals in ein Audioausgangssignal verbunden ist;

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wobei das Hörgerät (2) dafür eingerichtet ist, Audioströme (20) auszuwechseln, die Audiopakete mit einem anderen Hörgerät (14) aufweisen; wobei

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das Hörgerät (2) weiter dafür ausgelegt ist, Spiegeldienst (10), der ein Übertragungs- oder Kommunikationskanal ist, zwischen dem Hörgerät (2) und dem anderen Hörgerät (14) nach einer oder mehreren Spiegeldiensteigenschaften auszuführen, wobei der Spiegeldienst (10) Übertragen von Spiegeldienstpaketen (18, 18') mit einem Paketformat bei einer Paketübertragungsrate umfasst; wobei mindestens eines der Spiegeldienstpakete einen oder mehrere Hörgerätbetriebsparameter umfassend einen ersten Hörgerätbetriebsparameter umfasst, wobei die Verarbeitungseinheit (4) dafür ausgelegt ist:

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- Erhalten des ersten Hörgerätsbetriebsparameters;
  - Bestimmen, ob ein Änderungskriterium erfüllt ist, wobei das Änderungskriterium auf dem ersten Hörgerätsbetriebsparameter basiert; und
  - Ändern einer Spiegeldiensteigenschaft, wenn das Änderungskriterium erfüllt ist;
- wobei die Auswechslung von den Audioströmen (20) über einen getrennten Kanal ausgeführt wird.
2. Hörgerät (2) nach Anspruch 1, wobei die Spiegeldiensteigenschaft eine Paketübertragungsrate und/oder ein Paketformat umfasst.
3. Hörgerät (2) nach Anspruch 2, wobei die Verarbeitungseinheit (4) dafür ausgelegt ist, die Spiegeldiensteigenschaft durch Ändern der Paketübertragungsrate von einer ersten Paketübertragungsrate zu einer zweiten Paketübertragungsrate zu Ändern.
4. Hörgerät (2) nach Anspruch 3, wobei die erste Paketübertragungsrate größer als die zweite Paketübertragungsrate ist.
5. Hörgerät (2) nach Anspruch 3, wobei die zweite Paketübertragungsrate größer als die erste Paketübertragungsrate ist.
6. Hörgerät (2) nach einem der vorgehenden Ansprüche, wobei der erste Hörgerätsbetriebsparameter eine oder mehrere aus einer Benutzerschnittstellenaktivierung, einer Modusänderung und/oder einem Verarbeitungsparameter(n) des Hörgeräts anzeigt.
7. Hörgerät (2) nach Anspruch 6, wobei der bzw. die Verarbeitungsparameter des Hörgeräts (2) einen oder mehrere von den Folgenden umfasst:
- Umgebungsidentifikator;
  - Geräuschverminderungsparameter;
  - Verdichterparameter;
  - Signalgeneratorsteuereinrichtung; und
  - Autotelefondetektor.
8. Hörgerät (2) nach einem der vorgehenden Ansprüche, wobei der eine oder mehrere Hörgerätsbetriebsparameter einen Spiegeldienstidentifikator umfasst bzw. umfassen.
9. Hörgerät (2) nach einem der vorgehenden Ansprüche abhängig von Anspruch 2, wobei die Verarbeitungseinheit (4) dafür ausgelegt ist, die Spiegeldiensteigenschaft durch Ändern des Paketformats von einem ersten Paketformat zu einem zweiten Paketformat zu ändern.
10. Hörgerät (2) nach einem der vorgehenden Ansprüche, wobei der erste Hörgerätsbetriebsparameter einen Verarbeitungsparameter des Hörgeräts (2) umfasst; und wobei die Verarbeitungseinheit (4) dafür ausgelegt ist, zu bestimmen, ob das Änderungskriterium erfüllt ist (403) durch das Bestimmen, ob eine Änderung des Verarbeitungsparameters des Hörgeräts (2) größer als ein Schwellenwert ist.
11. Verfahren zum Ausführen von Spiegeldienst (400), der ein Übertragungs- oder Kommunikationskanal ist, zwischen einem ersten Hörgerät und einem zweiten Hörgerät, welches Verfahren (400) Folgendes umfasst:
- Auswechseln von Audioströmen (20) mit Audiopaketten;
  - dadurch gekennzeichnet, dass** das Verfahren (400) weiter Folgendes umfasst:
  - Übertragen (401) von Spiegeldienstpaketen nach einem oder mehreren Spiegeldiensteigenschaften mit einem Paketformat bei einer Paketübertragungsrate, wobei mindestens eines der Spiegeldienstpakete einen oder mehrere Hörgerätsbetriebsparameter umfassend einen ersten Hörgerätsbetriebsparameter umfasst;
  - Erhalten (402) des ersten Hörgerätsbetriebsparameters;
  - Bestimmen (403), ob ein Änderungskriterium erfüllt ist, wobei das Änderungskriterium auf dem ersten Hörgerätsbetriebsparameter basiert;
  - Ändern (404) einer Spiegeldiensteigenschaft, wenn das Änderungskriterium erfüllt ist; und
  - Übertragen (405) von Spiegeldienstpaketen gemäß der geänderten Spiegeldiensteigenschaft,
- wobei die Auswechslung von den Audioströmen (20) über einen getrennten Kanal ausgeführt wird.
12. Verfahren (400) nach Anspruch 11, wobei der Vorgang zum Ändern (404) der Spiegeldiensteigenschaften Ändern einer Paketübertragungsrate und/oder eines Paketformats umfasst.
13. Binaurales Hörgerätesystem umfassend ein erstes und ein zweites Hörgerät, wobei das erste und/oder zweite Hörgerät ein Hörgerät (2) nach einem der Ansprüche 1-10 ist.

## Revendications

### 1. Dispositif auditif (2) comprenant :

- une unité de traitement (4) ;
- un émetteur-récepteur sans fil (6) connecté à l'unité de traitement (4) ; et

- un récepteur (8) connecté à l'unité de traitement (4) pour la conversion d'un signal de sortie en un signal audio de sortie ; dans lequel le dispositif auditif (2) est configuré pour échanger des flux audio (20) ayant des paquets audio avec un autre dispositif auditif (14) ; dans lequel le dispositif auditif (2) est en outre configuré pour effectuer un service miroir (10), étant un canal de transmission ou de communication, entre le dispositif auditif (2) et l'autre dispositif auditif (14) selon une ou plusieurs propriétés de service miroir, le service miroir (10) comprenant la transmission de paquets de service miroir (18, 18') avec un format de paquet à un débit de transmission de paquets ; au moins un des paquets de service miroir comprenant un ou plusieurs paramètres de fonctionnement de dispositif auditif comprenant un premier paramètre de fonctionnement de dispositif auditif, l'unité de traitement (4) étant configurée pour :
- obtenir le premier paramètre de fonctionnement de dispositif auditif ;
  - déterminer si un critère de modification est rempli, le critère de modification étant basé sur le premier paramètre de fonctionnement de dispositif auditif ; et
  - modifier une propriété de service miroir, si le critère de modification est rempli ; dans lequel l'échange des flux audio (20) est effectué via un canal séparé.
2. Dispositif auditif (2) selon la revendication 1, dans lequel la propriété de service miroir comprend un débit de transmission de paquets et / ou un format de paquet.
  3. Dispositif auditif (2) selon la revendication 2, dans lequel l'unité de traitement (4) est configurée pour modifier la propriété de service miroir en modifiant le débit de transmission de paquets d'un premier débit de transmission de paquets à un deuxième débit de transmission de paquets.
  4. Dispositif auditif (2) selon la revendication 3, dans lequel le premier débit de transmission de paquets est supérieur au deuxième débit de transmission de paquets.
  5. Dispositif auditif (2) selon la revendication 3, dans lequel le deuxième débit de transmission de paquets est supérieur au premier débit de transmission de paquets.
  6. Dispositif auditif (2) selon l'une quelconque des revendications précédentes, dans lequel le premier paramètre de fonctionnement de dispositif auditif indique un ou plusieurs paramètres d'activation d'interface utilisateur, de changement de mode et / ou de traitement du dispositif auditif.
  7. Dispositif auditif (2) selon la revendication 6, dans lequel le (s) paramètre (s) de traitement du dispositif auditif (2) comprend un ou plusieurs des éléments suivants :
    - identificateur d'environnement ;
    - paramètre de réduction du bruit ;
    - paramètre du compresseur ;
    - commande du générateur de signal ; et
    - détecteur de téléphone automatique.
  8. Dispositif auditif (2) selon l'une quelconque des revendications précédentes, dans lequel l'un ou les paramètres de fonctionnement de dispositif auditif comprennent un identifiant de service miroir.
  9. Dispositif auditif (2) selon l'une quelconque des revendications précédentes dépendant de la revendication 2, dans lequel l'unité de traitement (4) est configurée pour modifier la propriété de service miroir en modifiant le format de paquet d'un premier format de paquet à un deuxième format de paquet.
  10. Dispositif auditif (2) selon l'une quelconque des revendications précédentes, dans lequel le premier paramètre de fonctionnement de dispositif auditif comprend un paramètre de traitement du dispositif auditif (2) ; et dans lequel l'unité de traitement (4) est configurée pour déterminer si le critère de modification est rempli (403) en déterminant si une modification dans le paramètre de traitement du dispositif auditif (2) est supérieure à un seuil de modification.
  11. Procédé d'exécution d'un service de miroir (400), étant un canal de transmission ou de communication, entre un premier dispositif auditif et un deuxième dispositif auditif, le procédé (400) comprenant :
    - l'échange de flux audio (20) ayant des paquets audio ;
    - caractérisé en ce que** le procédé (400) comprend en outre les étapes consistant à :
      - transmettre (401) des paquets de service miroir selon une ou plusieurs propriétés de service miroir avec un format de paquet à un débit de transmission de paquets, au moins un des miroirs des paquets de services comprenant un ou plusieurs paramètres de fonctionnement de dispositif auditif comprenant un premier paramètre de fonctionnement de dispositif auditif ;
      - obtenir (402) le premier paramètre de fonctionnement de dispositif auditif ;
      - déterminer (403) si un critère de modification est rempli, le critère de modification étant basé

sur le premier paramètre de fonctionnement de dispositif auditif ;

- modifier (404) une propriété de service miroir, si le critère de modification est rempli ;

- transmettre (405) des paquets de service miroir selon la propriété de service miroir modifiée,

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dans lequel l'échange des flux audio (20) est effectué via un canal séparé.

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**12.** Procédé (400) selon la revendication 11, dans lequel le fait de modifier (404) les propriétés de service miroir comprend la modification d'un débit de transmission de paquets.

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**13.** Système de dispositif auditif binaural comprenant un premier et un deuxième dispositif auditif, le premier et/ou le deuxième dispositif auditif étant un dispositif auditif (2) selon l'une quelconque des revendications 1 à 10.

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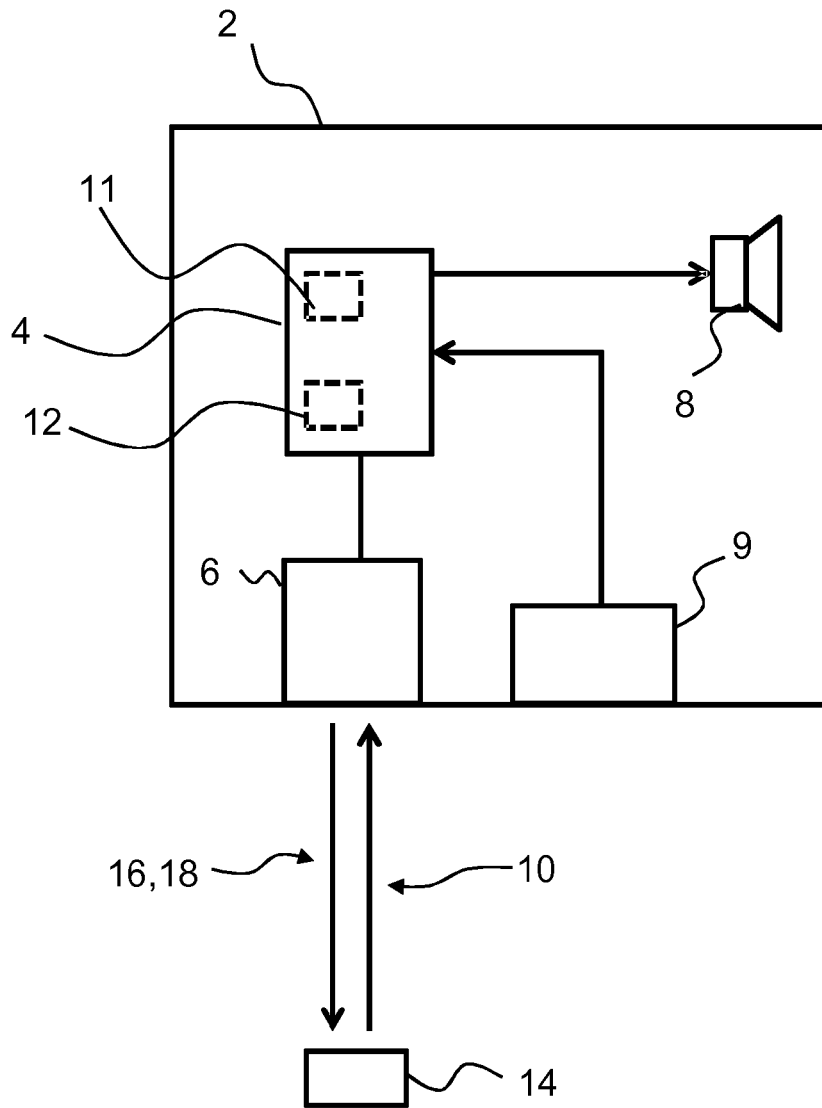
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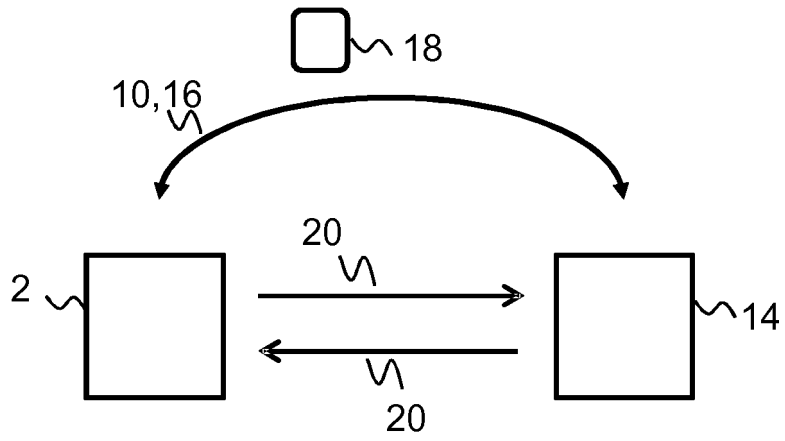
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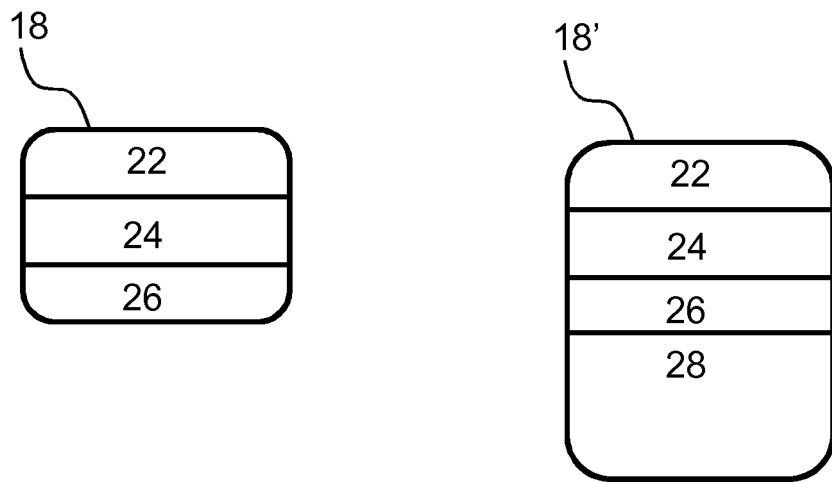
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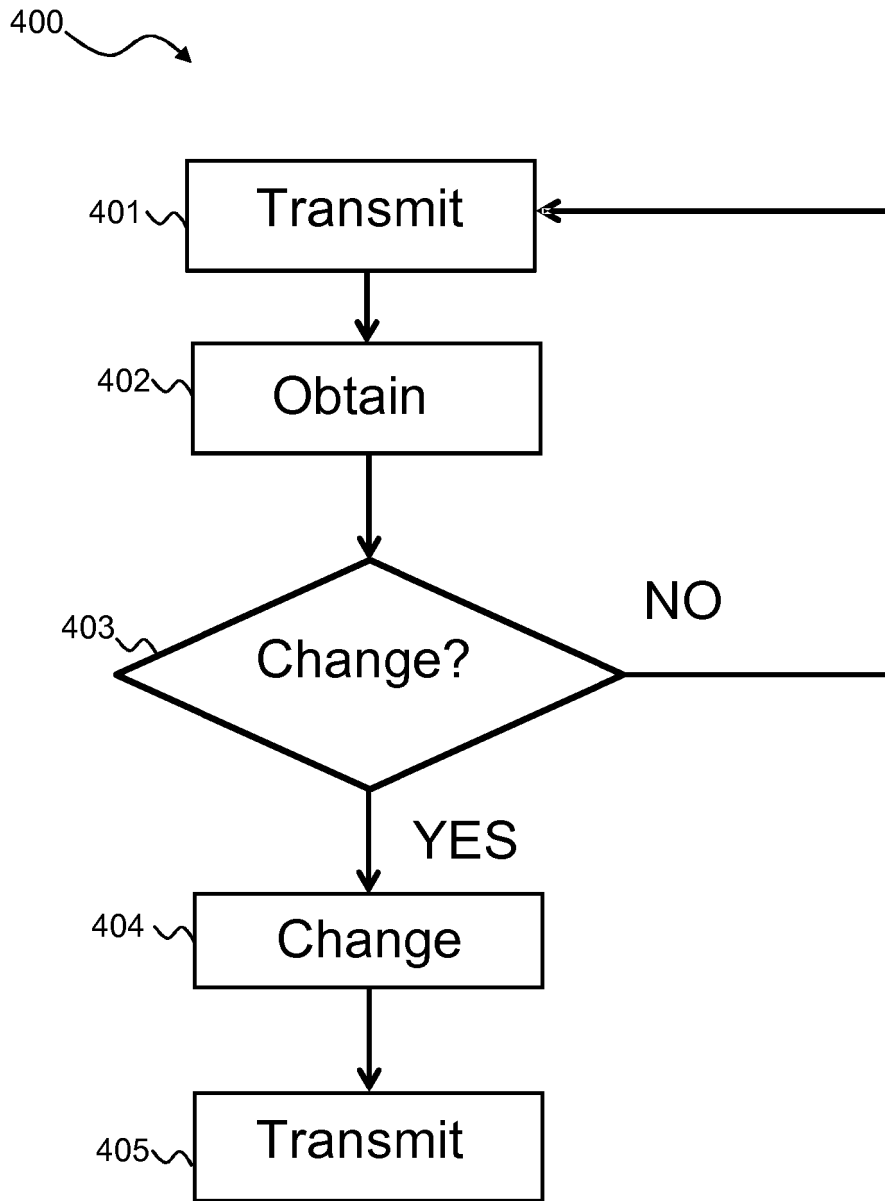
**Fig. 1**



**Fig. 2**



**Fig. 3**



**Fig. 4**

**REFERENCES CITED IN THE DESCRIPTION**

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**Patent documents cited in the description**

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