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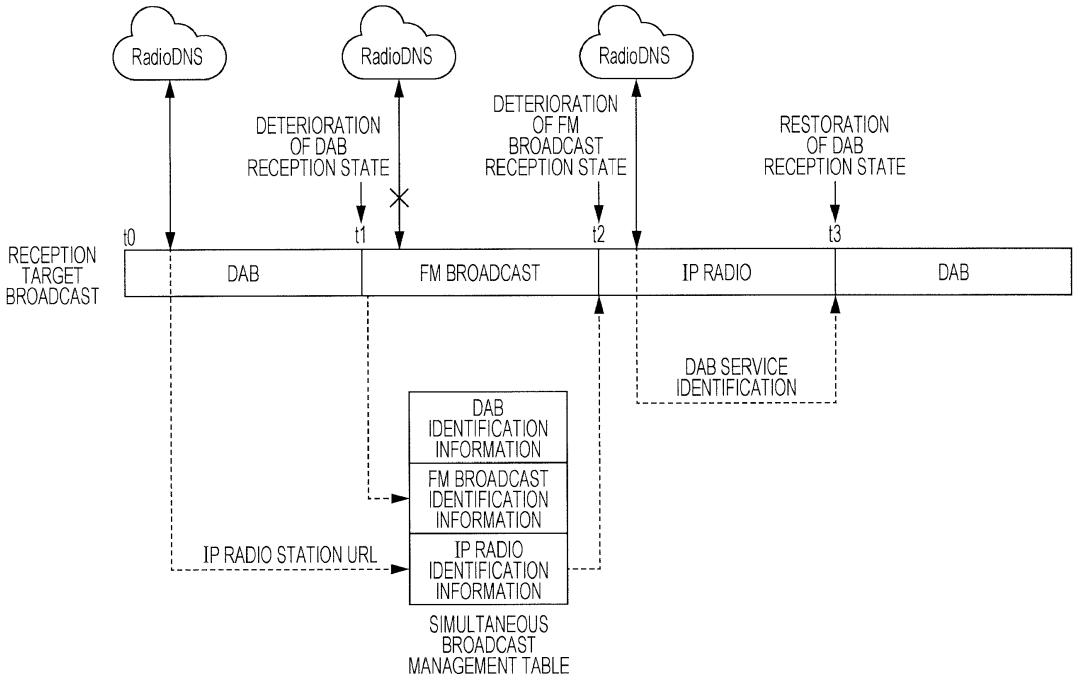
(54) BROADCAST RECEPTION APPARATUS

(57) A broadcast reception apparatus (1) performs switching of a broadcast in which a URL of an IP radio station having the relationship of a simultaneous broadcast with the broadcast is not obtained to an IP radio. When a reception of a DAB service is started at a first time point, a URL of an IP radio station having the relationship of a simultaneous broadcast with the DAB service is obtained from a Radio DNS (5) and stores the URL. Thereafter, when reception quality of the DAB service is deteriorated at a second time point, a reception of an FM broadcast station having the relationship of a simultaneous broadcast with the DAB service is started. Thereafter, when reception quality of the FM broadcast station is deteriorated at a third time point, a reception of the IP radio station indicated by the stored URL is started.

FIG. 8



EP 3 324 561 A1

Description

[0001] The present invention relates to a technique of switching a broadcast to be received from a broadcast being received to another broadcast of content which is the same as that of the broadcast being received in a broadcast reception apparatus.

[0002] In broadcast reception apparatuses, as a technique of switching a broadcast to be received from a broadcast being received to another broadcast of content which is the same as that of the broadcast being received (a broadcast having the relationship of a simultaneous broadcast with the broadcast being received), a technique of switching a reception target to an Internet protocol (IP) radio station having the relationship of a simultaneous broadcast with a radio broadcast when reception quality of the FM broadcast being received is deteriorated has been widely used (refer to JP2013-201469A, for example).

[0003] Furthermore, a technique of RadioDNS which supplies a uniform resource locator (URL) of an IP radio station having the relationship of a simultaneous broadcast with a radio broadcast through the Internet has also been widely used (refer to The RadioDNS Project, "refer to RadioDNS Technical Specification RDNS01 V1.0.0 (2012-02)", [online], Searched in November 9th, 2016, Website <URL:https://radiodns.org/wp-content/uploads/2014/02/RDNS01-1.0.0.pdf>, for example).

[0004] Moreover, as a technique of switching a broadcast to be received from a broadcast being received to another broadcast having the relationship of a simultaneous broadcast with the broadcast being received which is employed in broadcast reception apparatuses, a technique of switching a reception target to an FM broadcast station having the relationship of a simultaneous broadcast with a digital audio broadcasting (DAB) service when reception quality of the DAB service being received is deteriorated in a radio broadcast reception apparatus which receives DAB and an FM broadcast has been widely used (refer to JP2013-120967A).

[0005] In a broadcast reception apparatus which is capable of receiving DAB, an FM broadcast and an IP radio and which is mounted on mobile terminals, in a case where a broadcast to be received is switched from a broadcast being received to a broadcast having the relationship of a simultaneous broadcast with the broadcast being received so that a user may use content being broadcasted even when reception quality of the broadcast being received is deteriorated, a communication fee may be charged for reception of an IP radio and audio quality of the FM broadcast is lower than that of the DAB. Therefore, the switching between simultaneous broadcasts may be performed while priority is given to the DAB, the FM broadcast, and the IP radio in this order.

[0006] However, such switching is to be performed, the following problems arise.

[0007] Specifically, some broadcasters provide a URL of an IP radio station having the relationship of a simultaneous broadcast with the DAB, others do not provide a URL of an IP radio station having the relationship of a simultaneous broadcast with an FM broadcast which has the relationship of a simultaneous broadcast with the DAB.

[0008] In this case, a URL of an IP radio station having the relationship of a simultaneous broadcast with an FM broadcast being received may not be obtained while the FM broadcast is being received. Furthermore, in a case where reception quality of the FM broadcast being received is deteriorated in a state in which the DAB may not be received, switching to the IP radio to be received may not be performed.

[0009] The present invention relates to a broadcast reception apparatus and a broadcast service switching method according to the appended claims.

[0010] Accordingly, in the present invention, even in a broadcast in which a URL of an IP radio station having the relationship of a simultaneous broadcast through the Internet may not be obtained, the switching to the IP radio having the relationship of a simultaneous broadcast with the broadcast in which the URL of the IP radio station having the relationship of a simultaneous broadcast through the Internet may not be obtained may be performed as quickly as possible.

[0011] According to an embodiment of the present invention, a broadcast reception apparatus receives a radio broadcast based on a first broadcast standard, a radio broadcast based on a second broadcast standard, and an IP radio and which is connectable to the Internet. The broadcast reception apparatus includes a reception output unit configured to output content received from a broadcast service set as a reception target broadcast, a broadcast service following unit configured to switch the reception target broadcast among the broadcast service of the radio broadcast based on the first broadcast standard, the broadcast service of the radio broadcast based on the second broadcast standard, and the broadcast service of the IP radio in a priority order of the broadcast service of the radio broadcast based on the first broadcast standard, the broadcast service of the radio broadcast based on the second broadcast standard, and the broadcast service of the IP radio so that a reception of content which is broadcasted in the reception target broadcast is continued even when reception quality of the reception target broadcast is deteriorated, and an IP radio identification information obtaining unit configured to be connected to an information service for providing identification information of broadcast services of the IP radio which broadcasts content the same as that of the broadcast services of the radio broadcast based on the first broadcast standard through the Internet when one of the broadcast services of the radio broadcast based on the first broadcast standard is set as the reception target broadcast, obtain the identification information of the broadcast service of the IP radio which broadcasts the content the same as that of the broadcast service of the radio broadcast based on the first broadcast standard

set as the reception target broadcast from the information service, and store the identification information. Note that the broadcast service following unit performs the switching of the reception target broadcast from the broadcast service of the IP radio indicated by the identification information stored when the broadcast service of the radio broadcast based on the first broadcast standard which transmit content the same as the content of the reception target broadcast is the reception target broadcast in a case where the broadcast service of the radio broadcast based on the second broadcast standard is set as the reception target broadcast, to the broadcast service of the IP radio which broadcasts content the same as the broadcast service of the radio broadcast based on the second broadcast standard set as the reception target broadcast.

[0012] According to another embodiment of the present invention, a broadcast reception apparatus which receives a radio broadcast based on a first broadcast standard, a radio broadcast based on a second broadcast standard, and an IP radio and which is connectable to the Internet. The broadcast reception apparatus includes a reception output unit configured to output content received from a broadcast service set as a reception target broadcast, an IP radio identification information obtaining unit configured to be connected to an information service for providing identification information of broadcast services of the IP radio which broadcasts content the same as that of the broadcast services of the radio broadcast based on the first broadcast standard through the Internet when one of the broadcast services of the radio broadcast based on the first broadcast standard is set as the reception target broadcast, obtain the identification information of the broadcast service of the IP radio which broadcasts the content the same as that of the broadcast service of the radio broadcast based on the first broadcast standard set as the reception target broadcast from the information service, and store the identification information, and a broadcast service following unit configured to switch the reception target broadcast to the broadcast service of the radio broadcast based on the second broadcast standard which broadcasts content the same as that of the reception target broadcast, when the broadcast service of the radio broadcast based on the first broadcast standard is set as the reception target broadcast and reception quality of the reception target broadcast is deteriorated and when at least another broadcast service of the radio broadcast based on the first broadcast standard which broadcasts content the same as that of the broadcast service of the radio broadcast based on the first broadcast standard set as the reception target broadcast is not receivable, and switch the reception target broadcast to a broadcast service of an IP radio indicated by the identification information stored when the broadcast service of the radio broadcast based on the first broadcast standard which broadcasts content the same as that of the reception target broadcast is the reception target broadcast, when reception quality of the reception target broadcast is deteriorated and at least the broadcast service of the radio broadcast based on the first broadcast standard which broadcasts content the same as that of the broadcast service of the radio broadcast based on the second broadcast standard set as the reception target broadcast and another broadcast service of the radio broadcast based on the second broadcast standard which broadcasts content the same as that of the broadcast service of the radio broadcast based on the second broadcast standard set as the reception target broadcast are not receivable.

[0013] According to these broadcast reception apparatuses, in a case where the broadcast service of the radio broadcast based on the second broadcast standard is a reception target broadcast which is a target of a reception and output of content, even when identification information of the broadcast service of the IP radio which broadcasts the same content may not be obtained from an information service, the reception target broadcast may be switched to the broadcast service of the IP radio which broadcasts content the same as that of the broadcast of the radio broadcast based on the second broadcast standard using the identification information of the broadcast service of the IP radio obtained from the information service when the broadcast service of the radio broadcast based on the first broadcast standard which broadcasts content the same as that of the broadcast service of the radio broadcast based on the second broadcast standard is the reception target broadcast.

[0014] In the broadcast reception apparatuses, the IP radio identification information obtaining unit may associate, when the broadcast service following unit switches a reception target broadcast from the broadcast service of the radio broadcast based on the first broadcast standard to the broadcast service of the radio broadcast based on the second broadcast standard, identification information of the broadcast service of the IP radio obtained when the broadcast service of the radio broadcast based on the first broadcast standard which is the reception target broadcast before the switching is set as the reception target broadcast with an identifier of the broadcast service of the radio broadcast based on the second broadcast standard set as the reception target broadcast after the switching, and stores the identification information. The broadcast service following unit may switch the reception target broadcast to the broadcast service of the IP radio indicated by the identification information which is stored and which is associated with the identifier of the broadcast service of the radio broadcast based on the second broadcast standard set as the reception target broadcast, when reception quality of the reception target broadcast is deteriorated while the broadcast service of the radio broadcast based on the second broadcast standard is set as the reception target broadcast and when at least the broadcast service of the radio broadcast based on the first broadcast standard which broadcasts content the same as that of the broadcast service of the radio broadcast based on the second broadcast standard

set as the reception target broadcast and another broadcast service of the radio broadcast based on the second broadcast standard which broadcasts content the same as that of the broadcast service of the radio broadcast based on the second broadcast standard set as the reception target broadcast are not receivable.

[0015] In the broadcast reception apparatuses, the broadcast service following unit may switch the reception target broadcast to the receivable broadcast service of the radio broadcast based on the first broadcast standard, in a case where the broadcast service of the radio broadcast based on the first broadcast standard which broadcasts content the same as that of the reception target broadcast becomes receivable while the broadcast service of the radio broadcast based on the second broadcast standard is set as the reception target broadcast.

[0016] In the broadcast reception apparatuses, the broadcast service following unit may switch, when the broadcast service of the radio broadcast based on the first broadcast standard which broadcasts content the same as that of the reception target broadcast becomes receivable which the broadcast service of the IP radio is set as the reception target broadcast, the reception target broadcast to the receivable broadcast service of the radio broadcast based on the first broadcast standard.

[0017] In the broadcast reception apparatuses, the radio broadcast based on the first broadcast standard may be a digital radio broadcast, and the radio broadcast based on the second broadcast standard may be an analog radio broadcast.

[0018] In the broadcast reception apparatuses, the radio broadcast based on the first broadcast standard may be digital audio broadcasting (DAB), and the radio broadcast based on the second broadcast standard may be an FM broadcast.

[0019] In the broadcast reception apparatuses, the information service may be based on a RadioDNS standard.

[0020] The broadcast reception apparatuses may be an in-vehicle broadcast reception apparatus which is mounted on a vehicle.

[0021] According to the present invention, even in a broadcast in which a URL of an IP radio station having the relationship of a simultaneous broadcast through the Internet may not be obtained, the switching to the IP radio having the relationship of a simultaneous broadcast with the broadcast may be performed as quickly as possible.

Fig. 1 is a block diagram illustrating a configuration of a radio broadcast system according to an embodiment of the present invention;

Fig. 2 is a block diagram illustrating a configuration of a radio broadcast receiver according to an embodiment of the present invention;

Fig. 3 is a simultaneous broadcast management table according to an embodiment of the present invention;

Fig. 4 is a flowchart of a DAB following process according to an embodiment of the present invention;

Fig. 5 is a flowchart of a simultaneous broadcast registration process according to an embodiment of the present invention;

Fig. 6 is a flowchart of a FM broadcast following process according to an embodiment of the present invention;

Fig. 7 is a flowchart of an IP radio following process according to an embodiment of the present invention; and

Fig. 8 is a diagram illustrating operation of the radio broadcast receiver according to an embodiment of the present invention.

[0022] Hereinafter, an embodiment of the present invention will be described.

[0023] Fig. 1 is a diagram illustrating a configuration of a radio broadcast system according to an embodiment.

[0024] As illustrated in Fig. 1, a radio broadcast receiver 1 mounted on a vehicle receives digital audio broadcasting (DAB) and FM broadcasts from broadcast stations 2. Furthermore, the radio broadcast receiver 1 connected to the Internet 3 through a mobile communication receives IP radios delivered by IP radio servers 4 on the Internet. Here, examples of the IP radios delivered by the IP radio servers 4 include an IP radio having the relationship of a simultaneous broadcast with the DAB or the FM broadcasts, that is, an IP radio which broadcasts content which is the same as that of the DAB or the FM broadcasts (the same program).

[0025] Furthermore, RadioDNS 5 which provides a URL of an IP radio having the relationship of a simultaneous broadcast with the DAB or the FM broadcast is installed on the Internet.

[0026] Next, a configuration of the radio broadcast receiver 1 will be described with reference to Fig. 2.

[0027] As illustrated in Fig. 2, the radio broadcast receiver 1 includes a mobile communication device 111 which performs mobile communication, an IP radio player 112 which receives an IP radio from the IP radio server 4 on the Internet 3 through the mobile communication device 111 and which outputs received audio, a DAB tuner 113 which receives DAB from the broadcast station 2 and which outputs received audio, and an FM tuner 114 which receives an FM broadcast from the broadcast station 2 and which outputs received audio.

[0028] The radio broadcast receiver 1 further includes an input device 115, a display device 116, a storage device 117, a selector 118 which selects and outputs one of audio output from the DAB tuner 113, audio output from the FM tuner 114, and audio output from the IP radio player 112, an amplifier 119 which amplifies and outputs the audio output from the selector 118, speakers 120 which are driven by an audio signal output from the amplifier 119 and which outputs the audio, and a controller 121 which controls these units included in the radio broadcast receiver 1.

[0029] Next, Fig. 3 is a simultaneous broadcast management table stored in the storage device 117 according to this embodiment.

[0030] As illustrated in Fig. 3, the simultaneous broadcast management table includes a plurality of entries (individual rows in Fig. 3) which include DAB identification information indicating identifiers of DAB services, FM broadcast identification information indicating identifiers of FM broadcast stations (corresponding to the DAB services), IP radio identification information indicating identifiers of IP radio stations (corresponding to the DAB services), and updating date and times registered therein. Here, the DAB identification information, the FM broadcast identification information, and the IP radio identification information in the same entry indicate identifiers of a DAB service, an FM broadcast station, and an IP radio station which have the relationship of a simultaneous broadcast. Furthermore, each of the updating date and times indicates a date and time when a corresponding one of the entries is updated.

[0031] Here, examples of the DAB identification information include a country code of a DAB service, an assembly identifier EID, a service identifier SID, and a service component identifier SIDS. Furthermore, examples of the FM broadcast identification information include a country code of an FM broadcast station, a program identifier PI, and a frequency. The FM broadcast identification information essentially includes the program identifier PI. Furthermore, a URL of an IP radio station is used as the IP radio identification information.

[0032] In the radio broadcast receiver 1 described above, when a user instructs a reception of a specific DAB service, the controller 121 sets the DAB service instructed to be received as a reception target broadcast, causes the DAB tuner 113 to start a reception of the reception target broadcast, causes the selector 118 to select audio output from the DAB tuner 113, and outputs the received audio of the reception target broadcast from the speakers 120. Furthermore, when the user instructs a reception of a specific FM broadcast station, the controller 121 sets the FM broadcast station instructed to be received as a reception target broadcast, causes the FM tuner 114 to start a reception of the reception target broadcast, causes the selector 118 to select audio output from the FM tuner 114, and outputs the received audio of the reception target broadcast from the speakers 120. Moreover, when the user instructs a reception of a specific IP radio station, the controller 121 sets the IP radio station instructed to be received as a reception target broadcast, causes the IP radio player 112 to start a reception of the reception target broadcast, causes the selector 118 to select audio output from the IP radio player 112, and outputs the received audio of the reception target broadcast from the speakers 120.

[0033] Here, service linking information received by the DAB tuner 113 in the DAB indicates an identifier for each program of a DAB service and an FM broadcast station which broadcast the program and which have the relationship of a simultaneous broadcast.

[0034] Furthermore, content which is broadcasted by the DAB service and content of a PI program broadcasted by the FM station which corresponds to an SID of the service have the relationship of a simultaneous broadcast, and the program of the same content is broadcasted. The PI of the FM broadcast station is received by the FM tuner 114 along with audio of the FM broadcast using a radio data system (RDS) of a broadcast performed by the FM broadcast station.

[0035] An alternative frequency (AF) list received by the RDS of the FM broadcast indicates frequencies of other FM broadcasts which broadcast the same PI program.

[0036] The controller 121 accesses the RadioDNS 5 through the mobile communication device 111 so as to obtain a URL of an IP radio station having the relationship of a simultaneous broadcast with a specific DAB service, obtains a URL of an IP radio station having the relationship of a simultaneous broadcast with a specific FM broadcast, or obtain an identifier of a DAB service or an FM broadcast station having the relationship of a simultaneous broadcast with a specific IP radio station.

[0037] Note that the RadioDNS 5 does not provide URLs of IP radio stations having the relationship of a simultaneous broadcast for a number of FM broadcast stations, and therefore, the controller 121 may not obtain the URLs of the IP radio stations having the relationship of a simultaneous broadcast with such FM broadcast stations from the RadioDNS 5.

[0038] The controller 121 performs a DAB following process while a DAB service is set as a reception target broadcast.

[0039] Fig. 4 is a flowchart of a procedure of the DAB following process.

[0040] As illustrated in Fig. 4, the controller 121 monitors deterioration of reception quality of the DAB in the DAB tuner 113 in the DAB following process (step 402).

[0041] When the reception quality is deteriorated, the controller 121 determines whether other receivable DAB services which have the relationship of a simultaneous broadcast with the DAB service which is the reception target broadcast being received by the DAB tuner 113 exist (step 404). When the determination is affirmative, the controller 121 switches the reception target broadcast to one of the other DAB services in a most excellent reception state and causes the DAB tuner 113 to start a reception of the reception target broadcast so that audio received from the reception target broadcast after the switching is output from the speakers 120 (step 406).

[0042] Here, the other DAB services having the relationship of a simultaneous broadcast with the DAB service which is the reception target broadcast may be identified in accordance with service linking information supplied from the DAB. Furthermore, reception states of the other DAB services having the relationship of a simultaneous broadcast with the DAB service which is the reception target broadcast are detected by providing tuners

in two systems for a reception of the DAB in the DAB tuner 113 and repeatedly searching the reception states of the other DAB services having the relationship of the simultaneous broadcast with the DAB service which is the reception target broadcast using one of the tuners in background while the other of the tuner receives the DAB service which is the reception target broadcast.

[0043] On the other hand, when other receivable DAB services having the relationship of a simultaneous broadcast with the DAB service which is the reception target broadcast being received by the DAB tuner 113 do not exist (step 404), the controller 121 determines whether receivable FM broadcast stations having the relationship of a simultaneous broadcast with the DAB service being received by the DAB tuner 113 which is the reception target broadcast exist (step 408). When the determination is affirmative, the controller 121 switches the reception target broadcast to one of the FM broadcast stations in a most excellent reception state, causes the FM tuner 114 to start a reception of the reception target broadcast, and causes the selector 118 to select audio output from the FM tuner 114 so that audio received from the reception target broadcast after the switching is output from the speakers 120 (step 410). Then the DAB following process is terminated.

[0044] Note that reception states of the FM broadcast stations having the relationship of a simultaneous broadcast with the DAB service being received by the DAB tuner 113 which is the reception target broadcast are obtained by causing the FM tuner 114 to repeatedly execute search for reception states of the FM broadcast stations having the relationship of a simultaneous broadcast with the DAB service being received which is indicated by the service linking information received by the DAB tuner 113 while the DAB service is set as the reception target broadcast.

[0045] On the other hand, when other receivable FM broadcast stations having the relationship of a simultaneous broadcast with the DAB service which is the reception target broadcast being received by the DAB tuner 113 do not exist (step 408), the controller 121 determines whether an IP radio station having the relationship of a simultaneous broadcast with the DAB service being received by the DAB tuner 113 which is the reception target broadcast exists (step 412). When the determination is affirmative, the controller 121 switches the reception target broadcast to the existing IP radio station, causes the IP radio player 112 to start a reception of the reception target broadcast, and causes the selector 118 to select audio output from the IP radio player 112 so that audio received in the reception target broadcast after the switching is output from the speakers 120 (step 414). Then the DAB following process is terminated.

[0046] Here, the IP radio station having the relationship of a simultaneous broadcast with the DAB service being received by the DAB tuner 113 which is the reception target broadcast is identified by obtaining a URL of the IP radio station having the relationship of a simultaneous broadcast with the DAB service being received from the RadioDNS 5 in advance.

[0047] Furthermore, when an IP radio station having the relationship of a simultaneous broadcast with the DAB service being received by the DAB tuner 113 which is the reception target broadcast does not exist (step 412), the process returns to step 402 onwards.

[0048] The DAB following process performed by the controller 121 while a DAB service is set as a reception target broadcast has been described.

[0049] Next, when switching of a reception target broadcast to a DAB service is performed, the controller 121 executes a simultaneous broadcast registration process in parallel to the DAB following process described above.

[0050] Fig. 5 is a flowchart of a procedure of the simultaneous broadcast registration process.

[0051] As illustrated in Fig. 5, the controller 121 obtains a URL of an IP radio station having the relationship of a simultaneous broadcast with the DAB service being received from the RadioDNS 5 in the simultaneous broadcast registration process (step 502).

[0052] Thereafter, the obtained URL of the IP radio station is registered as IP radio identification information in an entry, in the simultaneous broadcast management table, including DAB identification information of the DAB service being received by the DAB tuner 113 which is a reception target broadcast registered therein, and an updating date and time of the entry is updated to a current date and time (step 504). Note that, when an entry in which the DAB identification information of the DAB service being received by the DAB tuner 113 which is the reception target broadcast is not included in the simultaneous broadcast management table when the process in step 504 is executed, an entry including DAB identification information of the DAB service being received registered therein is newly generated in the simultaneous broadcast management table before the obtained URL of the IP radio station is registered in the generated entry as IP radio identification information and the updating date and time of the entry is updated to a current date and time.

[0053] Subsequently, the controller 121 monitors generation of a change of the reception target broadcast (step 506). When the reception target broadcast is changed, the controller 121 determines whether the change of the reception target broadcast has occurred due to switching from the DAB service of the reception target broadcast to the FM broadcast station which is performed in the DAB following process described above (step 508).

[0054] When the change of the reception target broadcast is caused by the switching from the DAB service of the reception target broadcast to the FM broadcast station in the DAB following process described above (step 508), an identifier of the FM broadcast station of a reception target broadcast after the change is registered as FM broadcast identification information in an entry in

which DAB identification information of the DAB service of the reception target broadcast before the change of the reception target broadcast is registered, and an updating date and time of the entry is updated to a current date and time (step 510). Then the simultaneous broadcast registration process is terminated.

[0055] On the other hand, when the change of the reception target broadcast is not caused by the switching from the DAB service of the reception target broadcast to the FM broadcast station in the DAB following process described above (step 508), the simultaneous broadcast registration process is immediately terminated.

[0056] Subsequently, the controller 121 periodically performs a process of deleting entries corresponding to registered updating date and times which are older than a predetermined period of time in entries of the simultaneous management table.

[0057] Furthermore, when the switching of the reception target broadcast to the FM broadcast station is performed, the controller 121 attempts to obtain a URL of an IP radio station having the relationship of a simultaneous broadcast with the FM broadcast station being received from the RadioDNS 5. When the obtainment of the URL of the IP radio station is successfully performed, a simultaneous IP radio broadcast lookup process is performed to store the URL of the obtained IP radio station.

[0058] Furthermore, the controller 121 performs an FM broadcast following process while the FM broadcast station is set as the reception target broadcast.

[0059] Fig. 6 is a flowchart of a procedure of the FM broadcast following process.

[0060] As illustrated in Fig. 6, the controller 121 monitors generation of receivable DAB services having the relationship of a simultaneous broadcast with an FM broadcast station being received by the FM tuner 114 which is a reception target broadcast (step 602) and occurrence of deterioration of reception quality of the FM broadcast station of the reception target broadcast in the FM tuner 114 (step 604).

[0061] Here, the DAB service having the relationship of a simultaneous broadcast with the FM broadcast station being received by the FM tuner 114 which is the reception target broadcast may be identified as a DAB service having an SID which is the same as an PI of the FM broadcast station being received or may be identified based on service linking information received so far by the DAB.

[0062] Furthermore, a reception state of the DAB service having the relationship of a simultaneous broadcast with the FM broadcast station being received by the FM tuner 114 which is the reception target broadcast is obtained by causing the DAB tuner 113 to repeatedly execute search for reception states of DAB services having the relationship of a simultaneous broadcast with the FM broadcast being received in background while the FM broadcast station is set as the reception target broadcast.

[0063] When a receivable DAB service having the relationship of a simultaneous broadcast with the FM broadcast being received by the FM tuner 114 which is the reception target broadcast is generated (step 602), the reception target broadcast is switched to a DAB service in an most excellent reception state which has the relationship of a simultaneous broadcast with the FM broadcast station being received (step 606), the controller 121 causes the DAB tuner 113 to start a reception of the reception target broadcast, and causes the selector 118 to select audio output by the DAB tuner 113, and outputs the audio received in the reception target broadcast after the switching from the speakers 120. Then the FM following process is terminated.

[0064] On the other hand, when the deterioration of the reception quality of the FM broadcast station which is the reception target broadcast in the FM tuner 114 occurs (step 604), the controller 121 determines whether another receivable FM broadcast station having the relationship of a simultaneous broadcast with the FM broadcast station which is the reception target broadcast being received by the FM tuner 114 exists (step 608). When the determination is affirmative, the controller 121 switches the reception target broadcast to the other receivable FM broadcast station and causes the FM tuner 114 to start a reception of the reception target broadcast so as to output the received audio of the reception target broadcast after the switching from the speakers 120 (step 610).

[0065] Here, the other FM broadcast station having the relationship of a simultaneous broadcast with the FM broadcast station of the reception target broadcast may be identified using the AF list received from the FM broadcast station of the reception target broadcast.

[0066] Furthermore, a reception state of the other FM broadcast station having the relationship of a simultaneous broadcast with the FM broadcast which is the reception target broadcast is detected by providing tuners in two systems for reception of FM broadcasts in the FM tuner 114 and repeatedly searching for the reception state of the other FM broadcast station having the relationship of a simultaneous broadcast with the FM broadcast which is the reception target broadcast using one of the tuners in background while the other of the tuners receives the FM broadcast station which is the reception target broadcast.

[0067] On the other hand, when another receivable FM broadcast station having the relationship of a simultaneous broadcast with the FM broadcast station which is the reception target broadcast being received by the FM tuner 114 does not exist (step 608), the controller 121 determines whether a URL of an IP radio station having the relationship of a simultaneous broadcast with the FM broadcast station being received has been obtained from the RadioDNS 5 by the simultaneous IP radio broadcast lookup process and whether the URL has been stored (step 612).

[0068] When the determination is affirmative, the controller 121 switches the reception target broadcast to the IP radio station corresponding to the stored URL, causes

the IP radio player 112 to start a reception of the reception target broadcast, and causes the selector 118 to select audio output from the IP radio player 112 so as to output the audio received in the reception target broadcast after the switching from the speakers 120 (step 614). Then the FM following process is terminated.

[0069] On the other hand, when the determination is negative, the controller 121 determines whether an entry in which an identifier including a PI which is the same as that of the FM broadcast station being received by the FM tuner 114 of the reception target broadcast is registered exists (step 616). When the determination is negative, the process from step 602 onward is performed again.

[0070] On the other hand, when the determination is affirmative (step 616), the controller 121 switches the reception target broadcast to an IP radio station corresponding to a URL indicated by IP radio identification information which corresponds to one of existence entries which corresponds to a latest updating date and time, causes the IP radio player 112 to start reception of the reception target broadcast, and causes the selector 118 to select audio output from the IP radio player 112 so as to output the audio received in the reception target broadcast after the switching from the speakers 120 (step 618).

[0071] Then the FM following process is terminated.

[0072] The FM broadcast following process performed by the controller 121 while an FM broadcast station is set as a reception target broadcast has been described above.

[0073] Furthermore, the controller 121 performs the IP radio following process while an IP radio station is set as a reception target broadcast.

[0074] Fig. 7 is a flowchart of a procedure of the IP radio following process.

[0075] As illustrated in Fig. 7, the controller 121 monitors generation of receivable DAB services which have the relationship of a simultaneous broadcast with an IP radio station being received by the IP radio player 112 which is a reception target broadcast (step 702) and generation of receivable FM broadcast stations which have the relationship of a simultaneous broadcast with the IP radio station being received by the IP radio player 112 which is a reception target broadcast (step 704).

[0076] Here, identifiers of a service of the DAB broadcast and an FM broadcast station which have the relationship of a simultaneous broadcast with the IP radio station being received may be obtained from the RadioDNS 5.

[0077] Furthermore, the reception states of the DAB broadcast service and the FM broadcast station which have the relationship of a simultaneous broadcast with the IP radio station being received are obtained by causing the DAB tuner 113 to repeatedly execute search of reception states of the DAB services having the relationship of a simultaneous broadcast and causing the FM tuner 114 to repeatedly execute search of reception states of the FM broadcast stations having the relationship of a simultaneous broadcast in background while the IP radio station is set as the reception target broadcast.

[0078] When receivable DAB services having the relationship of a simultaneous broadcast with the IP radio station being received by the IP radio player 112 which is the reception target broadcast are generated (step 702), the controller 121 switches the reception target broadcast to one of the DAB services in an most excellent reception state which has the relationship of a simultaneous broadcast with the IP radio station being received and causes the selector 118 to select audio output from the DAB tuner 113 so as to output the audio received in the reception target broadcast after the switching from the speakers 120 (step 706). Then the IP radio following process is terminated.

[0079] On the other hand, when receivable FM broadcast stations having the relationship of a simultaneous broadcast with the IP radio station being received by the IP radio player 112 which is the reception target broadcast are generated (step 704), the controller 121 switches the reception target broadcast to one of the FM broadcast stations in a most excellent reception state which has the relationship of a simultaneous broadcast with the IP radio station being received and causes the selector 118 to select audio output from the FM tuner 114 so as to output the audio received in the reception target broadcast after the switching from the speakers 120 (step 708). Then the IP radio following process is terminated.

[0080] The IP radio following process performed by the controller 121 while an IP radio station is set as a reception target broadcast has been described above.

[0081] Hereinafter, operation of such a radio broadcast reception apparatus will be described with reference to Fig. 8.

[0082] It is assumed here that, in a radio broadcast reception apparatus, when a DAB service is set as a reception target broadcast at a time point t0, a reception of the DAB service and output of audio received from the DAB service are started, a URL of an IP radio station having the relationship of a simultaneous broadcast with the DAB service being received from the RadioDNS 5 is obtained, and the obtained URL of the IP radio station is registered as IP radio identification information in an entry in which an identifier of the DAB service set as a reception target broadcast in the simultaneous management table is registered as DAB identification information.

[0083] Thereafter, when reception quality of the DAB service is deteriorated at a time point t1, the reception target broadcast is switched to an FM broadcast station having the relationship of a simultaneous broadcast with the DAB service being received, a reception of the FM broadcast station and output of audio received from the FM broadcast station are started, an identifier of the FM broadcast station which is the reception target broadcast after the switching is registered as FM broadcast identification information in an entry in which an identifier of

the DAB service of the reception target broadcast before the switching is registered as DAB identification information.

[0084] Furthermore, when the reception target broadcast is switched to the FM broadcast station at the time point t1, an obtainment of a URL of an IP radio station having the relationship of a simultaneous broadcast with the FM broadcast station being received from the RadioDNS 5 is attempted. However, the RadioDNS 5 does not provide information on a simultaneous broadcast of the FM broadcast station being received, and therefore, an obtainment of the URL of the IP radio station fails.

[0085] Thereafter, when reception quality of the FM broadcast station is deteriorated at a time point t2, the reception target broadcast is switched to the IP radio station corresponding to the URL indicated by the IP radio identification information of the entry in which the identifier of the FM broadcast station set as the reception target broadcast is registered as the FM broadcast identification information in the simultaneous management table, and a reception of the IP radio station and output of audio received from the IP radio station are started.

[0086] Furthermore, when the reception target broadcast is switched to the IP radio station at the time point t2, identifiers of a DAB broadcast service and an FM broadcast station which have the relationship of a simultaneous broadcast with the IP radio station being received from the RadioDNS 5 are obtained.

[0087] Thereafter, when the DAB service having the relationship of a simultaneous broadcast with the IP radio station being received becomes receivable at a time point t3, the reception target broadcast is switched to the DAB service and reception of the DAB service and output of audio received from the DAB service are started.

[0088] The embodiment of the present invention has been described hereinabove.

[0089] Note that the foregoing embodiment may be modified as follows.

[0090] Specifically, in this case, in the simultaneous broadcast registration process illustrated in Fig. 5, a URL of an IP radio station having the relationship of a simultaneous broadcast with the DAB service being received from the RadioDNS 5 is obtained and stored while the DAB service is set as the reception target broadcast. Furthermore, in step 612 in the FM broadcast following process of Fig. 6, when a current reception target broadcast is one of an FM broadcast station set as a reception target broadcast by the DAB following process and an FM broadcast station having an PI the same as that of the FM broadcast station set as a reception target broadcast by the DAB following process, the process proceeds to step 614, and otherwise, the process returns to step 602. Then in step 614 in the FM broadcast following process, the reception target broadcast is switched to the IP station corresponding to a URL of a latest IP radio station stored in the simultaneous broadcast registration process, the IP radio player 112 starts a reception of the reception target broadcast, and the selector 118 selects audio output from the IP radio player 112 so that the audio received in the reception target broadcast after the switching is output from the speakers 120. In this way, the FM broadcast following process is terminated. In this case, steps 616 and 618 are not required.

[0091] Although the case where the IP radio, the DAB, and the FM broadcast are received by the radio broadcast receiver has been described hereinabove, this embodiment is similarly applicable to a radio broadcast receiver which receives an IP radio and different radio broadcasts of different broadcast standards.

Claims

1. A broadcast reception apparatus which is configured to receive a radio broadcast based on a first broadcast standard, a radio broadcast based on a second broadcast standard, and an IP radio and which is connectable to the Internet, the broadcast reception apparatus comprising:

   a reception output unit (112, 113, 114) configured to output content received from a broadcast service set as a reception target broadcast;
   an IP radio identification information obtaining unit (121) configured to be connected to an information service for providing identification information of broadcast services of the IP radio which broadcasts content the same as that of the broadcast services of the radio broadcast based on the first broadcast standard through the Internet when one of the broadcast services of the radio broadcast based on the first broadcast standard is set as the reception target broadcast, obtain the identification information of the broadcast service of the IP radio which broadcasts the content the same as that of the broadcast service of the radio broadcast based on the first broadcast standard set as the reception target broadcast from the information service, and store the identification information; and
   a broadcast service following unit (121) configured to switch the reception target broadcast to the broadcast service of the radio broadcast based on the second broadcast standard which broadcasts content the same as that of the reception target broadcast, when the broadcast service of the radio broadcast based on the first broadcast standard is set as the reception target broadcast and reception quality of the reception target broadcast is deteriorated and when at least another broadcast service of the radio broadcast based on the first broadcast standard which broadcasts content the same as that of the broadcast service of the radio broadcast based on the first broadcast standard set as the reception target broadcast is not receivable, and

switch the reception target broadcast to a broadcast service of an IP radio indicated by the identification information stored when the broadcast service of the radio broadcast based on the first broadcast standard which broadcasts content the same as that of the reception target broadcast is the reception target broadcast, when reception quality of the reception target broadcast is deteriorated and at least the broadcast service of the radio broadcast based on the first broadcast standard which broadcasts content the same as that of the broadcast service of the radio broadcast based on the second broadcast standard set as the reception target broadcast and another broadcast service of the radio broadcast based on the second broadcast standard which broadcasts content the same as that of the broadcast service of the radio broadcast based on the second broadcast standard set as the reception target broadcast are not receivable.

2. The broadcast reception apparatus according to claim 1, wherein
the IP radio identification information obtaining unit is configured to associate, when the broadcast service following unit switches a reception target broadcast from the broadcast service of the radio broadcast based on the first broadcast standard to the broadcast service of the radio broadcast based on the second broadcast standard, identification information of the broadcast service of the IP radio obtained when the broadcast service of the radio broadcast based on the first broadcast standard which is the reception target broadcast before the switching is set as the reception target broadcast with an identifier of the broadcast service of the radio broadcast based on the second broadcast standard set as the reception target broadcast after the switching, and to store the identification information, and
the broadcast service following unit is configured to switch the reception target broadcast to the broadcast service of the IP radio indicated by the identification information which is stored and which is associated with the identifier of the broadcast service of the radio broadcast based on the second broadcast standard set as the reception target broadcast, when reception quality of the reception target broadcast is deteriorated while the broadcast service of the radio broadcast based on the second broadcast standard is set as the reception target broadcast and when at least the broadcast service of the radio broadcast based on the first broadcast standard which broadcasts content the same as that of the broadcast service of the radio broadcast based on the second broadcast standard set as the reception target broadcast and another broadcast service of the radio broadcast based on the second broadcast standard which broadcasts content the same as that of the broadcast service of the radio broadcast based on the second broadcast standard set as the reception target broadcast are not receivable.

3. The broadcast reception apparatus according to claim 1 or 2, wherein the broadcast service following unit is configured to switch the reception target broadcast to the receivable broadcast service of the radio broadcast based on the first broadcast standard, in a case where the broadcast service of the radio broadcast based on the first broadcast standard which broadcasts content the same as that of the reception target broadcast becomes receivable while the broadcast service of the radio broadcast based on the second broadcast standard is set as the reception target broadcast.

4. The broadcast reception apparatus according to any one of claims 1 to 3, wherein the broadcast service following unit is configured to switch, when the broadcast service of the radio broadcast based on the first broadcast standard which broadcasts content the same as that of the reception target broadcast becomes receivable which the broadcast service of the IP radio is set as the reception target broadcast, the reception target broadcast to the receivable broadcast service of the radio broadcast based on the first broadcast standard.

5. The broadcast reception apparatus according to any one of claims 1 to 4, wherein the radio broadcast based on the first broadcast standard is a digital radio broadcast, and the radio broadcast based on the second broadcast standard is an analog radio broadcast.

6. The broadcast reception apparatus according to claim 5, wherein the radio broadcast based on the first broadcast standard is digital audio broadcasting (DAB), and the radio broadcast based on the second broadcast standard is an FM broadcast.

7. The broadcast reception apparatus according to any one of claims 1 to 6, wherein the information service is based on a RadioDNS standard.

8. The broadcast reception apparatus according to any one of claims 1 to 7, wherein the broadcast reception apparatus is an in-vehicle broadcast reception apparatus which is mounted on a vehicle.

9. A broadcast service switching method for switching a reception target broadcast which is a broadcast service which performs a reception of content and output of the received content between broadcast services which broadcast the same content in a broadcast reception apparatus which is connectable

to the Internet and which receives a radio broadcast based on a first broadcast standard, a radio broadcast based on a second broadcast standard, and an IP radio, the broadcast service switching method comprising:

being connected to an information service for providing identification information of broadcast services of the IP radio which broadcasts content the same as that of the broadcast services of the radio broadcast based on the first broadcast standard through the Internet when one of the broadcast services of the radio broadcast based on the first broadcast standard is set as the reception target broadcast, obtaining the identification information of the broadcast service of the IP radio which broadcasts the content the same as that of the broadcast service of the radio broadcast based on the first broadcast standard set as the reception target broadcast from the information service, and storing the identification information; and

switching the reception target broadcast to the broadcast service of the radio broadcast based on the second broadcast standard which broadcasts content the same as that of the reception target broadcast, when the broadcast service of the radio broadcast based on the first broadcast standard is set as the reception target broadcast and reception quality of the reception target broadcast is deteriorated and when at least another broadcast service of the radio broadcast based on the first broadcast standard which broadcasts content the same as that of the broadcast service of the radio broadcast based on the first broadcast standard set as the reception target broadcast is not receivable, and switching the reception target broadcast to a broadcast service of an IP radio indicated by the identification information stored when the broadcast service of the radio broadcast based on the first broadcast standard which broadcasts content the same as that of the reception target broadcast is the reception target broadcast, when reception quality of the reception target broadcast is deteriorated and at least the broadcast service of the radio broadcast based on the first broadcast standard which broadcasts content the same as that of the broadcast service of the radio broadcast based on the second broadcast standard set as the reception target broadcast and another broadcast service of the radio broadcast based on the second broadcast standard which broadcasts content the same as that of the broadcast service of the radio broadcast based on the second broadcast standard set as the reception target broadcast are not receivable.

10. The broadcast service switching method according to claim 9, wherein

when the reception target broadcast is switched from the broadcast service of the radio broadcast based on the first broadcast standard to the broadcast service of the radio broadcast based on the second broadcast standard, identification information of the broadcast service of the IP radio obtained when the broadcast service of the radio broadcast based on the first broadcast standard which is the reception target broadcast before the switching is set as the reception target broadcast is associated with an identifier of the broadcast service of the radio broadcast based on the second broadcast standard set as the reception target broadcast after the switching, and the identification information is stored, and

the reception target broadcast is switched to the broadcast service of the IP radio indicated by the identification information which is stored and which is associated with the identifier of the broadcast service of the radio broadcast based on the second broadcast standard set as the reception target broadcast, when reception quality of the reception target broadcast is deteriorated while the broadcast service of the radio broadcast based on the second broadcast standard is set as the reception target broadcast and when at least the broadcast service of the radio broadcast based on the first broadcast standard which broadcasts content the same as that of the broadcast service of the radio broadcast based on the second broadcast standard set as the reception target broadcast and another broadcast service of the radio broadcast based on the second broadcast standard which broadcasts content the same as that of the broadcast service of the radio broadcast based on the second broadcast standard set as the reception target broadcast are not receivable.

FIG. 1

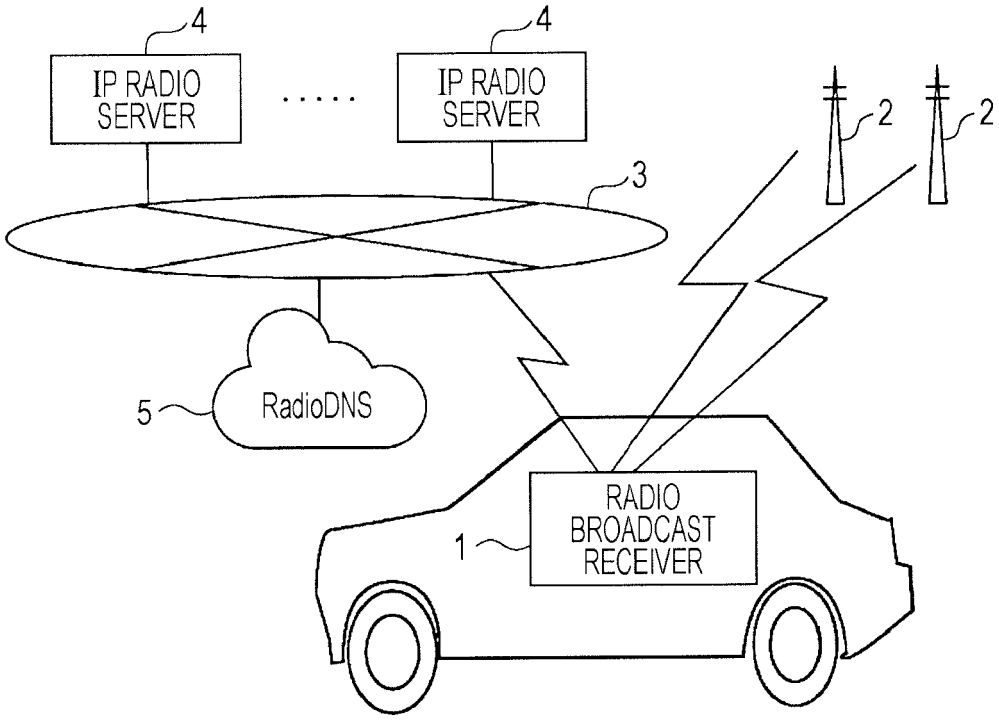

4
IP RADIO SERVER
4
IP RADIO SERVER
3
2
2
5
RadioDNS
1
RADIO BROADCAST RECEIVER

FIG. 2

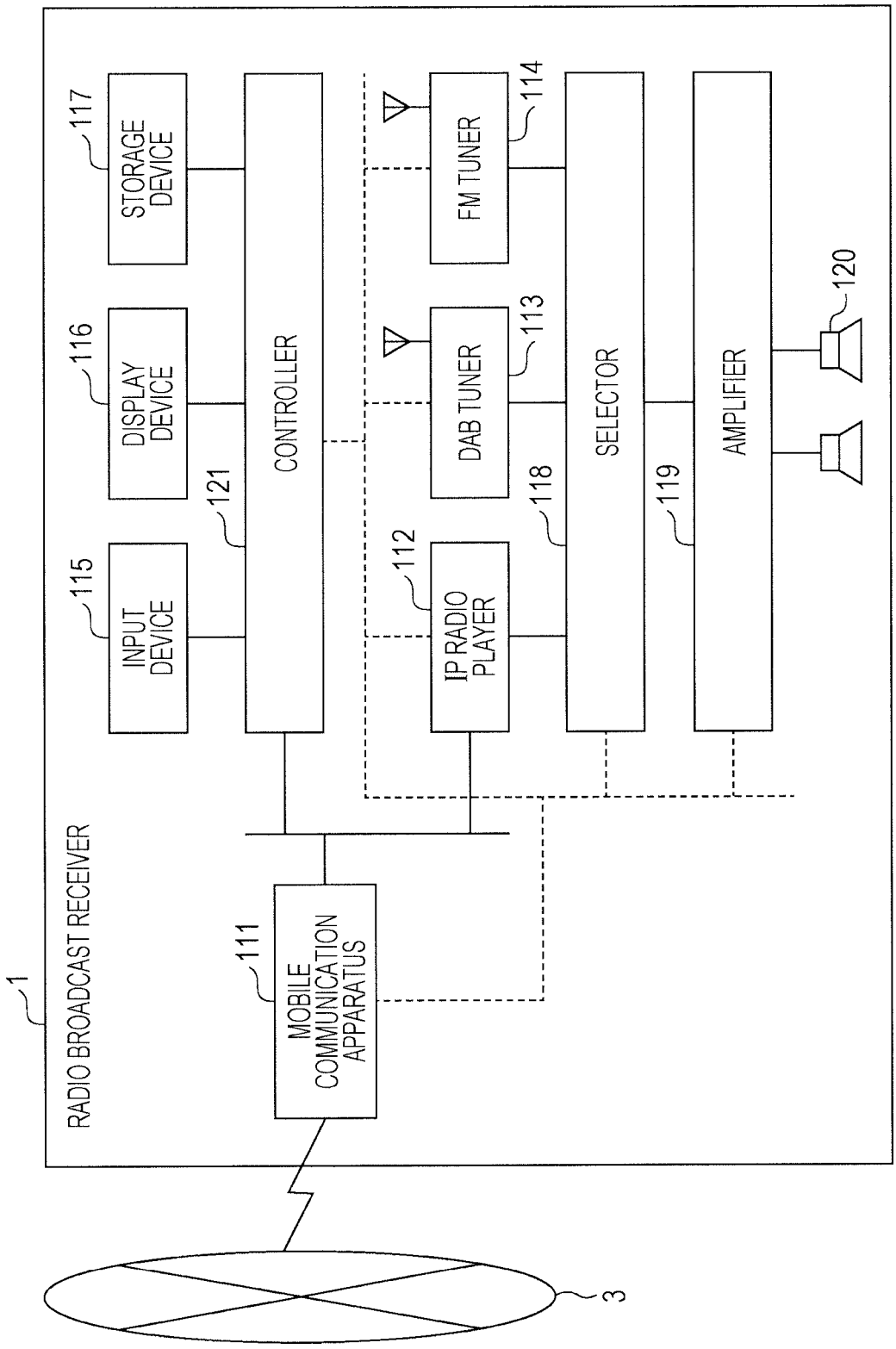

1
RADIO BROADCAST RECEIVER
111
MOBILE COMMUNICATION APPARATUS
112
IP RADIO PLAYER
113
DAB TUNER
114
FM TUNER
115
INPUT DEVICE
116
DISPLAY DEVICE
117
STORAGE DEVICE
118
SELECTOR
119
AMPLIFIER
120
121
CONTROLLER
3

FIG. 3

DAB IDENTIFICATION INFORMATION	FM BROADCAST IDENTIFICATION INFORMATION	IP RADIO IDENTIFICATION INFORMATION	UPDATING DATE AND TIME
ce1.c1a5.c47f.0	09580.c586.ce1	http://music.com/UK.m3u	2016/11/07 14:24
ce1.b2a3.c18c.0	10580.c18c.ce1	http://radio.com/LD.m3u	2016/11/07 13:44
⋮	⋮	⋮	

FIG. 4

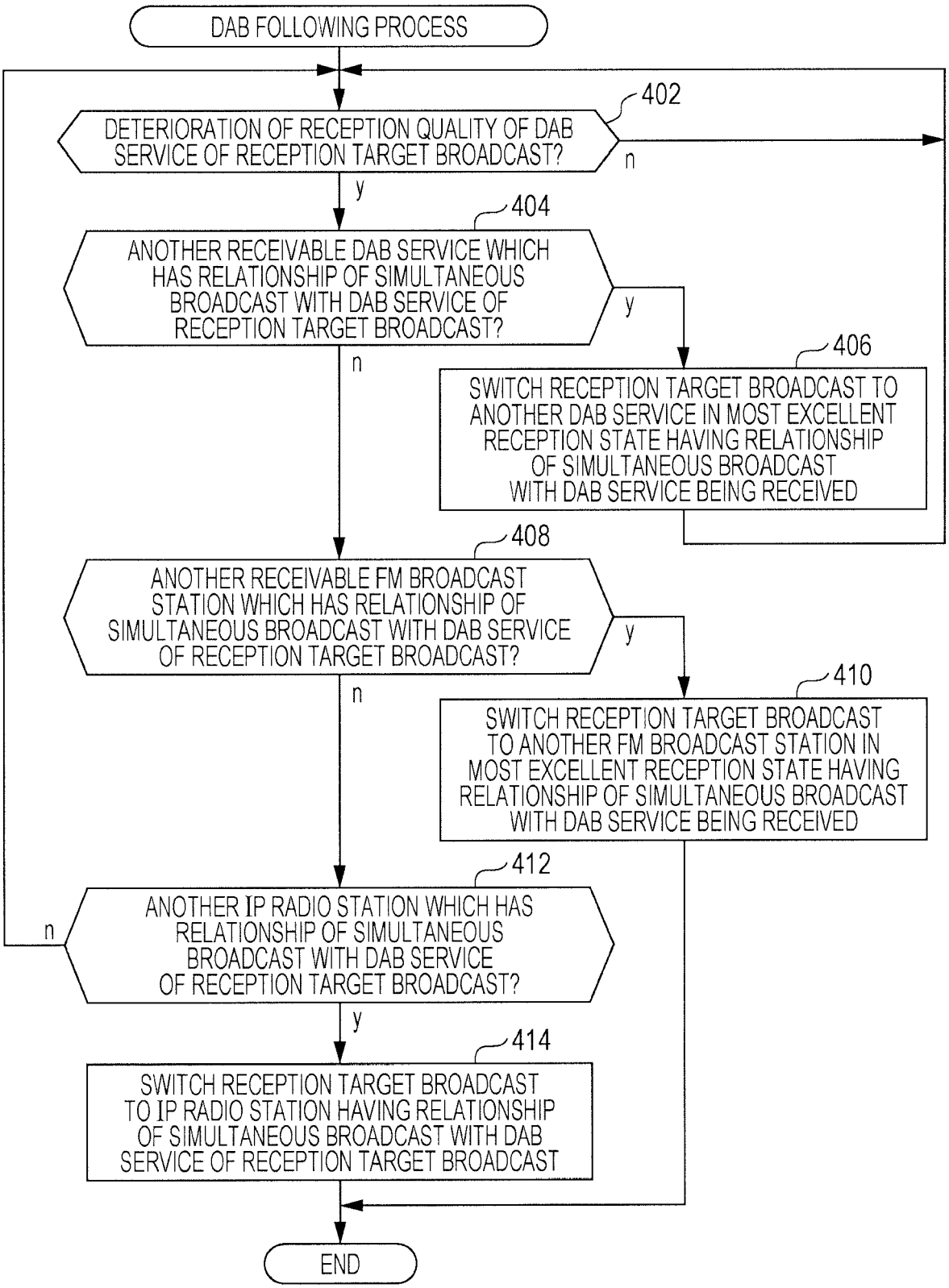

DAB FOLLOWING PROCESS
402
DETERIORATION OF RECEPTION QUALITY OF DAB SERVICE OF RECEPTION TARGET BROADCAST?
n
y
404
ANOTHER RECEIVABLE DAB SERVICE WHICH HAS RELATIONSHIP OF SIMULTANEOUS BROADCAST WITH DAB SERVICE OF RECEPTION TARGET BROADCAST?
y
406
SWITCH RECEPTION TARGET BROADCAST TO ANOTHER DAB SERVICE IN MOST EXCELLENT RECEPTION STATE HAVING RELATIONSHIP OF SIMULTANEOUS BROADCAST WITH DAB SERVICE BEING RECEIVED
n
408
ANOTHER RECEIVABLE FM BROADCAST STATION WHICH HAS RELATIONSHIP OF SIMULTANEOUS BROADCAST WITH DAB SERVICE OF RECEPTION TARGET BROADCAST?
y
410
SWITCH RECEPTION TARGET BROADCAST TO ANOTHER FM BROADCAST STATION IN MOST EXCELLENT RECEPTION STATE HAVING RELATIONSHIP OF SIMULTANEOUS BROADCAST WITH DAB SERVICE BEING RECEIVED
n
412
ANOTHER IP RADIO STATION WHICH HAS RELATIONSHIP OF SIMULTANEOUS BROADCAST WITH DAB SERVICE OF RECEPTION TARGET BROADCAST?
n
y
414
SWITCH RECEPTION TARGET BROADCAST TO IP RADIO STATION HAVING RELATIONSHIP OF SIMULTANEOUS BROADCAST WITH DAB SERVICE OF RECEPTION TARGET BROADCAST
END

FIG. 5

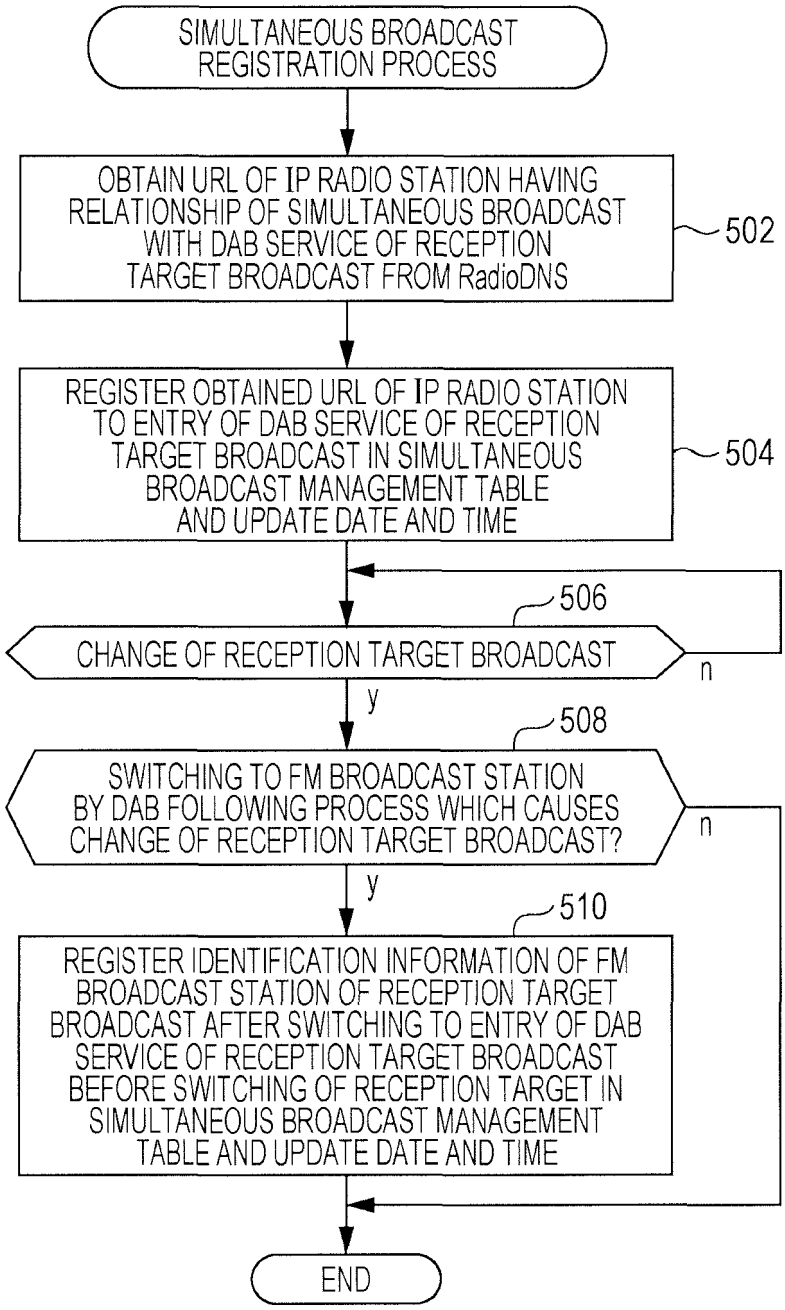

SIMULTANEOUS BROADCAST REGISTRATION PROCESS
OBTAIN URL OF IP RADIO STATION HAVING RELATIONSHIP OF SIMULTANEOUS BROADCAST WITH DAB SERVICE OF RECEPTION TARGET BROADCAST FROM RadioDNS
502
REGISTER OBTAINED URL OF IP RADIO STATION TO ENTRY OF DAB SERVICE OF RECEPTION TARGET BROADCAST IN SIMULTANEOUS BROADCAST MANAGEMENT TABLE AND UPDATE DATE AND TIME
504
506
CHANGE OF RECEPTION TARGET BROADCAST
n
y
508
SWITCHING TO FM BROADCAST STATION BY DAB FOLLOWING PROCESS WHICH CAUSES CHANGE OF RECEPTION TARGET BROADCAST?
n
y
510
REGISTER IDENTIFICATION INFORMATION OF FM BROADCAST STATION OF RECEPTION TARGET BROADCAST AFTER SWITCHING TO ENTRY OF DAB SERVICE OF RECEPTION TARGET BROADCAST BEFORE SWITCHING OF RECEPTION TARGET IN SIMULTANEOUS BROADCAST MANAGEMENT TABLE AND UPDATE DATE AND TIME
END

FIG. 6

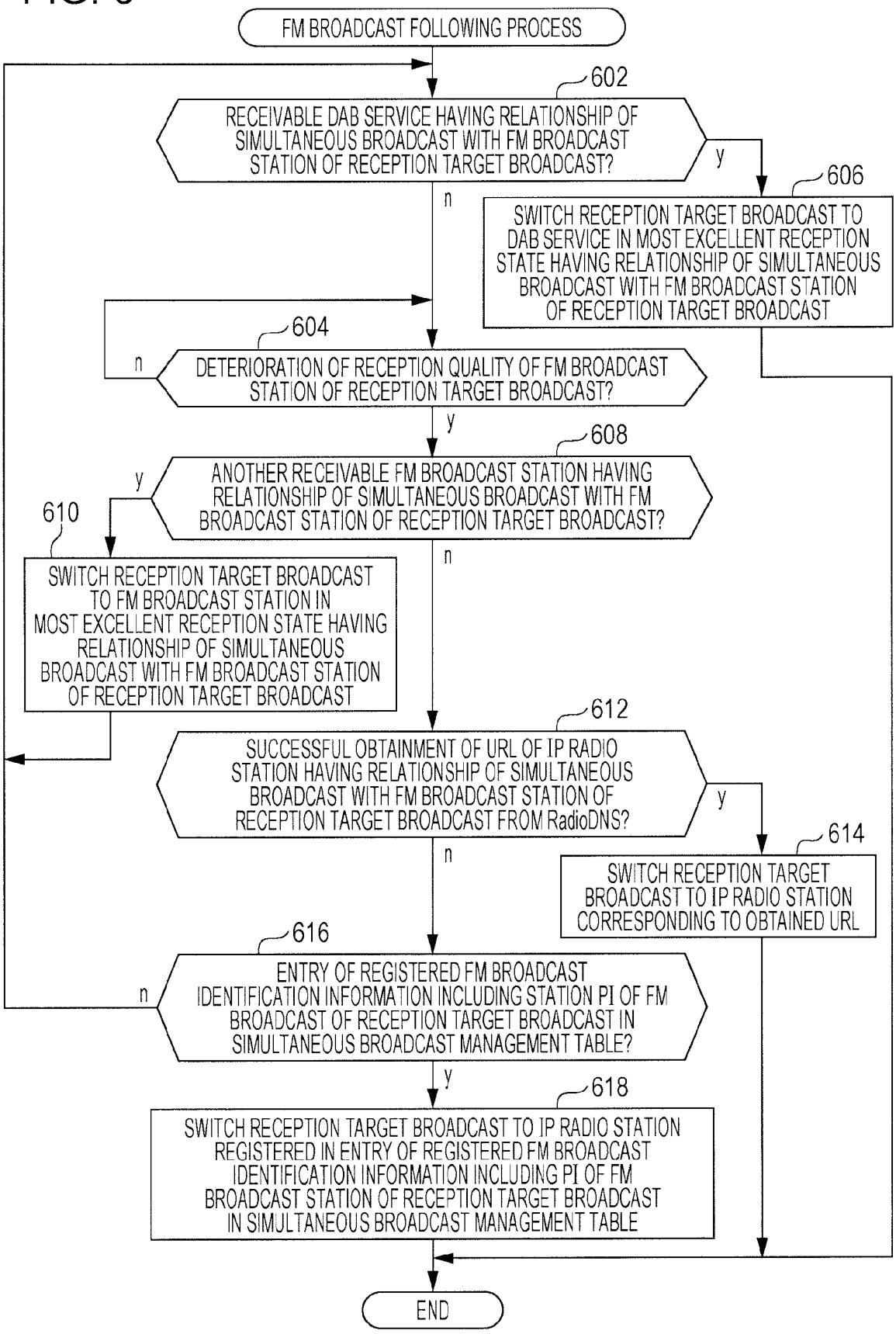

FM BROADCAST FOLLOWING PROCESS
602
RECEIVABLE DAB SERVICE HAVING RELATIONSHIP OF SIMULTANEOUS BROADCAST WITH FM BROADCAST STATION OF RECEPTION TARGET BROADCAST?
y
n
606
SWITCH RECEPTION TARGET BROADCAST TO DAB SERVICE IN MOST EXCELLENT RECEPTION STATE HAVING RELATIONSHIP OF SIMULTANEOUS BROADCAST WITH FM BROADCAST STATION OF RECEPTION TARGET BROADCAST
604
n
DETERIORATION OF RECEPTION QUALITY OF FM BROADCAST STATION OF RECEPTION TARGET BROADCAST?
y
608
y
ANOTHER RECEIVABLE FM BROADCAST STATION HAVING RELATIONSHIP OF SIMULTANEOUS BROADCAST WITH FM BROADCAST STATION OF RECEPTION TARGET BROADCAST?
610
n
SWITCH RECEPTION TARGET BROADCAST TO FM BROADCAST STATION IN MOST EXCELLENT RECEPTION STATE HAVING RELATIONSHIP OF SIMULTANEOUS BROADCAST WITH FM BROADCAST STATION OF RECEPTION TARGET BROADCAST
612
SUCCESSFUL OBTAINMENT OF URL OF IP RADIO STATION HAVING RELATIONSHIP OF SIMULTANEOUS BROADCAST WITH FM BROADCAST STATION OF RECEPTION TARGET BROADCAST FROM RadioDNS?
y
n
614
SWITCH RECEPTION TARGET BROADCAST TO IP RADIO STATION CORRESPONDING TO OBTAINED URL
616
n
ENTRY OF REGISTERED FM BROADCAST IDENTIFICATION INFORMATION INCLUDING STATION PI OF FM BROADCAST OF RECEPTION TARGET BROADCAST IN SIMULTANEOUS BROADCAST MANAGEMENT TABLE?
y
618
SWITCH RECEPTION TARGET BROADCAST TO IP RADIO STATION REGISTERED IN ENTRY OF REGISTERED FM BROADCAST IDENTIFICATION INFORMATION INCLUDING PI OF FM BROADCAST STATION OF RECEPTION TARGET BROADCAST IN SIMULTANEOUS BROADCAST MANAGEMENT TABLE
END

FIG. 7

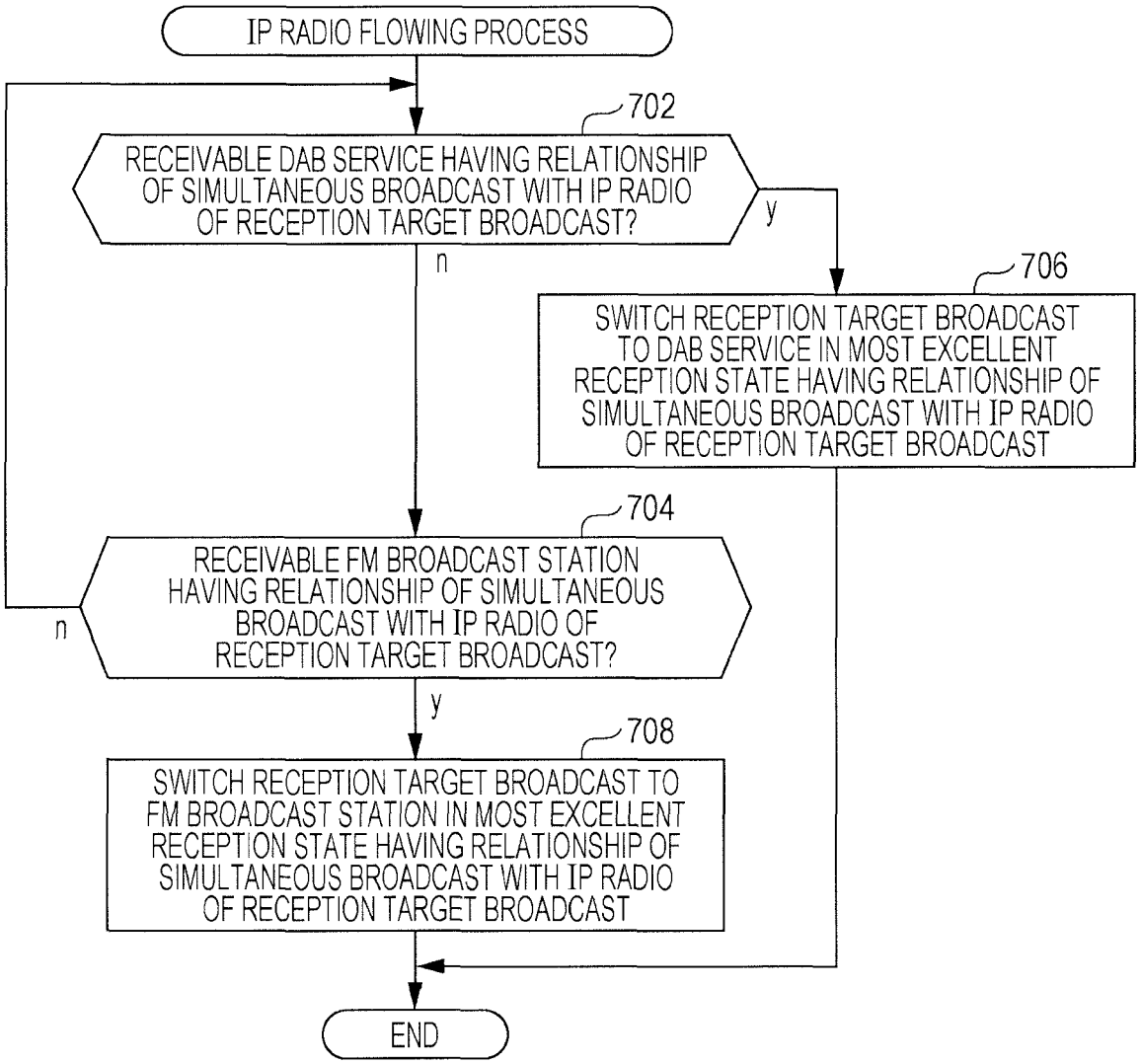
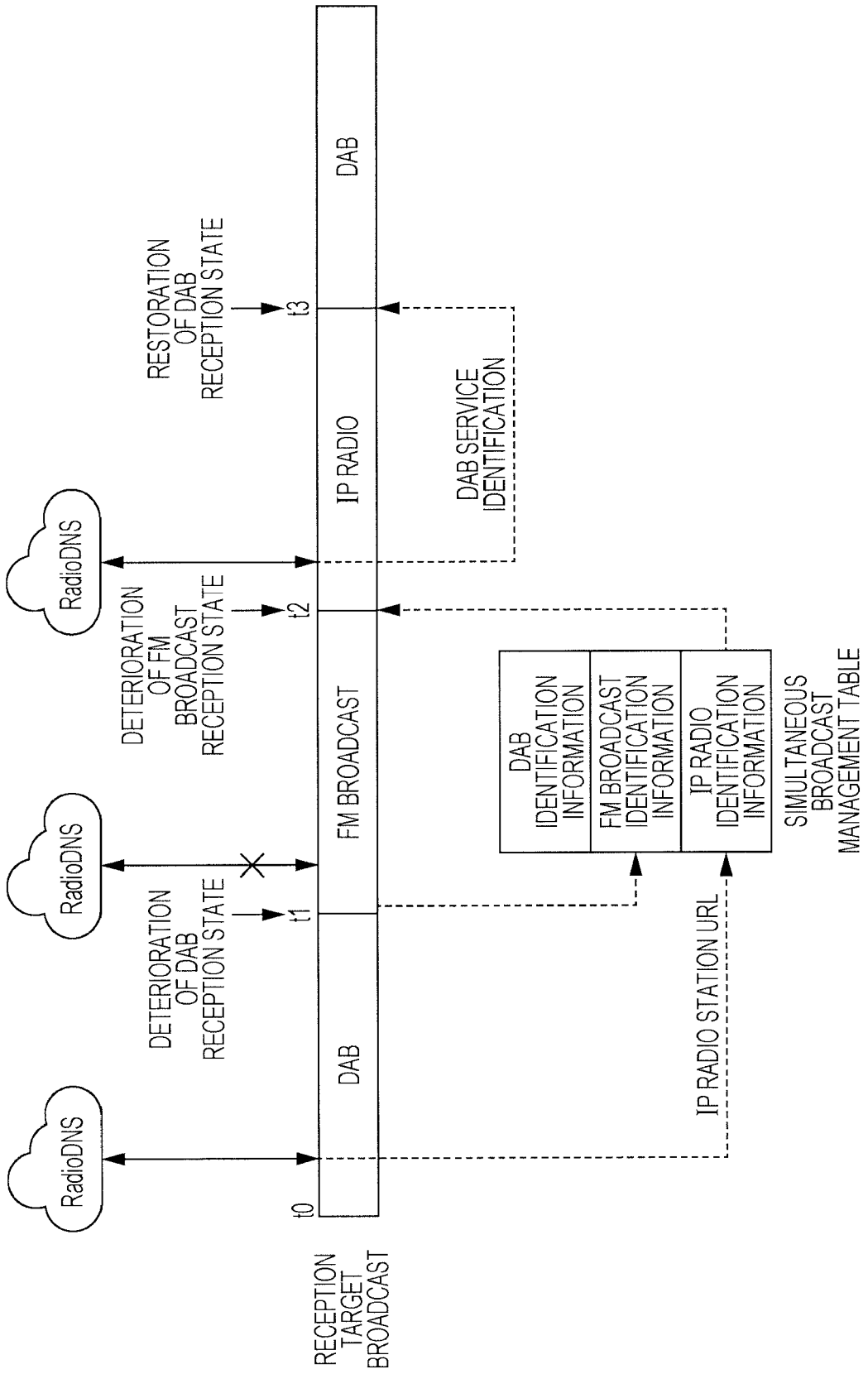

IP RADIO FLOWING PROCESS
702
RECEIVABLE DAB SERVICE HAVING RELATIONSHIP OF SIMULTANEOUS BROADCAST WITH IP RADIO OF RECEPTION TARGET BROADCAST?
y
n
706
SWITCH RECEPTION TARGET BROADCAST TO DAB SERVICE IN MOST EXCELLENT RECEPTION STATE HAVING RELATIONSHIP OF SIMULTANEOUS BROADCAST WITH IP RADIO OF RECEPTION TARGET BROADCAST
704
RECEIVABLE FM BROADCAST STATION HAVING RELATIONSHIP OF SIMULTANEOUS BROADCAST WITH IP RADIO OF RECEPTION TARGET BROADCAST?
n
y
708
SWITCH RECEPTION TARGET BROADCAST TO FM BROADCAST STATION IN MOST EXCELLENT RECEPTION STATE HAVING RELATIONSHIP OF SIMULTANEOUS BROADCAST WITH IP RADIO OF RECEPTION TARGET BROADCAST
END

FIG. 8


RadioDNS
RadioDNS
RadioDNS
DETERIORATION OF DAB RECEPTION STATE
DETERIORATION OF FM BROADCAST RECEPTION STATE
RESTORATION OF DAB RECEPTION STATE
t0
t1
t2
t3
DAB
FM BROADCAST
IP RADIO
DAB
DAB SERVICE IDENTIFICATION
DAB IDENTIFICATION INFORMATION
FM BROADCAST IDENTIFICATION INFORMATION
IP RADIO IDENTIFICATION INFORMATION
SIMULTANEOUS BROADCAST MANAGEMENT TABLE
IP RADIO STATION URL
RECEPTION TARGET BROADCAST

Europäisches Patentamt
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EUROPEAN SEARCH REPORT

Application Number
EP 17 20 2332

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	FR 2 945 399 A1 (STERESYS DEV E [FR]) 12 November 2010 (2010-11-12) * page 6, line 28 - page 7, line 6 * * page 7, lines 12-17 * * page 10, lines 22-32 * * page 12, line 29 - page 13, line 4 * * page 13, lines 20-25,27-30 * * page 16, line 20 - page 17, line 5 * * page 22, lines 21-25 * * figure 1 *	1-10	INV. H04H20/24 H04H20/20 H04H60/11 H04H20/46 H04H20/26
A	US 2010/203823 A1 (APAAR TULI [FI]) 12 August 2010 (2010-08-12) * paragraphs [0041], [0113], [0162], [0170] * * figure 1 *	1,4,9	
A	US 2008/139109 A1 (EWERTZ CARL CHRISTIAN [SE]) 12 June 2008 (2008-06-12) * paragraphs [0013], [0037] - [0038] * * figure 2 *	1,4,9	
			TECHNICAL FIELDS SEARCHED (IPC) H04H

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	19 January 2018	Iovescu, Vladimir

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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19-01-2018

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		US 2010203823 A1	12-08-2010
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		WO 2008071460 A1	19-06-2008

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

REFERENCES CITED IN THE DESCRIPTION

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- JP 2013201469 A **[0002]**
- JP 2013120967 A **[0004]**