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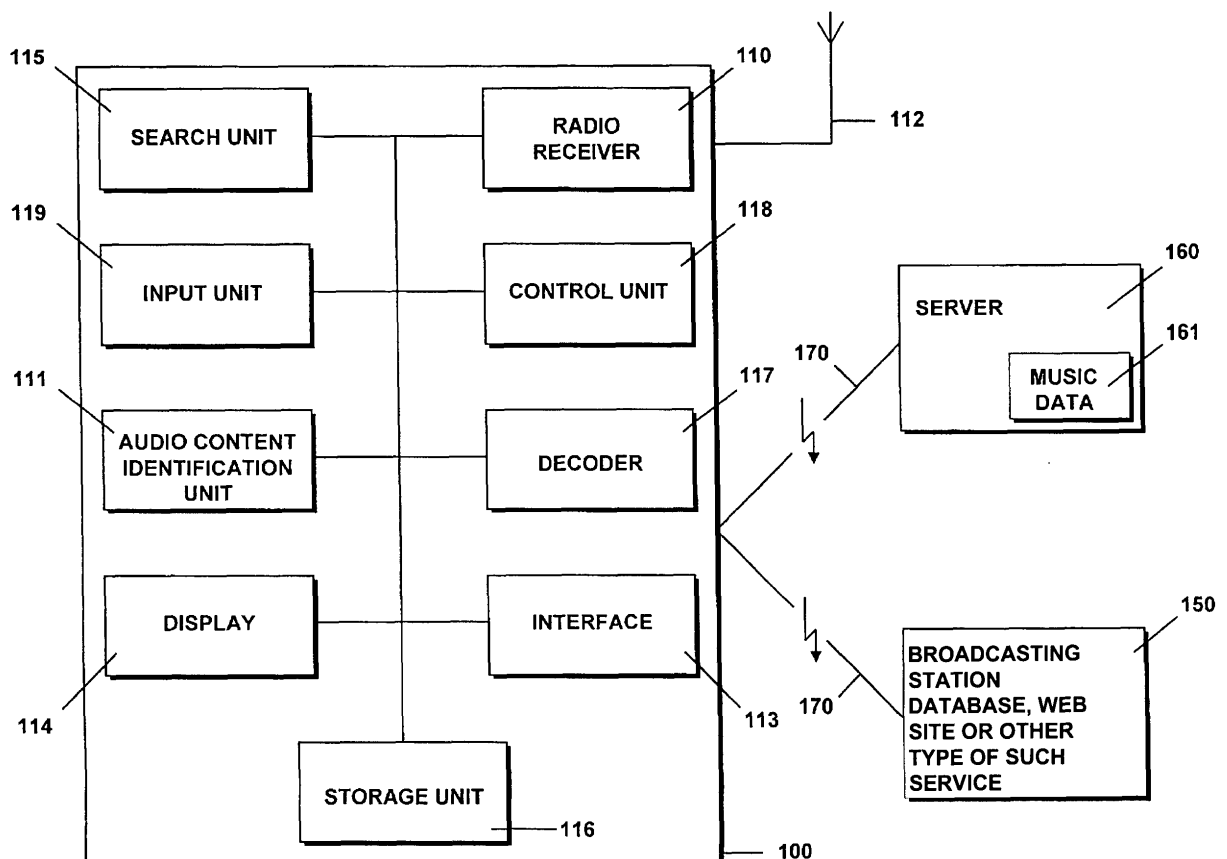
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(54) Radio receiver capable of downloading audio data from a remote database

(57) Radio receiving system (100) comprising a radio program receiving unit (110) for receiving a radio signal with a broadcast radio program, a radio program audio content identification unit (111) for identifying the audio content of the received radio program, a search unit (115)

for searching for data comprising the identified audio content on a remote data base server (160), a control unit (118) for selecting the data comprising the identified audio content and for initiating the download of the data, and an input unit (119) for inputting a download command.



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Description

[0001] This invention relates to a radio receiving system and to a method for downloading data from a remote data base server, the invention relates especially to a method for downloading audio data from a data base server provided from the internet or an internet based service/content.

RELATED ART

[0002] In recent years the use of audio and/or video data which are available over a centralized data base usable for a variety of users has become well known. The use of audio and video data, which are accessible via a communication network such as the internet using wired or wireless connections has become a widely spread phenomena due to the fact that systems have been developed which allow the storing of audio and video data in a compact format. The storing of audio and video data in a compressed way is based on the fact that some of the audio or video information provided in a film or a music title can be omitted without notice of the user. These audio or video data are compressed in such a way that an end user using an internet connection between a data base server and the home computer can download music songs or movies in an acceptable amount of time. Furthermore, electronic music stores such as i-tunes provide data bases comprising a large variety of different music songs and titles which can be bought individually.

[0003] Additionally, radio stations broadcasting radio programs often provide data bases or simple Websites which are also accessible over the internet and which can be used for, identifying the title and the interpret of the music title, which is currently broadcast. Summarizing, there exists a possibility to identify the content of a radio program.

[0004] As a consequence, a need exists to provide a possibility for an end user to acquire, i.e. to buy the content he or she is currently hearing on the radio.

SUMMARY OF THE INVENTION

[0005] According to the invention this need is met by a radio system and by a method for downloading data as mentioned in the independent claims. In the dependent claims preferred embodiments of the invention are described.

[0006] According to a first embodiment of the invention a radio receiving system is provided comprising a radio program receiving unit for receiving a radio signal with a broadcast radio program. Furthermore, a radio program audio content identification unit is provided for identifying the audio content of the received radio program. When the user of the radio receiver hears a radio program broadcasted by a radio station comprising an audio content such as a music title, a radio play, a report about a certain event or topic, etc., the user may wish to identify

the audio content. He or she may want to know what he or she is listening to. To this end a radio program audio content identification unit is provided which helps to identify the content of the broadcast radio program. Additionally, a search unit is provided for searching for data comprising the identified audio content of on a remote data base server. Furthermore, a control unit is provided for selecting the data comprising the identified audio content and for initiating the download of the data. Additionally, an input unit may be used for inputting a download command. The radio receiving system of the invention helps the user to identify the audio content of a broadcast radio program and additionally when the user wants to acquire or buy the program content, a data base server may be accessed to identify the audio content and the user can download the audio data for personal use. Whenever the user of the radio hears a program he or she is interested in, the program may be identified and downloaded to the user so that the latter can reuse it, be it a music song, a report on a certain event or a radio drama or radio play.

[0007] According to a preferred embodiment the audio content of the received radio program comprises a music title. When the user decides that he enjoys this music so much that this music title should be bought, this title can be searched on a remote data base server and downloaded if available. Recently the use of electronic music stores has become very popular and it is possible to chose different music titles or songs out of a large variety of titles which are provided on the data base server and which can be accessed via the internet. An example of such a music data base server is i-tunes from Apple. Additionally, there exist many other commercial music data bases providing songs for downloading by a user.

[0008] According to a preferred embodiment the radio program content identification unit extracts identification data, which identify the audio content. The identification data are able to unambiguously identify the audio content broadcast by the radio station. Preferably, the audio content identification unit extracts the title and the interpret of a music song or a music title. When the title and the interpret of the song are known, the user of the radio receiver or the radio receiving system itself can use this information in order to search for the same song. It should be understood that the identification data can comprise any other code or the radio data itself which helps to identify the audio content of the radio program.

[0009] Depending on the way the audio data are stored on the remote data base server, the audio content identification unit identifies the audio content which the user currently hears so that the audio data can be extracted from the data base server and downloaded to the user. It is also possible that the different music titles or any other audio content are stored on the data base server with a predetermined numbering system. In this case the audio content identification unit extracts numbers, which help to identify the audio content.

[0010] According to another embodiment of the invention the radio receiving system is used in a vehicle. Now-

adays drivers spend much time in vehicles where they hear radio programs provided by different radio stations. When the driver is hearing a certain broadcast music song, he or she may decide that he or she wants to get or buy this song. When the radio receiving system is used in a vehicle, the communication to the remote data base server has to be ensured. Preferably the communication of the radio receiving system and the remote data base server is done via a wireless telecommunication network. To this end the radio receiver may comprise the communication interface, which is able to communicate with the data base server. The telecommunication network technology on such a GSM, GPRS, EDGE, UMTS, WLAN, BT CDMA or any other wireless network technology allows the transfer of data in such a way that a data base can be accessed and that the audio data comprising the identified audio content, i.e. the music song or music title is downloaded to the radio receiving system. It should be mentioned that any other technique allowing the communication from a mobile radio receiver incorporated in a vehicle to a remote data base server could be used.

[0011] Preferably an information unit is provided which informs the user of the identification data identifying the audio content. If the user is interested in a music title, the information unit preferably informs the user of the title and/or the interpret of the music title. When the user gets the information about the name of the title and who the interpret is, it can be decided whether this music title should be downloaded or not. If it is the case, the user will input the download command into the system. In another case it is also possible that either the interpret or the title of the song are used as "key words" and that e.g. all files of said interpret are searched or all files of said interpret meeting any other predetermined requirement, e.g. all specified offers of this interpret available in the "electronic music store", or all files published after or before a certain date).

[0012] Further it is possible to search for all files having the same title, as often different cover versions do exist of the same title.

[0013] According to a preferred embodiment the data comprising the identified audio content comprises the audio content in a compressed way. A stereo compact disk is normally sampled 44, 100 times per second with a 16 bit resolution resulting in 1.4 megabits per second. The audio data of a music song of five minutes would be so large that a transmission of these audio data using wireless communication system would take too much time. As a consequence, the audio data are stored on the data base server in a compressed way. One known way of compressing audio and video data is the MPEG format (MPEG standing for moving Pictures Expert Group). This group developed standards for encoding movie data. The way of encoding the audio data comprised in these data is called MP3 (MPEG layer 3). By way of example, MP3 audio data has approximately only 9 percent of the size of the uncompressed audio data without losing too much quality. As a matter of cause there are many other formats

for compressing audio data, which can be used to provide compressed data on a data base server. (AAC, ATRAC, WAV, WMA etc.)

[0014] The compressed data can be transmitted using wireless communication technologies when the data should be transmitted to a vehicle. In the case of a non-mobile receiver the data can also be transmitted using telecommunication connections. (ISDN, Analog, Cable Networks, DSL, ...)

[0015] Preferably the radio receiving system further comprises a storage unit for storing the downloaded data. In this case the user of the radio receiving system can decide that a song should be downloaded and stored on the storage unit of the radio receiving system. The user can then repeatedly hear the same song and can configure in this way the user's own data base.

[0016] To this end the system may further comprise a decoding unit, which is able to decode the compressed audio data when they have been downloaded and preferably stored on the storage unit of the system. The decoding unit is needed when the downloaded data should be replayed on the radio receiving system.

[0017] According to one embodiment of the invention the radio program audio content identification unit retrieves the identification data from a data base or Website of the broadcasting station accessible via the internet. Radio stations often provide the information which song and which interpret the radio station is currently broadcasting. This information can be accessed using the internet. When the user wants to identify a certain song, the data base or the Website of the broadcasting station or any other commercial website providing such information may be accessed and the identification data such as title and interpreter can be retrieved. It is also possible to extract the identification data from the received radio signal. In addition to the received radio program the radio signal comprises information data encoded into the received radio signal, e.g. the RDS data (radio data system) or encoded besides (digital audio broadcast), which comprise information about traffic congestions. These additional information data of the radio signal could also be used to transmit the information which helps to identify the audio content. Digital audio broadcasting may extend this capabilities.

[0018] The invention further relates to a vehicle navigation system comprising a radio receiving system as described above. Navigation systems normally comprise different modules, such as a navigation module, a radio module, an audio module, and a telecommunication module. This navigation system can then be used for the communication via the telecommunication network and the radio receiving module for receiving the radio signals.

[0019] The invention additionally relates to a method for downloading data from a remote data base server comprising the following steps:

a radio signal comprising a broadcast radio program is received and the audio content of the received

radio program is identified. In a next step a search is performed in a remote data base server for data comprising the identified audio content. If the audio content is found on the server a download command can be input and the data comprising the identified audio content can be selected and the download of the data can be initiated. With the above mentioned steps the user is able to conveniently access the different music titles he or she is currently hearing on the radio. In order to identify the audio content of the received radio program an information providing service may be applied, which extracts an identification code of the audio content allowing an unambiguous allocation of the audio content. As mentioned above, the information providing service may preferably identify the title and the interpreter of a broadcast music song. In order to do so, the information providing service may either extract an identification code from the received radio signal according to one embodiment. According to another embodiment the information providing service accesses a data base or website of the broadcasting station accessible via the internet asking for the identification code of the broadcast radio content, the broadcasting station providing the identification code. It is also possible to use both steps for identifying the audio content.

[0020] Furthermore, commercially available data bases can be used to look up song/title; e.g. itunes uses Gracenode data base. These data bases collect the information of different radio stations, i.e. collect the titles and the interpreters the different radio station are currently playing.

[0021] According to another embodiment of the invention the connection to the remote data base server is built using a telecommunication network for searching for the audio data. When the audio data have been found, the user can additionally be informed of the costs of the downloading of the audio data. Normally the data base server will not provide the audio data free of charge, so that the user should be informed, how much money has to be spent to get this title. When the user has decided to download the title, the audio data can either be transferred to a storage unit provided in the radio receiver. However, it is also possible that the audio data should be transferred to any other computer selectable by the user. Additionally, it is also possible that the audio data should be transferred to a mail account of the user as an attachment to an electronic mail. As mentioned above, the audio data are preferably transferred in a compressed way so that the audio data can be handled more easily.

BRIEF DESCRIPTION OF THE DRAWINGS

[0022] In the following specific embodiments of the invention will be described by way of example with respect to the accompanying drawings, in which

Fig. 1 is a schematic view of the radio receiving system communicating to different data bases;

Fig. 2 shows a flow chart comprising the different steps for downloading a preferred program audio content, and

Fig. 3 a flow chart showing another embodiment for downloading music data to the radio receiving system.

[0023] In Fig. 1 a schematic view of a radio receiving system is shown. The radio receiving system 100 may be incorporated in a vehicle (not shown), but may also be part of an already installed audio system in a user's home. For receiving the radio program the radio receiving system comprises a radio receiver 110 for receiving the radio signals. The radio receiver can be an analogue or digital radio receiver receiving analogously broadcast or digitally broadcast radio signals. The functioning of a radio receiver is well known in the art so that a detailed explanation of it will be omitted. When the received radio program currently has a program the user is interested in, be it a music title or song, a report or a radio play or any other audio content which is broadcast with a radio signal, the audio content has to be identified. To this end, an audio content identification unit 111 is provided which helps to identify the audio content of the received radio program. When the audio content identification unit retrieves identification data, the latter can either be extracted by using the radio signals received by antenna 112 or by using a remote broadcasting station data base 150 or other methods, e.g. collection of broadcasting station data bases commercially available lookup data bases, e.g. "Gracenode". The broadcasting station data base can be accessed over the telecommunication network 170. By way of example, the broadcasting station can provide the information which song or which other audio content is currently broadcast on a home page accessible using the telecommunication network 170. On this homepage the currently played title and the interpret or any other identification code may be mentioned which helps to identify the currently broadcast content.

[0024] The radio receiving system further comprises an data interface 113, which receives and transmits data from or to the data base using the network 170. If the identification data, e.g. the title and the interpret are received by the receiving system 100, they may be displayed on a display 114, so that the user knows what song or what piece of music the radio station is currently playing and who is the performing act.

[0025] In the present context music means any kind of music, be it classical music, jazz, contemporary or modern music.

[0026] When the user is interested in the currently played song, the system can access a remote data base server 160, which comprises a music data base 161, whereas the data 161 provided on the server 160 can be

accessible via the internet. The electronic music stores provided on the server 160 comprise a large variety of songs or other music titles available to the public. Once the audio content identification unit 111 has identified the audio content the server 160 can be accessed via the same telecommunication network 170. When data comprising the identified audio content can be found on the server 160, the data can be provided for downloading. The music data 161 on the server 160 will normally be provided in a compressed way, which facilitates the transfer of the data using wireless communication technologies. As mentioned above, one known technique of compressing audio data is the MP3 format. It should be understood that any other format compressing the music data could be used.

[0027] A search unit 115 of the radio receiving system 100 will help to search the data on the server 160. By way of example the search unit can send a request to the server 160 comprising an identification code and can ask whether data corresponding to the identification code are available on the server 160. The server will answer either yes or no. The radio receiving system further comprises a storage unit 116, where the downloaded audio data can be stored. For recording the stored audio data a decoder 117 may be provided which decompresses the compressed audio data for further use. Additionally, a control unit 118 is provided which controls and organizes the functioning of the system and which, inter alia, selects the data comprising the identified audio content and which initiates the download of the audio data. Furthermore, an input unit 119 may be provided, which helps to tell the system that the user wants to search for a predetermined music title and wants to download the latter.

[0028] In Fig. 2 an example for downloading audio data to the radio receiving system 100 are shown. In a first step 210 the radio program is received using the receiver 110. Especially in vehicles the radio receiver is often turned on during driving. It may be the case that the driver is interested in the present radio program. If the driver wants to download the data comprising the desired audio content, the audio content has to be identified as shown in step 220. When the audio content is identified a connection has to be built up to the data base server 160 comprising the audio data (step 230). In the next step a search has to be performed on the server 160 for the identified audio content (step 240). In step 250 it is then asked whether the search was successful or not (step 250). If the identified data comprising the audio content could be found on the server 160, the user may be informed in step 260. In addition to that a download command may be displayed to the user, e.g. by offering a soft key the user has to press for downloading the audio data (step 270). When the user confirms the download command of step 270, the audio data are downloaded in step 280. However, if the desired audio data cannot be found on the server, the user may be informed in step 290 and the system can continue receiving the radio program as mentioned in step 210.

[0029] In Fig. 3 another embodiment for downloading music data is shown. When the user receives a radio program and decides that he or she is interested in the currently playing title, the music title and the interpreter of the title have to be found out in a first step 310. As mentioned above, the title and the interpreter can either be extracted from the received radio signal or from another remote data base providing information which helps to identify the currently played song. To this end the search unit may use an information providing service which further accesses the data base 150 of the broadcasting station or other data bases and/or the received radio signal and which extracts the data allowing the identification of the currently broadcast music title. In the next step 320 the title and the performer of the title are displayed to the user. If the user then decides that he or she wants to buy this title, a connection to the electronic music store or server 160 has to be built up (step 330). When the connection between the radio system 100 and the music store has been built up, the system has to search for the identified title in step 340. When the searched title can be found, the system can offer a key to the user for download. By way of example this can be done by displaying a download command on the display 140 (step 350).

[0030] The user phone can either be a fixedly installed part of a head unit of a vehicle or can be a cellular phone communicating with the electronic music store either directly or via the head unit of the vehicle using wireless communication techniques such as Bluetooth.

[0031] In the next step 360 the user should be additionally informed of the price of the download of the selected data. If the user then confirms the displayed download key, the audio data comprising the music title in a compressed way are downloaded in step 370 and are stored on the storage unit 116. The storage unit can either be a fixed disc or hard disc or flash memory device provided in the radio receiving system, however, the storage unit could also be a removable storage unit such as a CD ROM or any other memory card (SD card or multimedia card, etc.), which allows the storing of audio data. When the user wants to hear the downloaded song, the decoder has to decode the compressed data and can then reply the downloaded title.

[0032] Summarizing the invention provides a convenient possibility of accessing audio data and of building up an own selection of music or any other audio content. Every time the user hears something interesting, the system can be configured in such a way that a search is performed for audio data comprising the desired audio content, and the desired audio data can then be transmitted to the user.

Claims

1. Radio receiving system (100) comprising

- a radio program receiving unit (110) for receiving

- ing a radio signal with a broadcast radio program,
 - a radio program audio content identification unit (111) for identifying the audio content of the received radio program,
 - a search unit (115) for searching for data comprising the identified audio content on a remote data base server (160),
 - a control unit (118) for selecting the data comprising the identified audio content and for initiating the download of the data, and
 - an input unit (119) for inputting a download command.
2. System according to claim 1, **characterized in that** the radio receiving system (100) is a vehicle radio receiving system.
 3. System according to claim 1 or 2, **characterized in that** the audio content of the received radio program comprises a music title.
 4. System according to claim 3, **characterized in that** the radio program audio content identification unit (111) extracts identification data which identify the audio content, wherein the audio content identification unit (111) especially extracts the title and the interpreter of the music title.
 5. System according to any of the preceding claims, **characterized by** further comprising a communication interface (113) for communicating with the remote data base server (160) using a wireless telecommunication network (170).
 6. System according to claim 4 or 5, further comprising an information unit (114) for informing the user of the title and/or the interpreter of the music title.
 7. System according to any of the preceding claims, **characterized in that** the data comprising the identified audio content comprise the audio content in a compressed way.
 8. System according to claim 7, **characterized by** further comprising a decoding unit (117) which decodes the compressed audio data when they have been downloaded.
 9. System according to any of the preceding claims, **characterized by** further comprising storage unit (116) for storing the downloaded data.
 10. System according to any of claims 4 to 9, **characterized in that** the radio program audio content identification unit (111) retrieves the identification data from a data base (150) of the broadcasting station accessible via the internet or any other service providing such information.
 11. System according to any of the claims 4 to 10, **characterized in that** the radio program audio content identification unit (111) extracts the identification data, specially the title of the broadcast audio content, from the received radio signal.
 12. Vehicle navigation system **characterized by** comprising a radio receiving system according to any of the preceding claims.
 13. Method for downloading data from a remote data base server comprising the following steps:
 - receiving a radio signal comprising a broadcast radio program,
 - identifying the audio content of the received radio program,
 - searching for data on the remote data base server comprising the identified audio content,
 - inputting a download command, and
 - selecting the data comprising the identified audio content and initiating a download of the selected data.
 14. Method according to claim 13, wherein the step of identifying the audio content of the received radio program comprises the step of applying an information providing service which extracts an identification code of the audio content or just the radio station name allowing an unambiguous allocation of the audio content.
 15. Method according to claim 14, wherein the information providing service identifies the title and the interpreter of a broadcast music song.
 16. Method according to claim 14 or 15, wherein the information providing service extracts the identification code from the received radio signal.
 17. Method according to claim 14 or 15, wherein the information providing service accesses a data base of the broadcasting station accessible via the internet, the or any other type of such service broadcasting station providing the identification code for the broadcast radio content.
 18. Method according to any of claims 13 or 17, further comprising the steps:
 - building a connection to the remote data base server using a telecommunication network,
 - informing the user of the costs for downloading the audio data.
 19. Method according to any of claims 13 to 18, wherein

the audio data or access information to such audio data are transferred to a storage unit which is provided in a radio receiver, a computer or to a mail account of the user.

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- 20.** Method according to any of claims 13 to 19, wherein the audio data are transferred in a compressed way.

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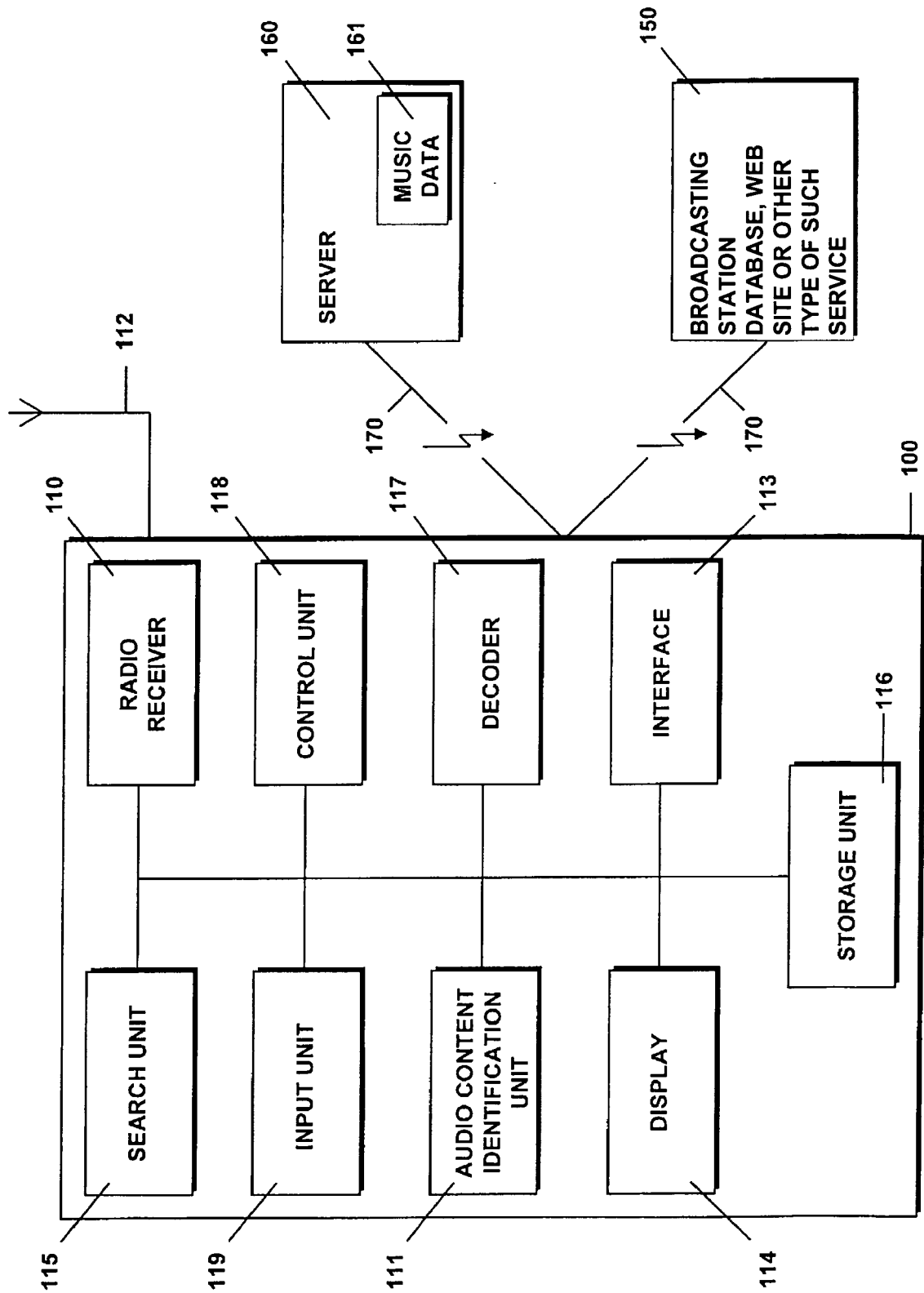
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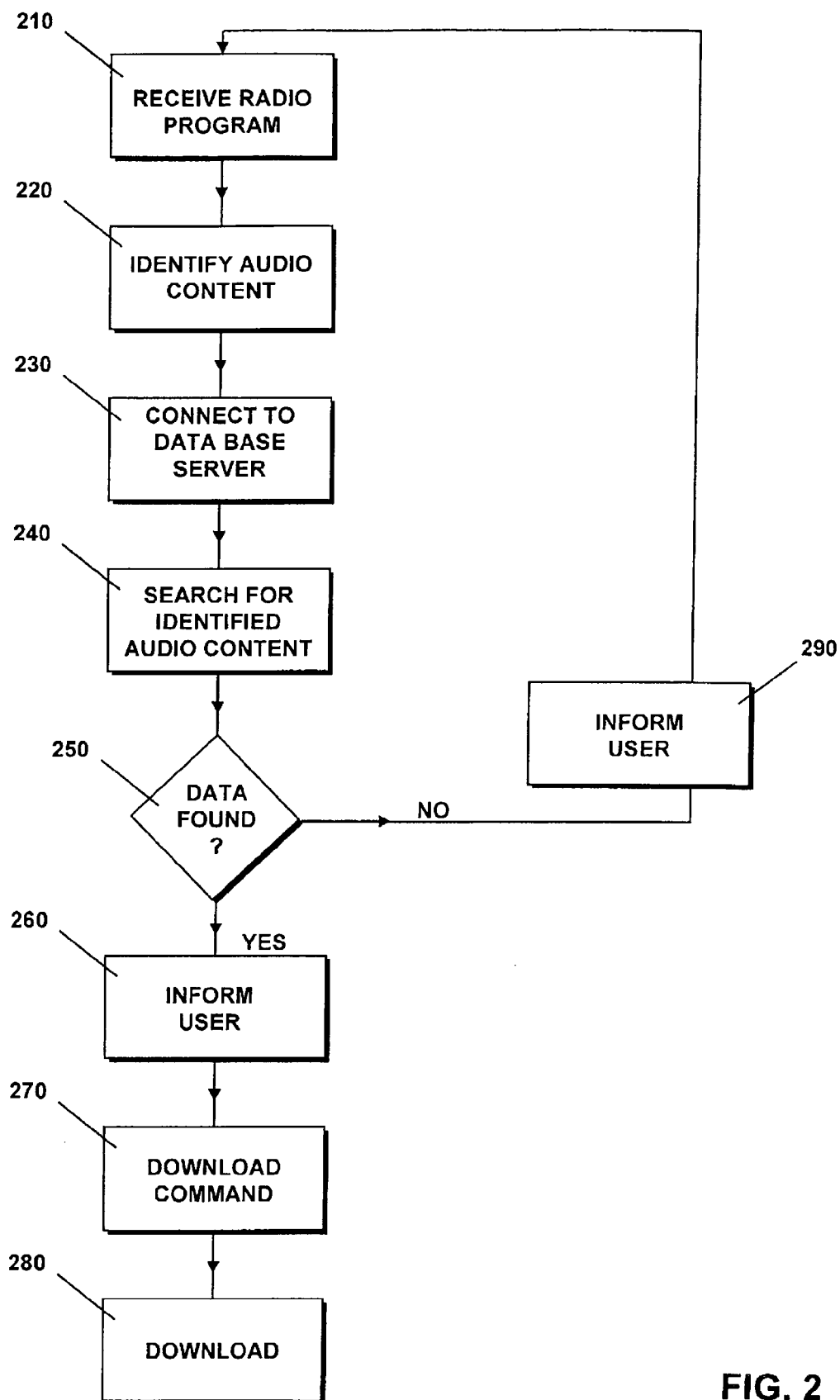


FIG. 2

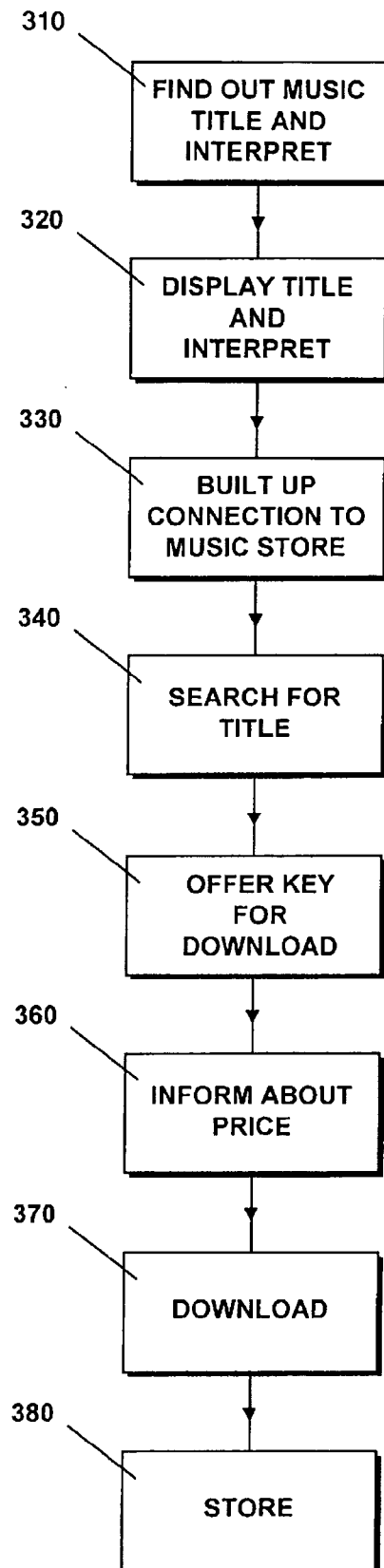


FIG. 3



European Patent
Office

EUROPEAN SEARCH REPORT

Application Number
EP 05 00 2799

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
X	EP 1 113 605 A (LUCENT TECHNOLOGIES INC) 4 July 2001 (2001-07-04) * paragraphs [0003], [0004], [0008] - [0010], [0016] - [0030] *	1-20	H04H1/00
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The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 4 May 2005	Examiner van Hoorick, J
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			

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EPO FORM 1503 03.82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 05 00 2799

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
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