(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) **EP 1 973 103 A1**

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
24.09.2008 Bulletin 2008/39

(51) Int Cl.:
G10L 19/00 *(2006.01)*

(21) Application number: **07006014.0**

(22) Date of filing: **23.03.2007**

(84) Designated Contracting States:
AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HU IE IS IT LI LT LU LV MC MT NL PL PT RO SE SI SK TR
Designated Extension States:
AL BA HR MK RS

(71) Applicant: **Vodafone Holding GmbH**
40213 Düsseldorf (DE)

(72) Inventor: **De Weerd, Jeroen**
6229 WE Maastricht (NL)

(74) Representative: **Jostarndt, Hans-Dieter**
Brüsseler Ring 51
52074 Aachen (DE)

(54) **System and method for providing additional information related to an audio piece**

(57) The invention relates to a playback system (20) for playing back an audio piece at a playback site and for providing additional information related to the audio piece. The proposed playback system (20) comprises:
- an acquisition component (40) for acquiring audio data (10) of the audio piece,
- a means (40, 55) for acquiring the additional information related to the audio piece,
- an encoding component (60), which is located at the playback site of the audio piece and which is configured to combine the audio data and the additional information and to generate an audio signal containing the audio piece and the additional information, and
- a playback component (80), which is connected to the encoding component (60) and which is configured to generate an acoustic signal (75) from the audio data.

The invention further relates to a method for playing back an audio piece at a playback site and for providing additional information related to the audio piece.

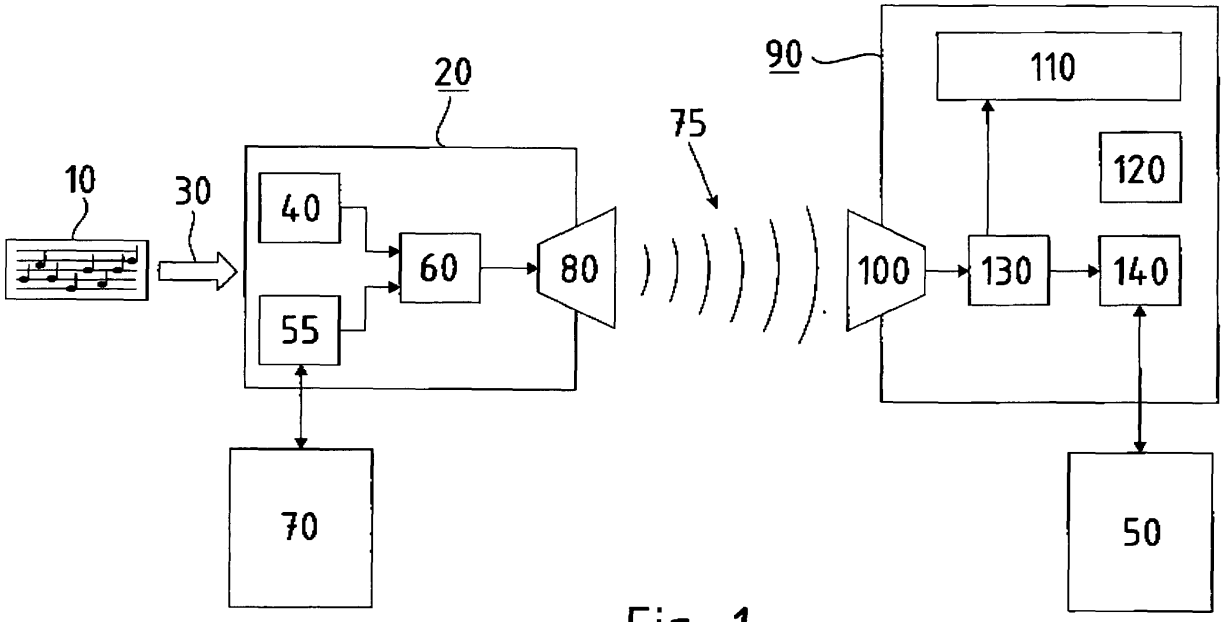

Fig. 1

EP 1 973 103 A1

Description

Field of the invention

[0001] The invention relates to a playback system and to a method for playing back an audio piece at a playback site and for providing additional information related to the audio piece.

Background of the invention

[0002] An audio watermark is a data signal within an audio signal that is essentially inaudible due to the psycho-acoustic properties of the human hearing. Audio watermarks are generated by modifications of the audio signal that are essentially imperceptible to the human ear, but can be detected and evaluated electronically. Through the use of watermark technology, additional information can be embedded into an audio signal and this information can be used, for example, to prove copyright of an audio piece or else the audio watermark can contain data identifying the audio piece.

[0003] German patent application DE 100 00 933 describes a method wherein identification information comprising, for example, the title and the performer of an audio piece, is embedded into the audio piece as an audio watermark. When the audio piece is received via the radio, the audio watermark in the radio signal is detected and the contained identification information about the audio piece is extracted. Moreover, the audio watermark can be decoded from the acoustic signal of the audio piece using a mobile receiving device for decoding the additional information and displaying it to the user of the mobile receiving device. When a user hears an audio piece, for example, on the radio or somewhere in the street, he can obtain information about the title and performer using the receiving device. On the basis of this information he can, for example, purchase the audio piece if desired. In addition, the identification information contained in the audio watermark can comprise ordering information allowing the user to order the audio piece using the receiving device.

[0004] With the known method, the audio data of the audio piece is provided together with the embedded audio watermark at the playback site of the audio piece. However, compressed audio files such as, for example audio files in the mp3 format, are often used as sources for the rendering of audio pieces, since these files, owing to their reduced data volume, can be simply acquired electronically. Here, the problem arises that audio watermarks are often not robust to compression of audio data, so that the audio watermarks can no longer be read out error-free. Furthermore, other manipulations of the audio data, such as for example format changes can at least partially destroy the audio watermark, so that the additional information contained in the audio watermarks can be at least partially unusable.

Summary of the invention

[0005] Therefore, it is an object of the present invention, to allow for more reliably providing additional information in an acoustic signal of an audio piece.

[0006] According to the invention, this object is achieved by a system comprising the features of claim 1 and by a method comprising the features of claim 15.

[0007] The invention proposes a playback system for playing back an audio piece at a playback site and for providing additional information related to the audio piece. The playback system comprises an acquisition component for acquiring audio data of the audio piece and a means for acquiring the additional information related to the audio piece. Further, the playback system comprises an encoding component, which is located at the playback site of the audio piece and which is configured to combine the audio data and the additional information and to generate an audio signal containing the audio piece and the additional information. The playback system also comprises a playback component, which is connected to the encoding component and which is configured to generate an acoustic signal from the audio signal.

[0008] Furthermore, the invention proposes a method for playing back an audio piece at a playback site and for providing additional information related to the audio piece. The method comprises acquiring audio data of the audio piece and acquiring information related to the audio piece. Further, the method comprises combining the audio signal and the additional information at the playback site of the audio piece and generating an audio signal containing the audio piece and the additional information, The method also comprises generating an acoustic signal from the audio signal.

[0009] The invention involves the idea, that the additional information is not embedded in the audio data provided at the playback site, but is added to the audio signal representing the audio piece at the playback site of the audio piece. Thus, it is prevented, that the additional information is corrupted by manipulations of the audio data that are carried out before or during the transmission of the audio data to the playback site. Moreover, the invention allows for a greater flexibility, if different audio data is provided to different playback systems, since in this case, identical audio data can be provided to the different playback systems and only the additional information have to be customized to the different playback systems.

[0010] Preferably, the audio signal is generated in such a way that the additional information is essentially imperceptible to the human ear, when the audio signal is transformed into an acoustic signal. The additional information may be extracted from the acoustic signal by means of a receiving device.

[0011] In an embodiment of the present invention the encoding component is configured to generate a first intermediate audio signal from the additional information and a second intermediate audio signal from the audio

data and to superpose the second intermediate audio signal with the first intermediate audio signal to generate the audio signal from which the acoustic signal is generated.

[0012] This embodiment has the advantage, that the additional information can be added to the audio signal of the audio data in a simple manner, In contrast to the audio watermarking technology described above, the audio data itself is not manipulated, so that less computing power is necessary for adding the additional information to the audio signal of the audio piece.

[0013] According to a related embodiment of the invention, the frequency range of the first intermediate audio signal is above the highest frequency the human ear is able to perceive.

[0014] As is known, the human hearing is able to perceive sounds up to a certain frequency that is typically about 20 kHz. By choosing a higher frequency for the first intermediate audio signal representing the additional information, it can be assured that the additional information contained in the acoustic signal of the audio piece is essentially imperceptible to the listener of the audio piece.

[0015] In another embodiment of the present invention, the additional information contains identification information for identifying the audio piece and/or ordering information for ordering the audio piece electronically.

[0016] By means of the identification information a listener of the audio piece can obtain information related to an audio piece he is listening to. For example, the identification information may comprise the title and/or the performer of the audio piece. By means of the ordering information the listener can order the audio piece electronically, if he is interested in obtaining a copy of the audio piece. The order information may indicate an ordering system, from which the audio piece can be obtained, and/or a price for ordering the audio piece.

[0017] In accordance with a further embodiment of the invention, at least part of the additional information is encrypted in such a way that it can be decrypted using a decryption key that is present in a receiving device, which is configured to receive the acoustic signal and to extract the additional information from the acoustic signal, and the audio signal comprises the encrypted additional information.

[0018] By encrypting the additional information, it can be assured that only authorized listeners of the audio piece, which dispose of a receiving device containing a decryption key for decrypting the additional information, are able to use the additional information.

[0019] In an embodiment of the present invention, the playback system is connected to a central system via a data network and the means for acquiring the additional information is configured to retrieve the additional information from the central system via the data network in response to the acquisition of the audio data of the audio piece,

[0020] It is an advantage of this embodiment that the additional information is provided by a central system separate from the audio data of the audio piece. The additional data are retrieved in response to the acquisition of the audio data by the acquisition component, In particular, this leads to a greater flexibility and to a simpler implementation of the invention, if customized additional information is provided for different playback systems that receive the same audio data. Here, an identical data stream can be provided to the different playback systems and the additional information that is customized to the playback systems can be retrieved from the central system.

[0021] According to a related embodiment of the invention, the means for acquiring the additional information is configured to transmit identification data identifying the playback system to the central system and at least part of the additional information that is retrieved by the playback system is chosen as function of the identification data from a plurality of different additional information related to the audio piece.

[0022] This embodiment has the advantage that the additional information customized to the playback system can be provided which is chosen on the basis of identification data identifying the playback system retrieving the additional information. Thus, customized additional information can be provided to different playback systems in an especially simple manner.

[0023] According to another aspect of the invention, a receiving device is provided, that is configured to receive an acoustic signal played back by a playback system of the type described before and to extract the additional information from the acoustic signal.

[0024] The receiving device may be used by a listener of the audio piece to receive and to evaluate the additional information contained in the acoustic signal of the audio piece.

[0025] In an embodiment of the present invention, the receiving device comprises a display unit for depicting at least part of the additional information.

[0026] This embodiment has the advantage that the additional information related to the audio piece can be depicted to the listener of the audio piece. In particular, the identification information related to the audio piece may be depicted at the displaying unit of the receiving device,

[0027] In another embodiment of the invention, the receiving device is configured to place an electronic order for the audio piece on the basis of the ordering information contained in the additional information in response to an operating action on the receiving device and in that it is configured to receive audio data of the audio piece from an ordering system as an answer to the order.

[0028] It is an advantage of this embodiment that the listener can use the receiving device for placing an order for the audio piece. Thus, the listener is able to order the audio piece, while he is listening to the audio piece.

[0029] In another embodiment of the invention, the receiving device is a mobile communication device.

[0030] Furthermore, the invention provides a system comprises a playback system of the type described before and a receiving device of the type described before.

[0031] According to one aspect of the invention, the system may be configured to obtain verification for the playback of the audio piece at the playback site. The verification may be used for evaluating royalty payments for the playback of the audio piece at a playback site that is located in a commercial facility, such as, for example, a shop or a restaurant.

[0032] Therefore, in an embodiment of the present invention, the receiving device is configured to store the additional information of the audio piece extracted from the acoustic signal played back by the playback system.

[0033] According to an embodiment of the present invention, the playback system and/or the receiving device is arranged in a protected housing.

[0034] By arranging the playback system and/or the receiving device in a protected housing, tampering of the playback system and/or the receiving device can be prevented.

[0035] These aforementioned and other aspects and advantages of the invention will be apparent from and elucidated with reference to the embodiments of the invention described hereinafter.

Brief description of the drawings

[0036] Reference will be made by way of example to the accompanying drawing in which figure 1 is a schematic diagram of an embodiment of the present invention.

Detailed description of embodiments

[0037] Referring to Figure 1, audio data 10 of audio pieces is provided to a playback system 20 located at the playback site of the audio pieces, as is schematically shown by the arrow 30. The playback site may be located in a facility open to the public, such as, for example, a hotel, a bar, a restaurant or a shop. The same audio data 10 may be provided by a provider to plurality of facilities of the aforementioned type, each facility having a playback system 20 to its disposal.

[0038] The audio data 10 may concern any kind of audio information, such as, for example, music pieces or radio dramas. In particular, it may concern music pieces that are played back in the aforementioned facilities as background music. Further it is to be understood that, within the scope of the invention, the term audio data also refers to audio data that is contained in video data that is provided at the playback site.

[0039] In principle, the audio data 10 can be provided at the playback site in any manner known to a person skilled in art. For example, the audio data 10 may be provided on a sound storage medium such as a compact disc, a memory card or a record. The playback system 20 may also receive the audio data 10 via the radio or via a data network such as, for example, the internet. In particular, the audio data 10 may be contained in an audio stream the playback system 20 receives via radio or via a data network and that contains consecutively transmitted audio pieces. The audio stream may be broadcasted to a plurality of playback systems 20 or facilities by a broadcast station or by another provider offering a music program that facilities have taken out a subscription to. The latter may particularly apply to bars or restaurants, which often have taken a subscription to a music program customized to their needs.

[0040] The playback system 20 comprises an acquisition component 40 for acquiring the audio data 10. If the audio data 10 is provided on a sound storage medium, the acquisition module is configured as a reading device that is able to read in the audio data from the sound storage medium. Depending on the sound storage medium used, the reading device may, for example, be a compact disc reader, a memory card reader or a reading device for reading in records. If the audio data 10 is received via the radio or a data network, the acquisition module may be configured as a radio receiver or as a network interface that is able to receive the audio data 10.

[0041] In addition to the audio data 10, additional information that is related to the audio pieces contained in the audio data 10 is provided. The additional information related to a specific audio piece may contain identification information related to that audio piece such as, for example, the title and the performer of the audio piece as well as the performer's album on which the audio piece can be found. Preferably, the additional information also contains order information related to the specific audio piece comprising parameters that allow for ordering the audio piece electronically. The order information may indicate an order system 50 from which the audio piece can be obtained, and it may comprise an identification code assigned to the audio piece that allows for identifying the audio piece within the order system 50. Further, the order information may indicate the price for ordering the audio piece.

[0042] In contrast to the identification information related to an audio piece, the order information for the same audio piece may differ depending on the facility, at which the audio piece is being played back, In particular, different order systems 50 and/or different prices for ordering the audio piece may be provided to different facilities or playback systems. Since the identification code that is contained in the order information is used to identify the audio piece in the order system 50, the identification code may also differ depending on the order system 50 indicated by the order information. Another reason for assigning several identification codes to one audio piece may be that each of the several identification codes may be assigned to a specific price for ordering the audio piece so that the order system 50 can not only identify the audio piece, but can also ascertain the price for ordering the audio piece on the basis of the identification code. However, the order information may likewise contain further data that allow for determining the order price

in the order system 50.

[0043] The order information related to an audio piece may be customized to one facility at which the audio piece is played back or it may be customized to a predefined group of facilities. For example, such a group may contain facilities to which equal order parameters are provided.

[0044] Particularly in the case, that different order information is provided to different facilities, the additional information or at least the order information may be encrypted using an encryption key. The encryption may be carried out in the playback system 20, or the playback system 20 may receive already encrypted additional information. The facility, in which the audio piece is played back, or the provider of the audio data 10 may issue a decryption key for decrypting the additional information or the order information to authorized persons. By encrypting the additional information or the order information, unauthorized listeners of the audio piece are prevented from using the additional information or the order information.

[0045] In one embodiment of the invention, the playback system 10 receives the audio data 10 of the audio pieces and the additional information related to the audio pieces from the same source. If the audio data 10 of one or several audio pieces is provided on a sound storage medium, the sound storage may contain data which is attached to the audio data 10 and comprise the additional information assigned to the audio pieces. If the audio data is transmitted via radio or via a data network, it is provided that the audio data is transmitted together with the additional information related to the audio pieces 10 that are contained in the audio data 10 or attached to the audio data 10.

[0046] If the audio data 10 is provided in form of one digital audio file for each audio piece, the additional information may, for example, be added to the so called headers of the digital audio files that contain information about the audio file. Digital audio files of certain formats such as, for example, the widely used mp3 format already comprise headers that contain identification information of the audio piece contained in the file. Within the scope of the invention, these headers may be expanded to allow the addition of the order information.

[0047] Digital audio streams usually also contain headers, which contain information about the audio pieces contained in the stream. Within the scope of the present invention, the additional information may thus be added to that header, in case the audio data is transmitted to the playback system 20 in form of a digital audio stream via radio or via a data network.

[0048] If analog audio data of the audio pieces is transmitted via radio to the playback system 20, the radio signal may also contain the additional information related to the audio pieces. For example, the additional information may be transmitted via a separate carrier frequency. An analog method is known, for example, from the radio data system (RDS) that allows for transmitting additional data in addition to the radio program.

[0049] If the audio data 10 of the audio pieces and the additional information related to the audio pieces are provided by the same source, the acquisition component 40 of the playback system 20 acquires the additional information related to the audio pieces in addition to the audio data 10 of the audio pieces. The acquisition component subsequently transfers the audio data 10 and the additional information to an encoding component 60 of the playback system 20 that will be described thereinafter.

[0050] In another embodiment of the invention, the additional information related to the audio pieces is provided by a central system separately from the audio data 10 containing the audio pieces. In particular, this allows for providing customized additional information to a plurality of playback systems 20 in an especially simple manner, since the customized additional information does not need to be directly linked to the audio data 10.

[0051] In this embodiment, the playback system 20 comprises an interface component 55 for connecting the playback system 20 to a central system 70 via a data network such as, for example, the internet. The interface component 55 is configured to retrieve the additional information related to the audio pieces that are to be played back in the playback system 20 from the central system 70.

[0052] The central system 70 may be connected to a plurality of playback systems 20, which retrieve the additional information form the central system 70. For example, the central systems may be operated by the provider of the audio data 10,

[0053] If the audio data is provided on a sound storage medium and/or if it is present in form of one or more digital audio files, the playback system 20 sends a request to the central system 70 that indicates the audio pieces for which the additional information are requested. For this purpose, the audio data 10 may be provided to the playback system 20 together with identification data that allows for identifying the audio pieces in the central system 70. The identification data may be contained in the headers of the audio files or it may be stored on the sound storage medium and suitably linked to the audio data in another form. The identification data is acquired by the acquisition component 70 and transfers the identification data to the interface component 55 of the playback system 20, which sends a request for transmittal of the additional information that contains the identification data to the central system 70. Upon receipt of the request, the central system 70 ascertains the additional information related to the audio pieces specified in the request and sends the additional information to the playback system 20 as an answer to the request. The additional information may be stored in a database of the central system 70 that also comprises an allocation between the additional information and the identification data.

[0054] If customized additional information is provided to several playback systems 20, the request sent to the central system 70 by a specific playback system 20 additionally contains identification data that allows the serv-

er to ascertain the customized additional information related to the audio pieces the request is related to. In this case, the answer of the central system 70 to the request sent by specific playback system 20 comprises the additional information customized to this playback system 20.

[0055] In case the audio data is provided to the playback system 20 in form of an audio stream, the interface component 55 retrieves the additional information online, i.e., it retrieves the additional information related to a specific audio piece, when the playback system 20 plays back this audio piece. For this purpose, the central system 20 provides at least one interface for the retrieval of the additional information related to the audio piece currently contained in the audio stream. The interface components 55 of the playback systems 20 asses the interface of the central component this interface to retrieve the additional information related to the audio piece that is currently contained in the stream.

[0056] If customized additional information is provided to the several playback systems 20, a specific playback system 20 retrieving the additional information identifies itself to the central system 70, whereupon the central system 70 provides access to the additional information intended for this playback system 20.

[0057] If the additional information is provided by the central system 70, the encoding component 60 of the playback system 20 receives the additional information related to the audio pieces from the interface component 55 and assigns the additional information to the audio pieces that are contained in the audio data 10 received from the acquisition component 40.

[0058] The encoding component 60 of the playback system 20 may be implemented in form of a software program that is run in a processor of the playback system 20. It generates an audio signal that represents the audio pieces contained in the audio data 10 and the additional information related thereto. The audio signal can subsequently be transformed into an acoustic signal 75 that is played back by the playback system 20. The audio signal comprises the additional information in such a form that it is essentially imperceptible to the human hearing in the subsequently generated acoustic signal 75.

[0059] In one embodiment of the invention, the additional information is embedded into the audio data as an audio watermark by the encoding component 60, The audio watermark is generated by modifying the audio data 10 in such a way that the modifications are essentially inaudible to the human ear, but can be detected and evaluated electronically. After having embedded the audio watermark into the audio data 10 of an audio piece, the encoding component 60 generates the audio signal from the audio data 10 containing the audio watermark. Since a plurality of methods for embedding audio watermarks into audio data 10 are known to a person skilled in the art, these methods will not be described in greater detail here. In principle, any method for audio watermarking known to a person skilled in the art may be applied within the scope of the present invention.

[0060] In another embodiment of the present invention, the encoding component 60 generates a frequency modulated audio signal from the additional information, hereinafter referred to as audio barcode signal. The frequency range of the audio barcode signal lies above the highest frequency the human ear is able to hear. As is known, the human hearing is able to hear sounds in the frequency range from approximately 20 Hz to 20 kHz. For this reason, the audio barcode signal has a carrier frequency that is sufficiently higher than 20 kHz to guarantee that the audio barcode signal is inaudible to the listener of the audio piece. For example, the carrier frequency is higher than 23 kHz. The audio barcode signal generated from the additional information is superposed with an audio signal that is generated from the audio data 10 of the audio piece to form a new audio signal that is subsequently played back by the playback system 20.

[0061] The advantage of this embodiment is that less computing power is necessary for generating the audio barcode signal than for embedding the audio watermark into the audio data. Therefore, this embodiment is particularly suitable for real time processing of the audio data and the additional information that may particularly be executed, when the playback system 20 receives the audio data in form of an audio stream.

[0062] The audio signal output by the encoding component 70 is transferred to a playback component 80 of the playback system 20, which converts the audio signal into an acoustic signal 75. The playback component 80 may comprise one or several loudspeakers that are configured in a manner known to person skilled in the art.

[0063] A listener staying at playback site may listen to audio pieces played back by the playback system 20, but does not perceive that additional information is contained in the acoustic signal 75 of the audio pieces. When he listens to an audio piece that he is interested in, the listener may read in the additional information by means of a receiving device 90.

[0064] The receiving device 90 is portable device comprising a microphone 100 for acquiring acoustic signals 70 and transforming them into electric signals. Further, the receiving device 90 comprises a processor and a memory for storing software applications that can be run on the processor and for storing further data. The processor is connected to a display unit 110 for displaying text and graphical information and to an input unit 120 that allows the listener to input commands and other data. Preferably, the receiving device 90 also comprises an interface for connecting the receiving device 90 to the order system 50 via a data network such as, for example, the internet.

[0065] In one embodiment of the present invention, the receiving device 90 is a mobile communication device such as, for example, a cell phone or a personal data assistant (PDA) that is equipped with a software program for processing the additional information contained in acoustic signals 70 that are played back by the playback

system 20. In particular, the signal generated by the microphone 100 is processed by a decoding component 130 of the receiving device 90 that may be implemented in form of a software application that is run on the processor of the receiving device 90. The software program may be started by actuating the input unit 120 of the receiving device 90. Thereupon, the signal generated by the microphone 100 is processed by the decoding component 130 to extract the additional information related to the audio piece from the signal.

[0066] If the additional information is encrypted, the decoding component applies the decryption key to the extracted additional information to obtain decrypted addition information that is used for the further processing of the additional information in the receiving device 90. The decryption key may be entered by the user of the receiving device 90 and may then be stored in the memory of receiving device 90. As aforementioned, the user may obtain the decryption key from the facility, in which the acoustic signal 75 containing the additional is played back, or from the provider of the audio data 10.

[0067] As described above, the additional information particularly contains identification information of an audio piece. Therefore, the decoding component 130 particularly extracts the identification information of the audio piece from the acoustic signal 75 of the audio piece, in order to display the identification information at the receiving device, the decoding component 130 transfers the identification information to the display unit 110 of the receiving device 90.

[0068] Further, the additional information may contain order information that allow for placing an electronic order for the audio piece with the ordering system 50. Preferably, the ordering process is carried out by means of the receiving device 90. For this purpose, the receiving device 90 provides an option for inputting a command that activates an order component 140, which is configured to generate an order for the audio piece and to send it to ordering system 50. The command may be issued by actuating a soft key button of the receiving device 90 to which the command is assigned, when the display unit 110 depicts the identification information. In addition to the identification information, the display unit 110 preferably also depicts the order price contained in the order information extracted from the acoustic signal 75 of the audio piece so that the listener is able to take the decision for ordering the audio piece on the basis of the price information.

[0069] Upon the command for ordering the audio piece, the order component 140 that may also be implemented as software program run by the processor of the receiving device 90, sends an order to the order system 50 specified in the order information. The order comprises at least the identification code of the audio piece contained in the additional information to the order system 50 via the data network. If different prices for ordering the same audio piece are provided, the order also contains data indicating the order price. In particular, the order may comprise the identification code of the audio piece, to which a certain order price is assigned. As an alternative, the order may contain additional data that are contained in the order information extracted from the acoustic signal 75 of the audio piece and that allow for determining the order price in the order system 50.

[0070] Upon receipt of the order, the order system 50 identifies the audio piece using the identification code and sends a digital audio file of the audio piece to the receiving device 90 via the data network as an answer to the order. The digital audio file is received in the receiving device 90 and may be stored in the memory of the receiving device for future use.

[0071] Furthermore, the server evaluates the price for ordering the audio piece and starts out a payment process that may be carried out within the scope of a suitable payment method, such as, for example, a payment by credit card, debiting an account or payment via a telephone bill of the mobile communication provider that provides the mobile communication network the mobile communication device is used in. If several prices are assigned to the same audio piece, the order system 50 ascertains the order price on the basis of the aforementioned data that is contained in the order and that indicates the order price.

[0072] Insofar as the invention is described before with regards to exemplary embodiments, it may particularly be used to provide additional information related to audio pieces that are played back in facilities such as, for example, shops, bars, restaurants or hotels. Those facilities may provide the additional information within the scope of an extra service to its customers.

[0073] For example, the facilities may take out a subscription to a music program from a music provider. The music program may be provided in form of an audio stream that is received by playback systems 20 located in the facilities. Further, the music provider may operate a central system 70, from which the playback systems 20 can retrieve additional information related to the audio pieces contained in the audio stream. The music provider may provide different order information to different facilities, so that the facilities are able to chose an ordering system 50 from which their customers can order audio pieces. In this manner, the facilities may, for example, operate their own ordering system 50. In addition, the facilities may specify the price for ordering the audio pieces individually. This makes it possible, that the facilities define their own price structures. For example, they may offer a flat rate for ordering audio pieces to its customers, so that the costumers can order audio pieces without paying for each order.

[0074] In order to prevent unauthorized access to the additional information and, in particular, to the order information, at least the order information may be encrypted. The facilities may issue decrypting keys for decrypting the order information to the customers, which have subscribed to the extra service.

[0075] In a further embodiment, the invention is used

to obtain verification of the playback of an audio piece at the playback site. In this embodiment, the receiving device may store the identification information related to an audio piece contained in the additional information to verify that the audio piece has been played back at the playback site. Likewise, the receiving device 90 may be connected to a verification system via a data network such as, for example, the internet and transmits the identification data of the audio piece to the verification system, where it is stored as a verification of the playback of the audio piece at the playback site.

[0076] In order to prevent tampering of the playback system 20 and the receiving device 90 the playback system 20 and the receiving device 90 may be arranged in one protected housing, so that it is not possible to manipulate the playback system 20 or the receiving device 20 or to remove the receiving device 90 out the area, where it is able to receive the acoustic signal 75 generated by the playback system 20, In order to secure the housing it may be plumbed, for example. In another embodiment the playback system 20 and the receiving device are arranged in separate housings, and the housings are securely attached to their position, for example, by means of plumbs.

[0077] In these embodiments the invention may be used for evaluating royalty payments that are due for playing back an audio piece in a commercial facility such as for example a bar, a restaurant or a shop. Those royalty payments are typically levied by collecting societies such as for example, the German "GEMA", which collect the royalty payments for the copyright holders of the audio pieces.

[0078] Within the scope of the present invention, those collection societies may provide systems comprising a playback system 20 and a receiving device 30 to commercial facilities. As described above, the identification data of the audio pieces that are played back in the facilities are stored within the receiving devices 90 or within a central verification system connected to a plurality of receiving devices 90. The stored identification may then be used for evaluating the royalty fees due on the basis of the audio pieces that actually have been played back in the facilities.

Claims

1. A playback system(20) for playing back an audio piece at a playback site and for providing additional information related to the audio piece, comprising:

- an acquisition component (40) for acquiring audio data (10) of the audio piece,
- a means (40, 55) for acquiring the additional information related to the audio piece,
- an encoding component (60), which is located at the playback site of the audio piece and which is configured to combine the audio data and the additional information and to generate an audio signal containing the audio piece and the additional information, and
- a playback component (80), which is connected to the encoding component (60) and which is configured to generate an acoustic signal (75) from the audio data.

2. The playback system according to claim 1, **characterized in that** the encoding component (60) is configured to generate a first intermediate audio signal from the additional information and a second intermediate audio signal from the audio data and to superpose the second intermediate audio signal with the first intermediate audio signal to generate the audio signal from which the acoustic signal (75) is generated.

3. The playback system according to claim 1 or 2, **characterized in that** the frequency range of the first intermediate audio signal is above the highest frequency the human ear is able to perceive.

4. The playback system according to one of the preceding claims, **characterized in that** the additional information contains identification data for identifying the audio piece and/or ordering information for ordering the audio piece electronically,

5. The playback system according to any of the preceding claims, **characterized in that** at least part of the additional information is encrypted in such a way that it can be decrypted using a key that is present in a receiving device (90), which is configured to receive the acoustic signal and to extract the additional information from the acoustic signal, and **in that** the audio signal comprises the encrypted additional information.

6. The playback system according to one of the preceding claims, **characterized in that** it is connected to a central system (70) via a data network and **in that** the means (55) for acquiring the additional information is configured to retrieve the additional information from the central system (70) via the data network in response to the acquisition of the audio data (10) of the audio piece.

7. The playback system according to one of the preceding claims, **characterized in that** the means (55) for acquiring the additional information is configured to transmit identification data identifying the playback system (20) to the central system

(70) and **in that** at least part of the additional information that is retrieved by the playback system (20) is chosen as function of the identification data from a plurality of different additional information related to the audio piece.

8. A receiving device (90),
characterized in that
it is configured to receive an acoustic signal (75) played back by a playback system (20) according to one of the preceding claims and to extract the additional information from the acoustic signal.

9. The receiving device according to claim 8,
characterized in that
it comprises a display unit (110) for depicting at least part of the additional information.

10. The receiving device according to one of claims 8 or 9,
characterized in that
it is configured to place an electronic order for the audio piece on the basis of the ordering information contained in the additional information in response to an operating action on the receiving device and **in that** it is configured to receive audio data of the audio piece as an answer to the order.

11. The receiving device according to one of claims 8 to 10,
characterized in that it is a mobile communication device.

12. A system for playing back audio pieces at a playback site and for providing additional information about an audio piece,
characterized in that
it comprises a playback system (20) according to one of claims 1 to 7 and a receiving device (90) according to claim 8 or 9.

13. The system according to claim 12,
characterized in that the receiving device (90) is configured to store the additional information of the audio piece extracted from the acoustic signal (75) played back by the playback system (20).

14. The system according to claim 12,
characterized in that
the playback system (20) and/or the receiving device (909 is arranged in a protected housing.

15. A method for playing back audio pieces at a playback site and for providing additional information about an audio piece, comprising the steps of:

- acquiring audio data (10) of the audio piece,
- acquiring information related to the audio piece,
- combining the audio signal and the additional information at the playback site of the audio piece and generating an audio signal containing the audio piece and the additional information, and
- generating an acoustic signal (75) from the audio signal.

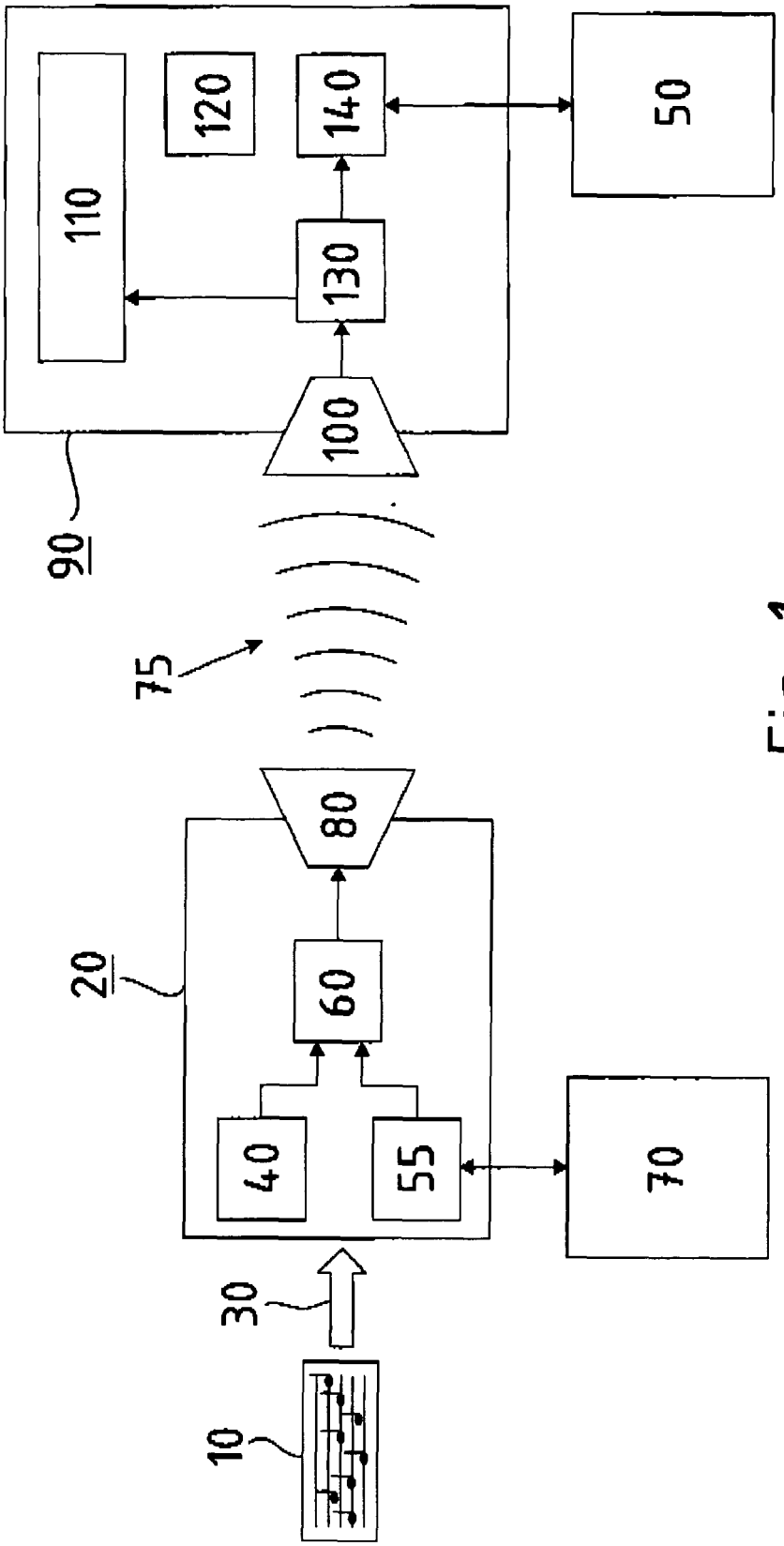

Fig. 1

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 07 00 6014

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	EP 1 739 618 A (FRAUNHOFER GES FORSCHUNG [DE]) 3 January 2007 (2007-01-03) * abstract; figure 1 * * paragraphs [0001], [0007], [0010] - [0014] *	1,5-7, 14,15	INV. G10L19/00
X	EP 1 672 638 A (TOKYO SHIBAURA ELECTRIC CO [JP]) 21 June 2006 (2006-06-21) * abstract * * figure 1 * * paragraphs [0006], [0007], [0011] - [0014], [0018] - [0020], [0034] *	1,2,5-9, 12,14,15	
D,Y	DE 100 00 933 A1 (FRAUNHOFER GES FORSCHUNG [DE]) 29 March 2001 (2001-03-29) * the whole document *	1,3,4,8, 10-15	
Y	LEANDRO DE C.T. GOMES ET AL.: "Audio Watermarking and Fingerprinting: For Which Applications?" JOURNAL OF NEW MUSIC RESEARCH, vol. 32, no. 1, March 2003 (2003-03), pages 65-81, XP002442544 * figure 3 * * page 68, last paragraph *	1,3,4,8, 10-15	TECHNICAL FIELDS SEARCHED (IPC) G10L
A	DE 43 13 107 C1 (KOERBER WALTER E J [DE]) 14 April 1994 (1994-04-14) * abstract * * column 1, line 1 - column 2, line 30 * * column 5 *	1-15	

-/--

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	16 July 2007	Santos Luque, Rocio

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
O : non-written disclosure
P : intermediate document

T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons

& : member of the same patent family, corresponding document

EPO FORM 1503 03.82 (P04C01)

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 07 00 6014

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	RYUKI TACHIBANA: "Audio watermarking for live performance" PROCEEDINGS OF SPIE, vol. 5020, June 2003 (2003-06), pages 32-43, XP002442545 * abstract * * pages 33-34 * * figures 1,2 *	1,15	
A	US 6 505 160 B1 (LEVY ET AL) 7 January 2003 (2003-01-07) * abstract * * column 15, lines 16-54 *	1,15	
			TECHNICAL FIELDS SEARCHED (IPC)

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	16 July 2007	Santos Luque, Rocio

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
O : non-written disclosure
P : intermediate document

T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons

& : member of the same patent family, corresponding document

3

EPO FORM 1503 03.82 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 07 00 6014

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

16-07-2007

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 1739618 A	03-01-2007	NONE	
EP 1672638 A	21-06-2006	CN 1822176 A	23-08-2006
		JP 2006174065 A	29-06-2006
		KR 20060067823 A	20-06-2006
		US 2006129519 A1	15-06-2006
DE 10000933 A1	29-03-2001	NONE	
DE 4313107 C1	14-04-1994	AT 175536 T	15-01-1999
		WO 9424782 A1	27-10-1994
		EP 0647377 A1	12-04-1995
US 6505160 B1	07-01-2003	NONE	

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- DE 10000933 **[0003]**