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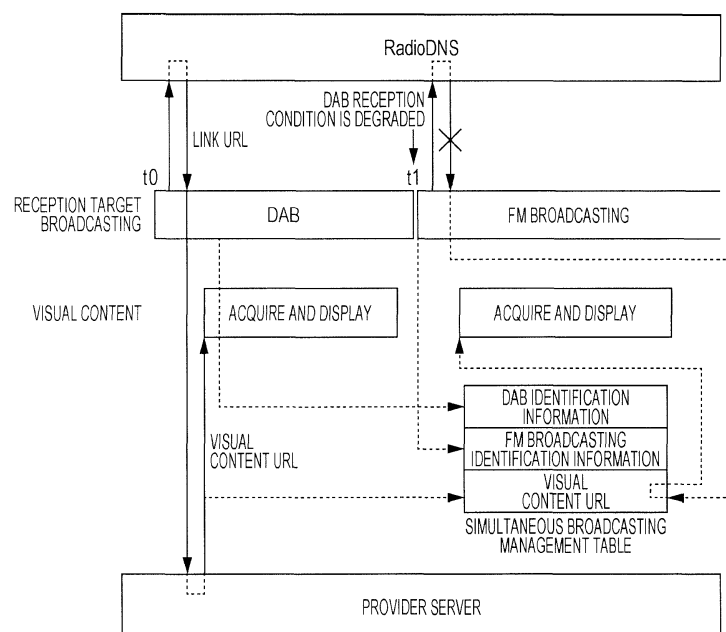
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(54) **RADIO BROADCASTING RECEIVING APPARATUS**

(57) A URL of visual content of DAB currently being received, the visual content being acquired during reception of DAB and displayed, is stored. When reception target broadcasting is switched from the DAB to FM broadcasting that has a simultaneous broadcasting relationship with the DAB service, if a URL of visual content

of the FM broadcasting currently being received is not acquired using RadioDNS, visual content is acquired from the stored URL of the visual content of the DAB that has the simultaneous broadcasting relationship with the FM broadcasting currently being received and is displayed.

FIG. 8



Description

[0001] The present invention relates to a technique, in a radio broadcasting receiving apparatus, for switching reception target broadcasting from broadcasting that is currently being received to different broadcasting that provides broadcasting of the same contents as those of the broadcasting currently being received.

[0002] For radio broadcasting receiving apparatuses, as a technique for performing switching between different broadcasting having a simultaneous broadcasting relationship with each other, in which broadcasting of the same contents are provided, a technique, in a radio broadcasting receiving apparatus that receives digital audio broadcasting (DAB) and FM broadcasting, for switching, when the reception quality of a DAB service that is currently being received is degraded, a reception target to an FM broadcasting station having the simultaneous broadcasting relationship with the DAB service, has been known (for example, JP2013-120967 A).

[0003] Furthermore, a service for distributing via the Internet to a radio broadcasting receiving apparatus visual content such as text and images associated in advance with broadcasting specified by the radio broadcasting receiving apparatus has also been known (for example, ETSI, "ETSI TS 103 270 V1.2.1 (2015-09) RadioDNS Hybrid Radio; Hybrid lookup for radio services", [online], [Searched on January 20, 2017], Internet <URL: http://www.etsi.org/deliver/etsi_ts/103270/103299%5C103270%5C01.02.01_60%5Cts_103270v010201p.pdf>, ETSI, "ETSI TS 101 499 V3.1.1 (2015-01) Hybrid Digital Radio (DAB, DRM, RadioDNS); SlideShow; User Application Specification", [online], [Searched on January 20, 2017], Internet <URL: http://www.etsi.org/deliver/etsi_ts/101400_101499/101499/03.01.01_60/ts_101499v030101p.pdf>, and ETSI, "ETSI TS 102 818 V3.1.1 (2015-01) Hybrid Digital Radio (DAB, DRM, RadioDNS); XML Specification for Service and Programme Information (SPI)", [online], [Searched on January 20, 2017], Internet <URL: http://www.etsi.org/deliver/etsi_ts/101400_101499/101499/03.01.01_60/ts_101499v030101p.pdf>).

[0004] For acquisition of visual content regarding broadcasting that is currently being received and display of the acquired visual content on a radio broadcasting receiving apparatus by using the above-mentioned service, during a period in which broadcasting that is not associated with visual content on a service side is being received, the radio broadcasting receiving apparatus is not capable of acquiring or displaying the visual content.

[0005] Therefore, for example, in the case where reception target broadcasting is switched between a DAB service and an FM broadcasting station that has a simultaneous broadcasting relationship with the DAB service as described above, when on the service side, visual content is associated with the DAB service but visual content is not associated with the FM broadcasting sta-

tion, the visual content that was acquired and displayed during reception of the DAB service is not displayed during reception of the FM broadcasting station after switching, even though the broadcasting contents of the FM broadcasting station are the same as the broadcasting contents of the DAB service before switching.

[0006] Accordingly, it is an object of the present invention to quickly display, by using a service for distributing visual content such as text and images associated with broadcasting via the Internet, the visual content regarding broadcasting that is currently being received.

[0007] The invention relates to a radio broadcasting receiving apparatus and method according to the appended claims. Embodiments are disclosed in the dependent claims. According to an aspect of the present invention, a radio broadcasting receiving apparatus that receives radio broadcasting and is capable of being connected to the Internet, includes a reception output unit configured to receive content from a broadcasting service set as reception target broadcasting and output the received content; a broadcasting service follow unit configured to perform, when a reception quality of the reception target broadcasting is degraded, switching of the reception target broadcasting to a different broadcasting service that broadcasts the same content as the reception target broadcasting; and a visual content display unit configured to acquire, when the reception target broadcasting is changed, a URL of visual content of a broadcasting service set as the changed reception target broadcasting from an information service that provides a URL of visual content of each broadcasting service via the Internet, display the visual content distributed from the acquired URL, and store the acquired URL of the visual content. In a case where the URL of the visual content of the broadcasting service set as the changed reception target broadcasting is not acquired from the information service when the reception target broadcasting is changed, the visual content display unit displays visual content distributed from a URL of visual content of a different broadcasting service stored when the different broadcasting service that broadcasts the same content as the broadcasting service set as the changed reception target broadcasting is the reception target broadcasting.

[0008] According to an embodiment of the radio broadcasting receiving apparatus, in the case where the URL of the visual content of the broadcasting service set as the changed reception target broadcasting is acquired from the information service when the reception target broadcasting is changed, the visual content display unit may display the visual content distributed from the acquired URL, and store the acquired URL of the visual content in association with identification of the broadcasting service set as the changed reception target broadcasting. When the broadcasting service follow unit switches the reception target broadcasting to a different broadcasting service that broadcasts the same content as the reception target broadcasting, the visual content

display unit may store identification of the broadcasting service as the switched reception target broadcasting in association with identification of the broadcasting service as the original reception target broadcasting before the switching of the reception target broadcasting. In a case where the URL of the visual content of the broadcasting service set as the changed reception target broadcasting is not acquired from the information service when the reception target broadcasting is changed, the visual content display unit may display visual content distributed from a URL of visual content stored in association with identification of a different broadcasting service stored in association with the identification of the broadcasting service set as the changed reception target broadcasting.

[0009] Furthermore, according to another aspect of the present invention, a radio broadcasting receiving apparatus that receives digital radio broadcasting and analog radio broadcasting and is capable being connected to the Internet, includes a reception output unit configured to receive content from a broadcasting service set as reception target broadcasting out of a broadcasting service of the digital radio broadcasting and a broadcasting service of the analog radio broadcasting and output the received content; a broadcasting service follow unit configured to perform, in a case where the reception target broadcasting is a broadcasting service of the digital radio broadcasting, when a reception quality of the reception target broadcasting is degraded, if no different broadcasting service of the digital radio broadcasting that broadcasts the same content as the reception target broadcasting exists but a broadcasting service of the analog radio broadcasting that broadcasts the same content as the reception target broadcasting exists, switching of the reception target broadcasting to the broadcasting service of the analog radio broadcasting that broadcasts the same content as the reception target broadcasting; and a visual content display unit configured to acquire, when the reception target broadcasting is changed to a broadcasting service of the digital radio broadcasting, a URL of visual content of the broadcasting service set as the changed reception target broadcasting from an information service that provides a URL of visual content of each broadcasting service via the Internet, display the visual content distributed from the acquired URL, and store the acquired URL of the visual content. When the reception target broadcasting is changed to a broadcasting service of the analog radio broadcasting, the visual content display unit displays visual content distributed from a URL of visual content of a broadcasting service of the digital radio broadcasting acquired from the information service and stored when the broadcasting service of the digital radio broadcasting that broadcasts the same content as the broadcasting service as the changed reception target broadcasting is the reception target broadcasting.

[0010] In the radio broadcasting receiving apparatus, the digital radio broadcasting may be digital audio broadcasting, and the analog radio broadcasting may be FM

broadcasting.

[0011] In the radio broadcasting receiving apparatus, the information service may be a service conforming to RadioDNS standards.

5 **[0012]** In the radio broadcasting receiving apparatus, the radio broadcasting receiving apparatus may be an in-vehicle radio broadcasting receiving apparatus mounted in an automobile.

10 **[0013]** In the case where the radio broadcasting receiving apparatus described above cannot acquire a URL of visual content of reception target broadcasting from an information service, the radio broadcasting receiving apparatus displays visual content distributed from a URL of visual content of a different broadcasting service stored when the different broadcasting service that broadcasts the same content as the reception target broadcasting is the reception target broadcasting, that is, a URL of visual content of a different broadcasting service that broadcasts the same content as the reception target.

20 **[0014]** Visual content of a different broadcasting service that broadcasts the same content as reception target broadcasting is visual content that is also related to the reception target broadcasting.

25 **[0015]** Therefore, according to the present invention, even during reception and output of a broadcasting service for which a URL of visual content is not provided by an information service, visual content regarding the broadcasting service may be acquired and displayed.

30 **[0016]** As described above, according to the present invention, visual content regarding broadcasting currently being received may be quickly displayed using a service that distributes visual content such as text and images associated with broadcasting via the Internet.

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

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Fig. 2 is a block diagram illustrating a configuration of a radio broadcasting receiving apparatus according to an embodiment of the present invention;

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

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

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Fig. 5 is a flowchart illustrating an FM broadcasting follow process according to an embodiment of the present invention;

Fig. 6 is a flowchart illustrating a visual content display process according to an embodiment of the present invention;

Fig. 7 is a flowchart illustrating a simultaneous broadcasting registration process according to an embodiment of the present invention; and

Fig. 8 is a diagram illustrating an example of an operation of a radio broadcasting receiving apparatus according to an embodiment of the present invention.

[0017] Embodiments of the present invention will be described below.

[0018] Fig. 1 illustrates a configuration of a radio broadcasting system according to an embodiment.

[0019] As illustrated in Fig. 1, a radio broadcasting receiving apparatus 1 is mounted in automobiles, and receives digital audio broadcasting (DAB) and FM broadcasting from broadcasting stations 2.

[0020] Furthermore, the radio broadcasting receiving apparatus 1 includes a function of being connected to the Internet 3.

[0021] DAB services and FM broadcasting stations will be generically referred to as "broadcasting services". A provider server 4 that distributes, for each broadcasting service, visual content such as text and images regarding the broadcasting service and provides, using a specific URL, information of a visual content URL of visual content to be distributed, is arranged on the Internet 3. A provider server 4 that distributes visual content may be different from a provider server 4 that provides information of a visual content URL.

[0022] Hereinafter, for convenience, explanation will be provided such that a URL representing the location of information of the above-mentioned visual content URL on the Internet 3 will be referred to as a "link URL".

[0023] Furthermore, on the Internet 3, a RadioDNS 5 that provides a link URL representing the location of information of a visual content URL of visual content of each broadcasting service is arranged. Visual content of each broadcasting service includes, for example, text and images (a broadcasting station's logo, artwork of a musical piece currently being broadcasted, and the like).

[0024] Fig. 2 illustrates a configuration of the radio broadcasting receiving apparatus 1.

[0025] As illustrated in Fig. 2, the radio broadcasting receiving apparatus 1 includes a mobile communication device 111 that performs mobile communication, a DAB tuner 112 that receives DAB from the broadcasting station 2 and outputs the received sound, and an FM tuner 113 that receives FM broadcasting from the broadcasting station 2 and outputs the received sound.

[0026] The radio broadcasting receiving apparatus 1 also includes an input device 114, a display device 115, a storage device 116, a selector 117 that selects one of sound output from the DAB tuner 112 and sound output from the FM tuner 113 and outputs the selected sound, an amplifier 118 that amplifies sound output from the selector 117 and outputs the amplified sound, a speaker 119 that is driven in accordance with a sound signal out-

put from the amplifier 118 and outputs the sound, and a controller 120 that controls each unit of the radio broadcasting receiving apparatus 1.

[0027] Fig. 3 illustrates a simultaneous broadcasting management table stored in the storage device 116 in an embodiment.

[0028] As illustrated in Fig. 3, the simultaneous broadcasting management table may include a plurality of entries (rows in Fig. 3) in which DAB identification information indicating identification of a DAB service, FM broadcasting identification information indicating identification of an FM broadcasting station, a visual content URL, and an update time are registered.

[0029] DAB identification information and FM broadcasting identification information in the same entry represent identification of a DAB service and identification of an FM broadcasting station that have a simultaneous broadcasting relationship with each other. Furthermore, a visual content URL represents a visual content URL representing the location on the Internet (on the provider server 4) of visual content of a DAB service represented by DAB identification information of the same entry or an FM broadcasting station represented by FM broadcasting identification information of the same entry. Furthermore, the update time represents the date and time at which the entry was updated.

[0030] In this embodiment, a country code, an ensemble identifier EID, a service identifier SID, a service component identifier SIDS, and the like of a DAB service may be used as DAB identification information. Furthermore, a country code, a program identifier PI, and frequency of an FM broadcasting station may be used as FM broadcasting identification information. FM broadcasting identification information always includes a program identifier PI.

[0031] In the radio broadcasting receiving apparatus 1 having the configuration described above, when an instruction to receive a specific DAB service is issued by a user, the controller 120 sets the DAB service as reception target broadcasting, causes the DAB tuner 112 to start to receive the reception target broadcasting, and causes the selector 117 to select sound output from the DAB tuner 112, so that the sound received through the reception target broadcasting is output from the speaker 119. Furthermore, when an instruction to receive a specific FM broadcasting station is issued by a user, the controller 120 sets the FM broadcasting station as reception target broadcasting, causes the FM tuner 113 to start to receive the reception target broadcasting, and causes the selector 117 to select sound output from the FM tuner 113, so that the sound received through the reception target broadcasting is output from the speaker 119.

[0032] Service linking information that the DAB tuner 112 receives in a DAB service represents, for each program, identification of a DAB service and an FM broadcasting station having the simultaneous broadcasting relationship with each other that broadcasts the program.

[0033] Furthermore, a DAB service that broadcasts

certain contents and an FM broadcasting station that broadcasts a program of a PI that matches the SID of the DAB service have the simultaneous broadcasting relationship with each other, and the FM broadcasting station broadcasts a program of the same contents as those broadcasted by the DAB service. The PI of an FM broadcasting station is received by the FM tuner 113, along with sound of the FM broadcasting by a radio data system (RDS) broadcasted by the FM broadcasting station.

[0034] Furthermore, an AF list received by an RDS of FM broadcasting represents the frequency of other FM broadcasting that is broadcasting a program of the same PI.

[0035] Next, the controller 120 may access the RadioDNS 5 via the mobile communication device 111 to acquire a link URL representing the location of information of a visual content URL of visual content of a desired broadcasting service (a DAB service or an FM broadcasting station) and acquire information of a visual content URL of the visual content of the desired broadcasting service from the acquired link URL.

[0036] However, the RadioDNS 5 does not provide a link URL for all broadcasting services. The RadioDNS 5 provides only a link URL representing the location of information of a visual content URL of visual content of a broadcasting service whose link URL is registered in advance in the RadioDNS 5 in association with identification information of the broadcasting service.

[0037] That is, in the radio broadcasting receiving apparatus 1, the controller 120 may not acquire a link URL representing the location of information of a visual content URL of visual content of some broadcasting services from the RadioDNS 5.

[0038] During a period in which a DAB service is set as reception target broadcasting, the controller 120 performs a DAB follow process.

[0039] Fig. 4 illustrates a procedure of a DAB follow process.

[0040] As illustrated in Fig. 4, in the DAB follow process, the controller 120 monitors degradation of the reception quality of DAB at the DAB tuner 112 (step 402).

[0041] When the reception quality is degraded, the controller 120 determines whether or not a different receivable DAB service that has a simultaneous broadcasting relationship with a DAB service as reception target broadcasting currently being received by the DAB tuner 112 exists (step 404). In the case where a different receivable DAB service that has the simultaneous broadcasting relationship with the DAB service currently being received exists, the controller 120 switches the reception target broadcasting to the different receivable DAB service, and causes the DAB tuner 112 to start to receive the switched reception target broadcasting, so that sound received through the switched reception target broadcasting is output from the speaker 119 (step 406). Then, the process returns to the processing of step 402.

[0042] A different DAB service that has the simultaneous broadcasting relationship with a DAB service as re-

ception target broadcasting may be identified based on service linking information received through DAB. Furthermore, tuners of two systems that receive DAB are provided at the DAB tuner 112, and the reception condition of a different DAB service that has the simultaneous broadcasting relationship with a DAB service as reception target broadcasting may be detected by, during a period in which one of the tuners is receiving the DAB service as the reception target broadcasting, causing the other one of the tuners to be used in the background to repeatedly search for the reception condition of the different DAB service that has the simultaneous broadcasting relationship with the DAB service as the reception target broadcasting.

[0043] In contrast, in the case where no different receivable DAB service that has the simultaneous broadcasting relationship with the DAB service as the reception target broadcasting currently being received by the DAB tuner 112 exists (step 404), the controller 120 determines whether or not a receivable FM broadcasting station that has the simultaneous broadcasting relationship with the DAB service as the reception target broadcasting currently being received by the DAB tuner 112 exists (step 408). In the case where a receivable FM broadcasting station that has the simultaneous broadcasting relationship with the DAB service currently being received exists, the controller 120 switches the reception target broadcasting to an FM broadcasting station with the best reception condition among receivable FM broadcasting stations that have the simultaneous broadcasting relationship with the DAB service currently being received, causes the FM tuner 113 to start to receive the switched reception target broadcasting, and causes the selector 117 to select sound output from the FM tuner 113, so that the sound received through the switched reception target broadcasting is output from the speaker 119 (step 410). Then, the DAB follow process ends.

[0044] The reception condition of an FM broadcasting station that has the simultaneous broadcasting relationship with a DAB service as reception target broadcasting currently being received by the DAB tuner 112 may be acquired by, during a period in which the DAB service is set as the reception target broadcasting, causing the FM tuner 113 to repeatedly search for, in the background, the reception condition of each FM broadcasting station that has the simultaneous broadcasting relationship with the DAB service currently being received represented by service linking information received by the DAB tuner 112.

[0045] In contrast, in the case where no receivable FM broadcasting station that has the simultaneous broadcasting relationship with the DAB service as the reception target broadcasting currently being received by the DAB tuner 112 exists (step 408), the process returns to the processing of step 402.

[0046] The DAB follow process performed by the controller 120 during a period in which a DAB service is set as reception target broadcasting has been explained

above.

[0047] Next, during a period in which an FM broadcasting station is set as reception target broadcasting, the controller 120 performs an FM broadcasting follow process.

[0048] Fig. 5 illustrates a procedure of an FM broadcasting follow process.

[0049] As illustrated in Fig. 5, in the FM broadcasting follow process, the controller 120 monitors whether or not a receivable DAB service that has a simultaneous broadcasting relationship with an FM broadcasting station as reception target broadcasting currently being received by the FM tuner 113 occurs (step 502) and whether or not the reception quality of FM broadcasting is degraded at the FM tuner 113 (step 504).

[0050] A DAB service that has the simultaneous broadcasting relationship with an FM broadcasting station as reception target broadcasting currently being received by the FM tuner 113 may be identified as a DAB service of an SID that matches the PI of the FM broadcasting station currently being received or may be identified based on service linking information received through DAB.

[0051] Furthermore, the reception condition of a DAB service that has the simultaneous broadcasting relationship with an FM broadcasting station as reception target broadcasting currently being received by the FM tuner 113 is acquired by, during a period in which the FM broadcasting station is set as the reception target broadcasting, causing the DAB tuner 112 to repeatedly search for, in the background, the reception condition of each DAB service that has the simultaneous broadcasting relationship with the FM broadcasting station currently being received.

[0052] In the case where a receivable DAB service that has the simultaneous broadcasting relationship with the FM broadcasting station as the reception target broadcasting currently being received by the FM tuner 113 occurs (step 502), the controller 120 switches the reception target broadcasting to a DAB service with the best reception condition having the simultaneous broadcasting relationship with the FM broadcasting station currently being received (step 510), causes the DAB tuner 112 to start to receive the switched reception target broadcasting, and causes the selector 117 to select sound output from the DAB tuner 112, so that the sound received through the switched reception target broadcasting is output from the speaker 119. Then, the FM broadcasting follow process ends.

[0053] In contrast, in the case where a degradation in the reception quality of FM broadcasting occurs at the FM tuner 113 (step 504), the controller 120 determines whether or not a different receivable FM broadcasting station that has the simultaneous broadcasting relationship with the FM broadcasting station as the reception target broadcasting currently being received by the FM tuner 113 exists (step 506). In the case where a different

receivable FM broadcasting station that has the simultaneous broadcasting relationship with the FM broadcasting station currently being received by the FM tuner 113 exists, the controller 120 switches the reception target broadcasting to the different receivable FM broadcasting station, and causes the FM tuner 113 to start to receive the switched reception target broadcasting, so that sound received through the switched reception target broadcasting is output from the speaker 119 (step 508). Then, the process returns to the processing of step 502.

[0054] A different FM broadcasting station that has the simultaneous broadcasting relationship with an FM broadcasting station as reception target broadcasting may be identified based on an AF list received from the FM broadcasting station as the reception target broadcasting.

[0055] Furthermore, for example, tuners of two systems that receive FM broadcasting are provided at the FM tuner 113, and the reception condition of a different FM broadcasting station that has the simultaneous broadcasting relationship with an FM broadcasting station as reception target broadcasting may be detected by, causing one of the tuners to receive the FM broadcasting station as the reception target broadcasting and causing the other one of the tuners to be used in the background to repeatedly search for the reception condition of the different FM broadcasting station that has the simultaneous broadcasting relationship with the FM broadcasting station as the reception target broadcasting.

[0056] In contrast, in the case where no different receivable FM broadcasting station that has the simultaneous broadcasting relationship with the FM broadcasting station as the reception target broadcasting currently being received by the FM tuner 113 exists (step 506), the process returns to the processing of step 502.

[0057] The FM broadcasting follow process performed by the controller 120 during a period in which an FM broadcasting station is set as reception target broadcasting has been explained above.

[0058] Next, a visual content display process performed by the controller 120 to display visual content regarding a broadcasting service currently being received (a DAB service or an FM broadcasting station) will be described below.

[0059] Fig. 6 illustrates a procedure of a visual content display process.

[0060] As illustrated in Fig. 6, in the visual content display process, the controller 120 monitors whether or not a change of reception target broadcasting occurs (step 602).

[0061] In the case where there is a change of reception target broadcasting (step 602), the controller 120 stops acquisition of the current visual content and display of the current visual content on the display device 115 (step 604).

[0062] Next, the controller 120 sends an inquiry including identification information of a broadcasting service (a DAB service or an FM broadcasting station) that is being

received as the changed reception target broadcasting to the RadioDNS 5 via the mobile communication device 111, and tries to acquire a link URL corresponding to the broadcasting service (step 606).

[0063] In the case where the link URL associated with the identification information of the broadcasting service included in the inquiry is registered in the RadioDNS 5, the RadioDNS 5 sends the link URL to the radio broadcasting receiving apparatus 1. In the case where the link URL associated with the identification information of the broadcasting service included in the inquiry is not registered in the RadioDNS 5, the RadioDNS 5 does not send the link URL to the radio broadcasting receiving apparatus 1.

[0064] In the case where a link URL is acquired from the RadioDNS 5 (step 608), the controller 120 accesses the acquired link URL to obtain information of the visual content URL, and acquires the visual content URL from the obtained information. Then, the controller 120 registers the acquired visual content URL in the entry of the simultaneous broadcasting management table in which identification information (DAB identification information or FM broadcasting identification information) of the broadcasting service (DAB service or FM broadcasting station) received as the changed reception target broadcasting detected in step 602 is registered, and updates the update time of the entry (step 610). At the time of execution of the processing of step 610, in the case where there is no entry in which the identification information of the broadcasting service received as the changed reception target broadcasting detected in step 602 is registered in the simultaneous broadcasting management table, the controller 120 creates an entry in which the identification information of the broadcasting service is registered in the simultaneous broadcasting management table, registers the acquired visual content URL in the created entry, and updates the update time of the entry.

[0065] Next, the controller 120 starts to acquire visual content from the acquired visual content URL and display the acquired visual content on the display device 115 (step 612).

[0066] Then, the process returns to the processing of step 602.

[0067] In contrast, in the case where acquisition of a link URL from the RadioDNS 5 in step 606 is not successful (step 608), the controller 120 determines whether or not an entry in which identification information (DAB identification information or FM broadcasting identification information) of the broadcasting service (DAB service or FM broadcasting station) received as the changed reception target broadcasting detected in step 602 is registered and a visual content URL is registered exists in the simultaneous broadcasting management table (step 614). In the case where an entry in which identification information of the broadcasting service received as the changed reception target broadcasting detected in step 602 is registered and a visual content URL is registered does not exist (step 614), the process returns to the

processing of step 602.

[0068] In contrast, in the case where an entry in which identification information of the broadcasting service received as the changed reception target broadcasting detected in step 602 is registered and a visual content URL is registered exists, the controller 120 acquires the visual content URL registered in the entry from the simultaneous broadcasting management table (step 616).

[0069] Then, the controller 120 starts to acquire the visual content from the visual content URL acquired from the simultaneous broadcasting management table and display the acquired visual content on the display device 115 (step 612).

[0070] Then, the process returns to the processing of step 602.

[0071] The visual content display process performed by the controller 120 has been explained above.

[0072] Next, a simultaneous broadcasting registration process performed by the controller 120 will be explained below.

[0073] Fig. 7 illustrates a procedure of a simultaneous broadcasting registration process.

[0074] As illustrated in Fig. 7, in the simultaneous broadcasting registration process, the controller 120 monitors whether or not a change of reception target broadcasting occurs (step 702). In the case where there is a change of reception target broadcasting, the controller 120 determines whether or not the change of the reception target broadcasting is caused by switching from a DAB service as reception target broadcasting to an FM broadcasting station in the DAB follow process described above (step 704).

[0075] In the case where the change of reception target broadcasting is caused by switching from a DAB service as reception target broadcasting to an FM broadcasting station in the DAB follow process described above (step 704), the controller 120 registers identification of the FM broadcasting station as the changed reception target broadcasting as FM broadcasting identification information in an entry in which DAB identification information of a DAB service as the original reception target broadcasting before the change detected in step 702, and updates the update time of the entry (step 708). In step 708, at the time of execution of the processing of step 708, in the case where there is no entry in which DAB identification information of the DAB service as the original reception target broadcasting before the change is registered, the controller 120 creates an entry in which DAB identification information of the DAB service is registered in the simultaneous broadcasting management table, registers identification of the FM broadcasting station as the changed reception target broadcasting in the created entry, and sets the current date and time for the updated time of the entry.

[0076] Then, the process returns to the processing of step 702.

[0077] In contrast, in the case where the change of reception target broadcasting is not caused by switching

from a DAB service as reception target broadcasting to an FM broadcasting station in the DAB follow process described above (step 704), the controller 120 determines whether or not the change of reception target broadcasting is caused by switching from an FM broadcasting station as reception target broadcasting to a DAB service in the FM broadcasting follow process described above (step 706). In the case where the change of reception target broadcasting is not caused by switching from an FM broadcasting station as reception target broadcasting to a DAB service in the FM broadcasting follow process (step 706), the process returns to the processing of step 702.

[0078] In contrast, in the case where the change of reception target broadcasting is caused by switching from an FM broadcasting station as reception target broadcasting to a DAB service in the FM broadcasting follow process described above (step 706), the controller 120 registers identification of the DAB service as the changed reception target broadcasting as DAB identification information in an entry in which FM broadcasting identification information of the FM broadcasting station as the original reception target broadcasting before the change detected in step 702 in the simultaneous broadcasting management table, and sets the current date and time for the update time of the entry (step 710). In step 710, at the time of execution of the processing of step 710, in the case where there is no entry in which the FM broadcasting identification information of the FM broadcasting station as the original reception target broadcasting before the change is registered, the controller 120 creates an entry in which the FM broadcasting identification information of the FM broadcasting station is registered in the simultaneous broadcasting management table, registers identification of the FM broadcasting station as the changed reception target broadcasting as the FM broadcasting identification information in the created entry, and sets the current date and time for the update time of the entry.

[0079] Then, the process returns to the processing of step 702.

[0080] The simultaneous broadcasting registration process performed by the controller 120 has been explained above.

[0081] Fig. 8 illustrates an operation example of the radio broadcasting receiving apparatus 1.

[0082] In the radio broadcasting receiving apparatus 1, when the controller 120 sets a DAB service as reception target broadcasting at time t0, the controller 120 starts to receive the DAB service and output sound received through the DAB service, and tries to acquire a link URL of the DAB service currently being received from the RadioDNS 5. In the case where acquisition of a link URL is successful, the controller 120 acquires information of a visual content URL from the acquired link URL, starts to acquire visual content from the visual content URL indicated by the acquired information and display the acquired visual content on the display device 115,

and registers the visual content URL indicated by the information obtained from the link URL acquired from the RadioDNS 5 in an entry of a simultaneous broadcasting management table in which DAB identification information of the DAB service currently being received is registered.

[0083] After that, when the reception quality of the DAB service is degraded at time t1 and the reception target broadcasting is switched to an FM broadcasting station that has the simultaneous broadcasting relationship with the received DAB service, the controller 120 starts to receive the FM broadcasting station and output sound received through the FM broadcasting station, and registers identification of the FM broadcasting station as the switched reception target broadcasting as FM broadcasting identification information in the entry of the simultaneous broadcasting management table in which the identification of the DAB service as the original reception target broadcasting before the switching is registered as DAB identification information.

[0084] Next, the controller 120 tries to acquire a link URL of the FM broadcasting station currently being received from the RadioDNS 5. In this case, the RadioDNS 5 does not provide the link URL of the FM broadcasting station currently being received. Therefore, acquisition of the link URL is not successful.

[0085] In the radio broadcasting receiving apparatus 1, in the case where acquisition of the link URL from the RadioDNS 5 is not successful, the controller 120 acquires a visual content URL from the entry of the simultaneous broadcasting management table in which identification of the FM broadcasting station currently being received is registered as FM broadcasting identification information, and starts to acquire visual content from the visual content URL acquired from the simultaneous broadcasting management table and display the acquired visual content on the display device 115.

[0086] Consequently, during reception and output of the FM broadcasting station whose link URL is not provided by the RadioDNS 5, visual content regarding a DAB service that has the simultaneous broadcasting relationship with the FM broadcasting station is acquired and displayed. The visual content regarding the DAB service that has the simultaneous broadcasting relationship with the FM broadcasting station is also related to an FM broadcasting station that has the simultaneous broadcasting relationship with the DAB service and provides the same contents as those of the DAB service.

[0087] As described above, according to the embodiment described above, even during reception and output of a broadcasting service whose link URL, which is a URL of information of a visual content URL, is not provided by the RadioDNS 5, visual content related to the broadcasting service may be acquired and displayed.

[0088] An embodiment of the present invention has been described above.

[0089] In the foregoing embodiment, an entry of a simultaneous broadcasting management table in which

identification information of a broadcasting service currently being received as reception target broadcasting is registered may be deleted or made disable when the reception target broadcasting is switched to a broadcasting service that does not have the simultaneous broadcasting relationship with the broadcasting service.

[0090] Furthermore, in the foregoing embodiment, in the case where a change of reception target broadcasting detected in step 602 is caused by switching of the reception target broadcasting to an FM broadcasting station, the visual content display process illustrated in Fig. 6 may proceed to step 614 unconditionally after acquisition of the current visual content from the provider server 4 and display of the visual content on the display device 115 are stopped (step 604). That is, during reception of an FM broadcasting station, only a visual content URL registered in the simultaneous broadcasting management table may be used for acquisition of visual content.

Claims

1. A radio broadcasting receiving apparatus (1) that receives radio broadcasting and is capable of being connected to the Internet, the apparatus comprising:

a reception output unit (120) configured to receive content from a broadcasting service set as reception target broadcasting and output the received content;

a broadcasting service follow unit (120) configured to perform, when a reception quality of the reception target broadcasting is degraded, switching of the reception target broadcasting to a different broadcasting service that broadcasts the same content as the reception target broadcasting; and

a visual content display unit (120) configured to acquire, when the reception target broadcasting is changed, a URL of visual content of a broadcasting service set as the changed reception target broadcasting from an information service that provides a URL of visual content of each broadcasting service via the Internet, display the visual content distributed from the acquired URL, and store the acquired URL of the visual content,

wherein in a case where the URL of the visual content of the broadcasting service set as the changed reception target broadcasting is not acquired from the information service when the reception target broadcasting is changed, the visual content display unit is configured to display visual content distributed from a URL of visual content of a different broadcasting service stored when the different broadcasting service that broadcasts the same content as the broadcasting service set as the changed reception tar-

get broadcasting is the reception target broadcasting.

2. The radio broadcasting receiving apparatus according to Claim 1, wherein in the case where the URL of the visual content of the broadcasting service set as the changed reception target broadcasting is acquired from the information service when the reception target broadcasting is changed, the visual content display unit is configured to display the visual content distributed from the acquired URL, and stores the acquired URL of the visual content in association with identification of the broadcasting service set as the changed reception target broadcasting, wherein when the broadcasting service follow unit switches the reception target broadcasting to a different broadcasting service that broadcasts the same content as the reception target broadcasting, the visual content display unit is configured to store identification of the broadcasting service as the switched reception target broadcasting in association with identification of the broadcasting service as the original reception target broadcasting before the switching of the reception target broadcasting, and wherein in a case where the URL of the visual content of the broadcasting service set as the changed reception target broadcasting is not acquired from the information service when the reception target broadcasting is changed, the visual content display unit is configured to display visual content distributed from a URL of visual content stored in association with identification of a different broadcasting service stored in association with the identification of the broadcasting service set as the changed reception target broadcasting.
3. A radio broadcasting receiving apparatus (1) that receives digital radio broadcasting and analog radio broadcasting and is capable being connected to the Internet, the apparatus comprising:

a reception output unit (120) configured to receive content from a broadcasting service set as reception target broadcasting out of a broadcasting service of the digital radio broadcasting and a broadcasting service of the analog radio broadcasting and output the received content; a broadcasting service follow unit (120) configured to perform, in a case where the reception target broadcasting is a broadcasting service of the digital radio broadcasting, when a reception quality of the reception target broadcasting is degraded, if no different broadcasting service of the digital radio broadcasting that broadcasts the same content as the reception target broadcasting exists but a broadcasting service of the analog radio broadcasting that broadcasts the

same content as the reception target broadcasting exists, switching of the reception target broadcasting to the broadcasting service of the analog radio broadcasting that broadcasts the same content as the reception target broadcasting; and
 a visual content display unit (120) configured to acquire, when the reception target broadcasting is changed to a broadcasting service of the digital radio broadcasting, a URL of visual content of the broadcasting service set as the changed reception target broadcasting from an information service that provides a URL of visual content of each broadcasting service via the Internet, display the visual content distributed from the acquired URL, and store the acquired URL of the visual content,
 wherein when the reception target broadcasting is changed to a broadcasting service of the analog radio broadcasting, the visual content display unit is configured to display visual content distributed from a URL of visual content of a broadcasting service of the digital radio broadcasting acquired from the information service and stored when the broadcasting service of the digital radio broadcasting that broadcasts the same content as the broadcasting service as the changed reception target broadcasting is the reception target broadcasting.

4. The radio broadcasting receiving apparatus according to Claim 3,
 wherein the digital radio broadcasting is digital audio broadcasting, and the analog radio broadcasting is FM broadcasting.
5. The radio broadcasting receiving apparatus according to Claim 1, 2, 3, or 4,
 wherein the information service is a service conforming to RadioDNS standards.
6. The radio broadcasting receiving apparatus according to Claim 1, 2, 3, 4, or 5,
 wherein the radio broadcasting receiving apparatus is an in-vehicle radio broadcasting receiving apparatus mounted in an automobile.
7. A visual content display method for use in a radio broadcasting receiving apparatus that receives radio broadcasting and is capable of being connected to the Internet, the method being for displaying visual content, the method comprising:

a step of receiving content from a broadcasting service set as reception target broadcasting and outputting the received content;
 a step of performing, when a reception quality of the reception target broadcasting is changed,

switching of the reception target broadcasting to a different broadcasting service that broadcasts the same content as the reception target broadcasting; and

a step of trying, when the reception target broadcasting is changed, to acquire a URL of visual content of a broadcasting service set as the changed reception target broadcasting from an information service that provides a URL of visual content of each broadcasting service via the Internet, displaying, when the URL of the visual content is acquired, the visual content distributed from the acquired URL, storing the acquired URL of the visual content, and displaying, when the URL of the visual content is not acquired, visual content distributed from a URL of visual content of a different broadcasting service stored when the different broadcasting service that broadcasts the same content as the broadcasting service set as the changed reception target broadcasting is the reception target broadcasting.

FIG. 1

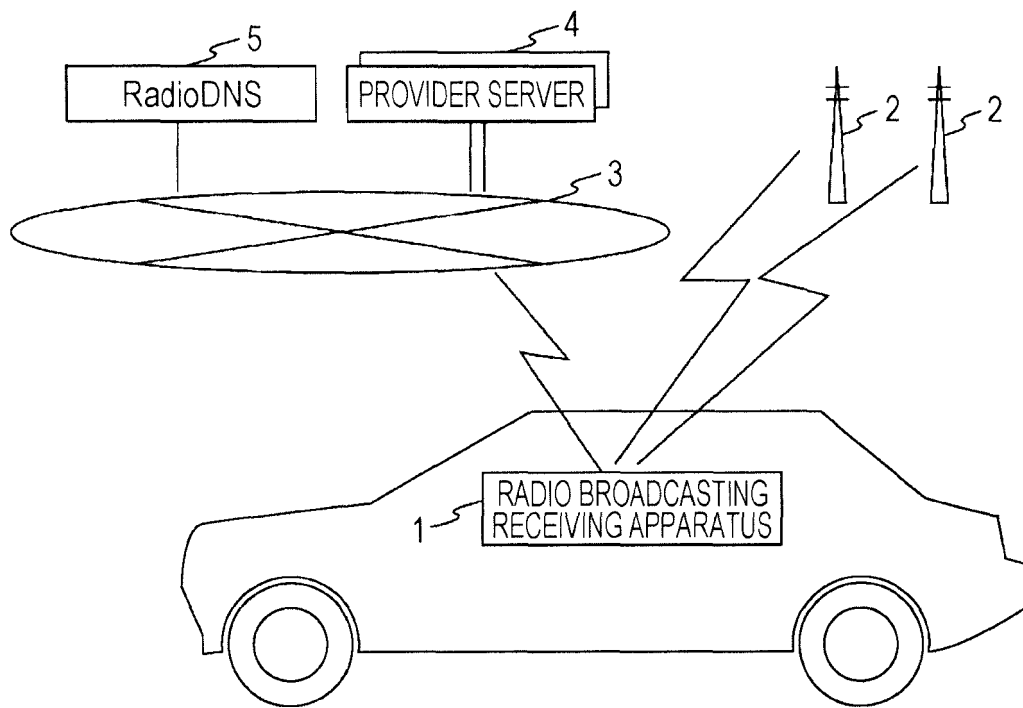


FIG. 2

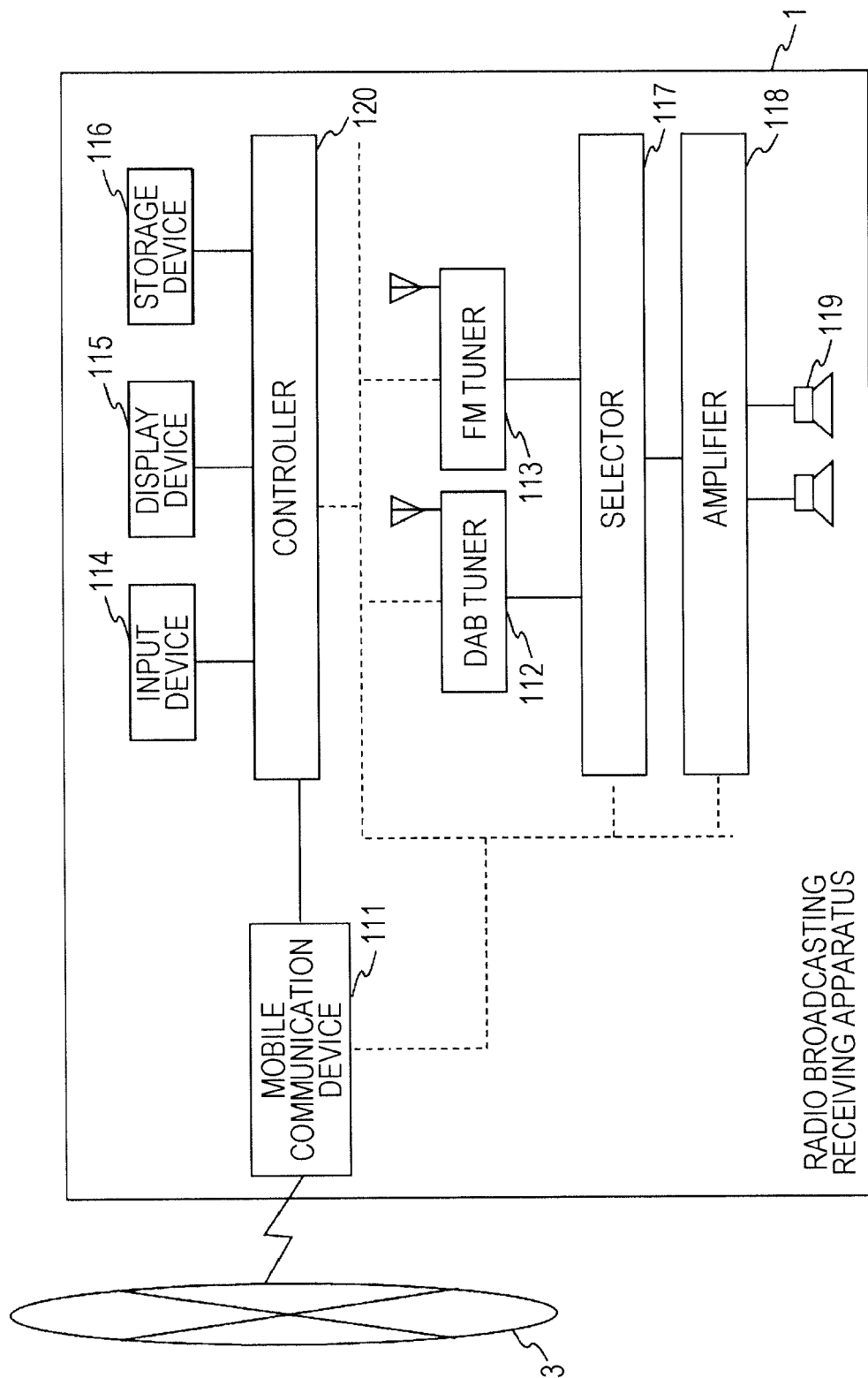


FIG. 3

DAB IDENTIFICATION INFORMATION	FMBROADCASTING IDENTIFICATION INFORMATION	VISUAL CONTENT URL	UPDATE TIME
ce1.c1a5.c47f.0	09580.c586.cel	http://music.com/VIS/414/	2016.11.07.14.24
ce1.b2a3.c18c.0	10580.c18c.cel	http://radio.com/VIS/ce8/	2016.11.07.13.44
⋮	⋮	⋮	

FIG. 4

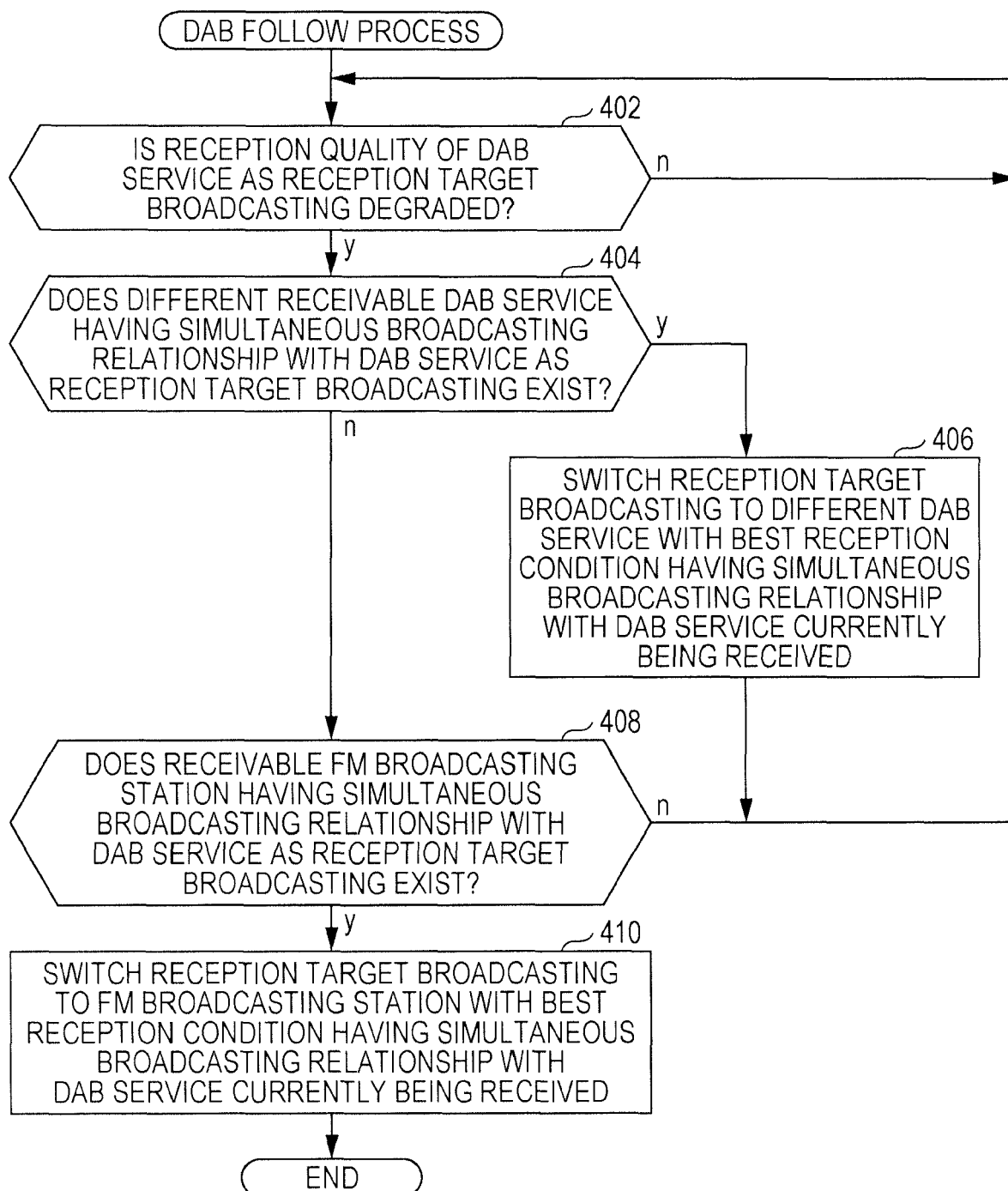


FIG. 5

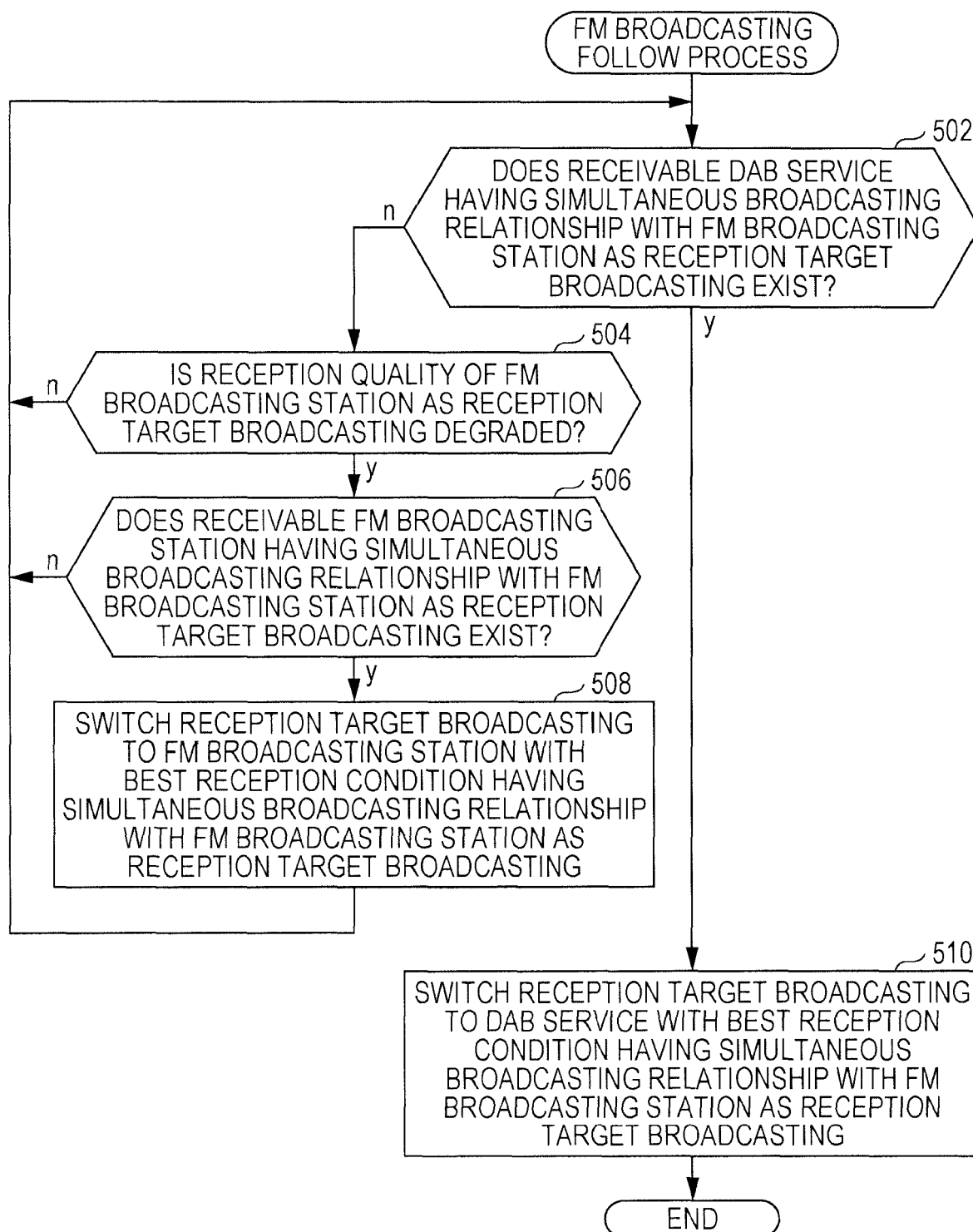


FIG. 6

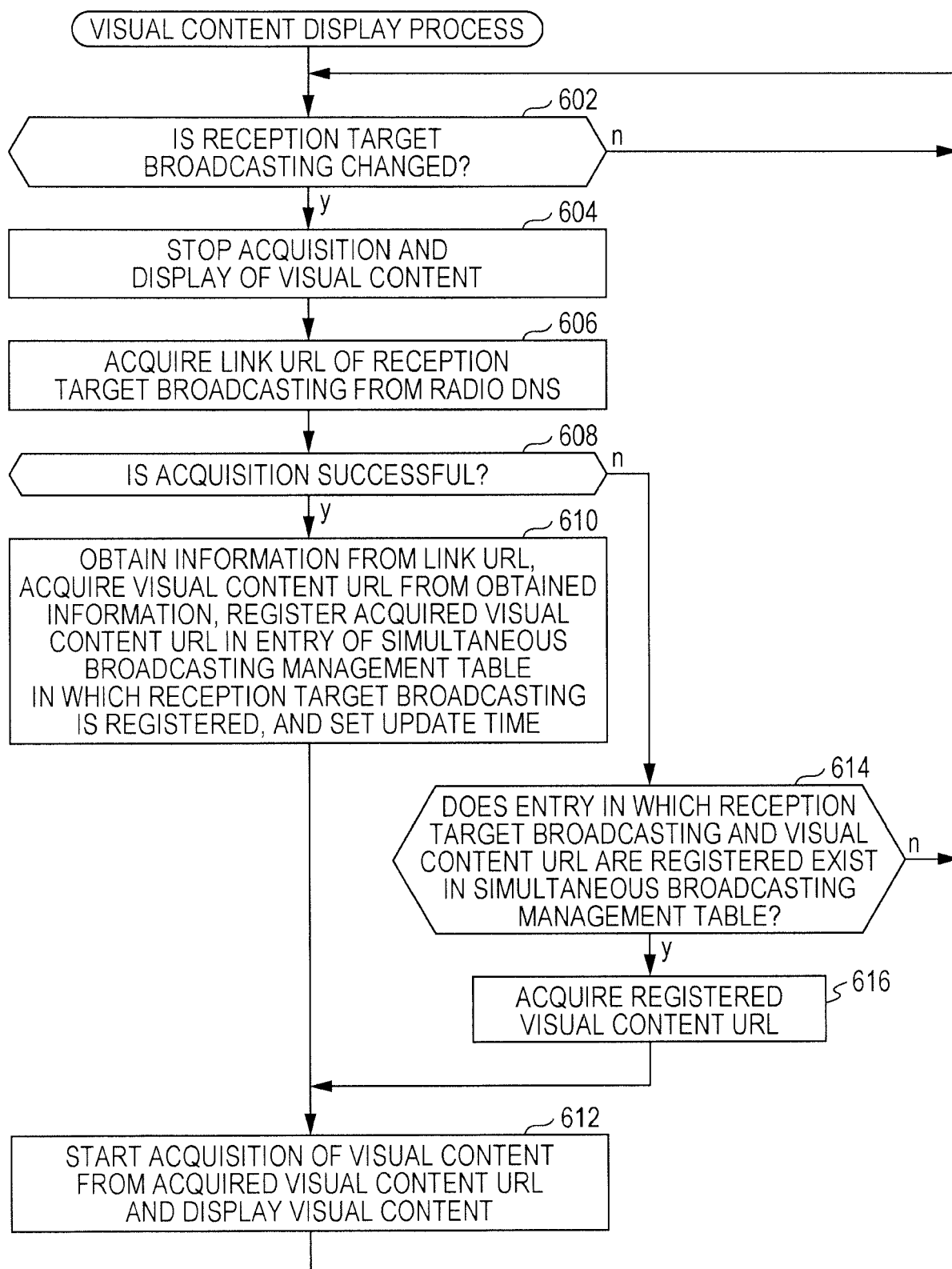


FIG. 7

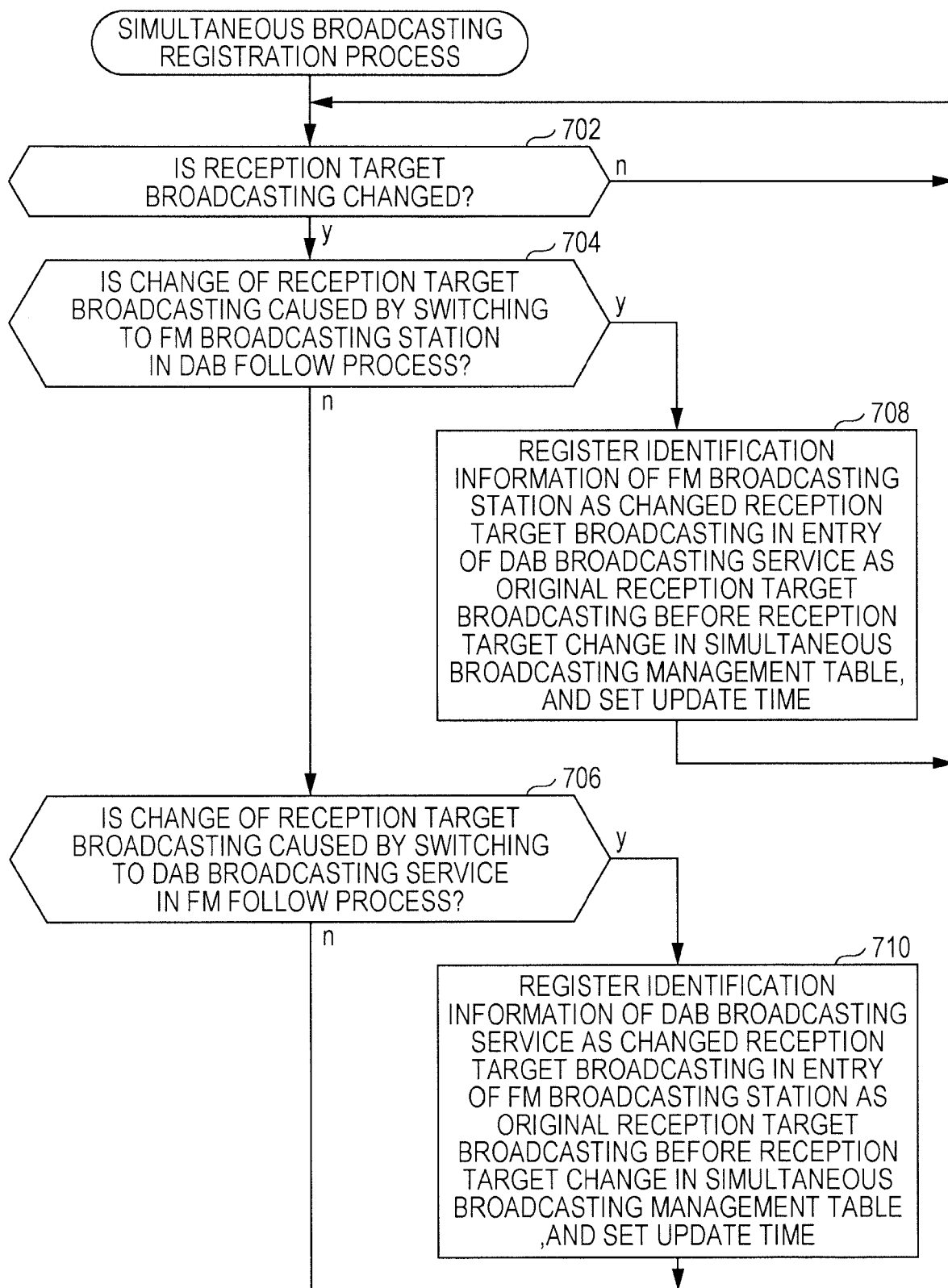
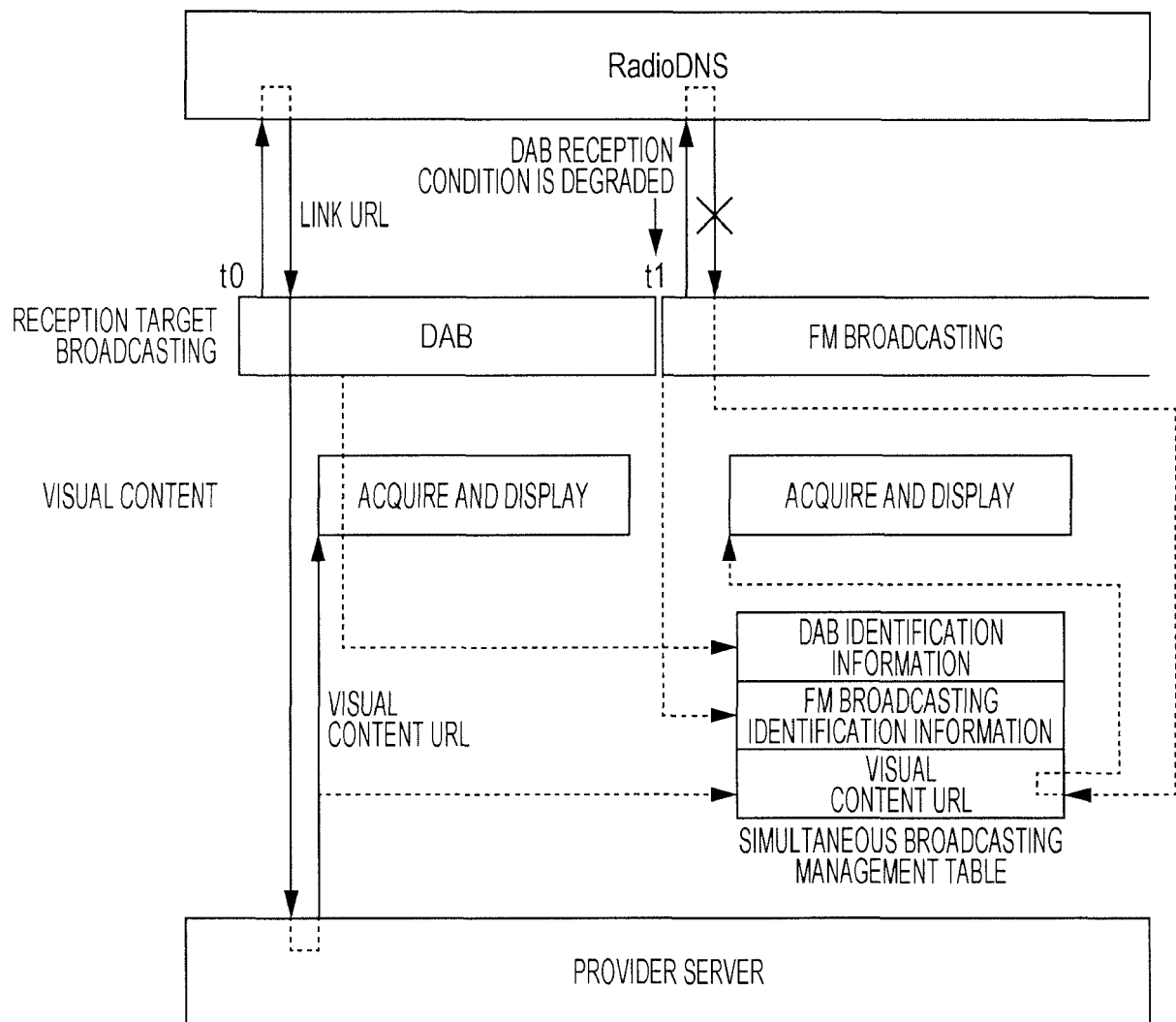


FIG. 8





EUROPEAN SEARCH REPORT

Application Number
EP 18 15 4485

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A	GB 2 539 200 A (IMAGINATION TECH LTD [GB]) 14 December 2016 (2016-12-14) * paragraphs [0041] - [0042] * * paragraphs [0044], [0047] * * paragraphs [0053], [0063] * * paragraph [0067]; figure 3 * -----	1-7	INV. H04H20/26 ADD. H04H60/85 H04H20/22
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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 24 May 2018	Examiner Pantelakis, P
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