Title: DIGITAL MULTIMEDIA BROADCASTING RECEIVER, PROGRAM VIEWING METHOD

Abstract: A digital multimedia broadcasting receiver, a program viewing method and program recording method thereof are disclosed, wherein if a predetermined program under current viewing or recording is switched over to and extensively broadcasted on another channel in a digital multimedia broadcasting receiver, a viewer can continuously view or record a relevant program being extensively broadcasted on the other channel without a separate key manipulation by the viewer, and if other programs such as urgent news and the like are broadcasted in the midst of a predetermined program being recorded, the other programs are not recorded, but the original predetermined program can be continuously recorded again without recording the other programs if the original program is broadcasted again.
For two-letter codes and other abbreviations, refer to the “Guidance Notes on Codes and Abbreviations” appearing at the beginning of each regular issue of the PCT Gazette.

Published:
— with international search report
Description

DIGITAL MULTIMEDIA BROADCASTING RECEIVER,
PROGRAM VIEWING METHOD

Technical Field

[1] The present invention relates to a digital multimedia broadcasting receiver, a program viewing method and program recording method thereof. More particularly, the present invention relates to a digital multimedia broadcasting receiver, a program viewing method and recording method thereof, by which a user is able to continuously view a relevant program if a predetermined program under current viewing is switched over to and continuously broadcasted in another channel, and a predetermined program can be effectively recorded.

[2] Background Art

[3] The digital multimedia broadcasting (DMB) provides not only a variety of additional data services such as high quality audio information and traffic information, but also video information with extension thereof. Furthermore, the DMB can provide a plurality of programs in a single ensemble.

[4] [5] A digital multimedia broadcasting receiver capable of receiving the digital multimedia broadcasting can encounter unexpected limitations or circumstances according to situations of a broadcasting station when the digital multimedia broadcasting is received, viewed or video-recorded (hereinafter referred to as recording).

[6] [7] For example, there may be a case where a program broadcasted via a predetermined channel is switched over to other channels and extensively broadcasted due to situations of a broadcasting station. In this case, there arises a cumbersoness of switching a receiving channel to other channels via a separate key manipulation in order for a user of a digital multimedia broadcasting to continuously view a relevant program. Therefore, it would be necessary for a user to continuously view a predetermined program by a DMB receiver automatically changing a receiving channel when a program broadcasted via a predetermined channel is switched over to other channels and extensively broadcast.

[8] [9] Furthermore, when there pops up urgent news, a broadcasting station temporarily stops a currently broadcasted program to broadcast the urgent news, and when the
broadcasting of the urgent news is over, the temporarily stopped program is continuously broadcasted.

10
11 Under this circumstance, if the digital multimedia broadcasting receiver is in the process of recording the program, the broadcasting of the urgent news is recorded at a midsection of the recorded program. Or, the digital multimedia broadcasting receiver records right before the urgent news is broadcasted, and does not record a relevant program subsequent to the broadcasting of the urgent news.

12
13 As a result, if another program different from the currently recorded program such as an urgent news or the like is broadcasted while a program broadcasted via a predetermined channel is being recorded, it would require to block said another program from being recorded, and to allow the originally recorded program to be continuously recorded if the originally recorded program is broadcasted again.

14
15 Furthermore, even if a digital multimedia broadcasting receiver records a predetermined program and the recorded program is switched over to another channel by a broadcasting station for an extended broadcasting, it is necessary for the digital multimedia broadcasting receiver to automatically switch the channel and to continuously record the predetermined program.

16

**Disclosure of Invention**

**Technical Solution**

17 An object of the present invention is to provide a digital multimedia broadcasting receiver and a program viewing method thereof, by which a digital multimedia broadcasting receiver automatically switches a receiving channel to allow a user to continuously view a predetermined program that is extensively broadcasted when the predetermined program is switched to other channels and extensively broadcasted.

18
19 Another object is to provide a digital multimedia broadcasting receiver and a program recording method thereof, by which, if other programs such as an urgent news and the like are broadcasted in the midst of a predetermined program being recorded, the other programs are not recorded, but the original predetermined program is continuously recorded after the other programs are completed in broadcasting.

20
21 Still another object is to provide a digital multimedia broadcasting receiver and a program recording method thereof, by which, in a case that a predetermined program is
switched over to other channels and extensively broadcasted in the midst of the predetermined program being recorded, a digital multimedia broadcasting receiver automatically switches receiving channels to extensively record the extensively broadcasted program.

[22]

[23] In one general aspect, a digital multimedia broadcasting receiver comprises: a broadcasting signal receiver receiving a digital multimedia broadcasting signal; a broadcasting signal decoder decoding the digital multimedia broadcasting signal received by the broadcasting signal receiver; an Audio Video (AV) signal decoder decoding streams of AV signals outputted by the broadcasting signal decoder; a Fast Information Channel (FIC) provider parsing and storing an FIC outputted from the broadcasting signal decoder; an Electronic Program Guide (EPG) provider parsing and storing EPG information outputted from the broadcasting signal decoder; a first controller controlling a viewing of a relevant program in response to a viewing command of a predetermined program inputted from outside, and controllably switching of a receiving channel to an extensively broadcasted other channel when a relevant program is to be extensively broadcasted to the extensively broadcasted other channel; and a second controller controlling the broadcasting signal receiver and the broadcasting signal decoder in response to the control of the first controller to enable a viewer to view the predetermined program.

[24]

[25] In another general aspect, a program viewing method of a digital multimedia broadcasting receiver comprises: receiving and processing a relevant program for a viewing when a viewing command of a predetermined program is inputted; determining whether the received program is to be extensively broadcasted to other channel; and switching over the receiving channel to the other channel to allow receiving the relevant program when the received program has been determined to be extensively broadcasted as a result of the determination.

[26]

[27] In still another general aspect, a program recording method of a digital multimedia broadcasting receiver comprises: parsing received EPG information and storing the parsed EPG information in an EPG memory; checking a program number of a program recording-designated by the EPG memory when a recording command of a predetermined program is inputted; determining whether a program corresponding to the checked program number has been received; and recording the corresponding program when it is determined as a result of the determination that the corresponding program has been received.
Advantageous Effects

[29] There is an advantage in that if a predetermined program currently received by a digital multimedia broadcasting receiver, viewed or recorded by a viewer is switched over to another channel and is to be extensively broadcasted, the predetermined program is switched over to the other channel to allow a related program to be extensively received without separate key manipulation by the viewer.

[30]

[31] Another advantage is that if other programs such as urgent news and the like are broadcasted in the midst of a predetermined program being recorded, the other programs are not recorded, but the originally predetermined program can be continuously recorded again if the predetermined program is to be broadcasted.

[32]

Brief Description of the Drawings

[33] The accompanying drawings, which are included to provide a further understanding of the invention and are incorporated in and constitute a part of this application, illustrate embodiment(s) of the invention and together with the description, serve to explain the principle of the invention. In the drawings:

[34] FIG. 1 is a structural diagram of a transmission frame in a digital multimedia broadcasting;

[35] FIGS. 2 and 3 are structural diagrams explaining XML EPG document;

[36] FIG. 4 illustrates a structure of an exemplary trigger type defined by the present invention;

[37] FIG. 5 is a block diagram illustrating a configuration of a digital multimedia broadcasting receiver according to the present invention;

[38] FIG. 6 is a flowchart illustrating a program viewing method according to the present invention;

[39] FIG. 7 is a drawing explaining in detail a program viewing method according to the present invention;

[40] FIGS. 8 and 9 are a flowchart illustrating a program recording method according to the present invention; and

[41] FIGS. 10 and 11 are drawings explaining in detail a program recording method according to the present invention.

[42]

[43] Throughout the drawings, like reference numerals will be understood to refer to like parts, components and structures.

[44]

Best Mode for Carrying Out the Invention
Certain exemplary embodiments of the present invention will be described in detail herein below with reference to the accompanying drawings. In the following description, detailed descriptions of functions and configurations incorporated herein that are well known to those skilled in the art are omitted for clarity and conciseness.

FIG. 1 is a structural diagram of a transmission frame in a digital multimedia broadcasting.

Referring to FIG. 1, a transmission frame in a digital multimedia broadcasting includes synchronization channel parts, Fast Information Channel (FlC) parts and Main Service Channel (MSC) parts. The MSC part includes a plurality of audio information, video information and data information. The data information comprises Electronic Program Guide (EPG) information.

The FlC part intended for providing information on the plurality of audio, video and data included in the MSC part comprises a plurality of Fast Information Blocks (FIGs), and each of the plurality of FIGs includes a plurality of Fast Information Groups (FlGs).

In the above-noted transmission frame, the present invention proposes FIG 0/XX (Fast Information Group, Type 0 field for extension XX) field, where XX is a single value (a binary natural number) currently not used in the plurality of FIGs. In other words, FIG 0/0~FIG 0/31 (HG Type 0 field for extension 0-FIG Type 0 field for extension 31) is a data format defined by the ETSI EN 300 401 V1. 3.3(2001-05) standards. The present invention proposes an exemplary FIG currently not defined, i.e., FIG 0/40 (FIG Type 0 field for extension 40).

The FlG 0/XX proposed by the present invention comprises a plurality of program number blocks. Each program number block includes a 32-bit SId (Service Identifier), a 16-bit PNum (Program Number), a 2-bit Rfa (Reserved for future addition), a 2-bit Rfu (Reserved for future use), a 1-bit Continuation flag, a 1-bit Update flag, a 32-bit New SId and a 16-bit New PNum.

The Sid, which is a service ID indicative of a broadcasting channel currently broadcasting a predetermined program, uses a 32-bit for expressing channels of a broadcasting station. The PNum, which is a code for discerning a plurality of programs broadcasted by channels of a broadcasting station, consists of a date, an hour and a minute on which broadcasting of a relevant program has started.
A plurality of encoded audio streams and a plurality of data are subjected to a channel coding and then are multiplexed into one bit stream along with system data, which is called an ensemble. Generally, one digital broadcasting station provides one ensemble in which a plurality of programs is delivered. The PNum is employed for discerning one program in the plurality of programs delivered in one ensemble.

The continuation flag is to broadcast urgent news and the like. In other words, the continuation flag temporarily stops a currently broadcasting program to broadcast programs such as urgent news and the like, and when the program such as urgent news is completed in broadcasting, the continuation flag notifies that the original program is to be again continuously broadcasted, where the continuation flag has a flag value of 0 or 1.

The update flag is to notify that a currently broadcasted program is changed to another program and is to be extensively broadcasted, where the update flag has a flag value of 0 or 1. The New Sid is a service ID of a channel extensively broadcasted when a currently broadcasted program having an update flag value of 1 is switched to another channel and extensively broadcasted. The New PNum is a code consisting of a date, an hour and a minute on which an extensive broadcasting is started when a currently broadcasted program having an update flag value of 1 is switched to another channel and extensively broadcasted.

FIG.2 illustrates a structural diagram of EPG information contained in MSC as data information in the transmission frame.

Referring to FIG.2, the EPG information contained in the MSC comprises XML (extensible Markup Language). The XML EPG format is largely classified into two elements, i.e., SI (Service Information) and epg elements. The SI element contains SI information comprising the EPG information and various related information. The SI element contains therebeneath ensemble information, and the ensemble includes frequency information and services comprising the ensemble as a sub-structure of the ensemble. The ensemble includes Service NameGroup as a sub-structure of the ensemble frequency, and the service includes service ID, genre and epgLanguage as a sub-structure thereof.

Furthermore, the epg element contains PI (Program Information) comprising the EPG information and various information related to the GI (Group Information) information. The epg element related to the PI (Program Information) includes as a sub-
structure thereof schedule information, program start and finish time information (scope), detailed information of broadcasting programs, and locations of each broadcasting program.

Referring to FIG.3, the location includes therebeneath a bearer element and the bearer element contains a dmbTriggerType according to the present invention as an attribute.

FIG.4 illustrates a structure of an exemplary trigger type defined by the present invention, where the dmbTriggerType includes a 32-bit Service ID (Sid), and a 16-bit Program Number (PNum).

Referring to FIG.4, the dmbTriggerType may be defined by a string of 8-12 digits structurally combined by numbers and characters within 0-9, a-f or A-F, i.e., "c2213aclll45".

The EPG information that includes thus-defined dmbTriggerType is encoded in binaries for transmission, and divided into Service Information (SI), GI (Group Information) and one day s PI (Program Information), and then grouped into each MOT (Multimedia Object Transfer) object to be provided from EPG information providers to a digital multimedia broadcasting receiver via a broadcasting signal.

FIG.5 is a block diagram illustrating a configuration of a digital multimedia broadcasting receiver according to the present invention, where the receiver is comprised of a broadcasting signal receiver (500), a broadcasting signal decoder (510), a recorder (520), a FIC provider (530), an EPG provider (540), a first controller (550), a switch (560), an AV signal decoder (570) and a second controller (580).

The broadcasting signal receiver (500) includes an antenna (501), a tuner (503) and an Orthogonal Frequency-Division Multiplexing (OFDM) demodulator (505). The tuner (503) receives a digital multimedia broadcasting signal of a predetermined channel via the antenna (501). The digital multimedia broadcasting signal received by the tuner (503) is demodulated by the OFDM modulator (505) to be outputted in a form referred to as frequency-deinterleaved OFDM symbols. The frequency-deinterleaved symbols are divided into FIC and MSC according to attributes thereof. The OFDM symbols outputted from the OFDM demodulator (505) may be time-deinterleaved via a time deinterleaver to be rearranged and outputted in CIF (Common Interleaved Frame) unit which is a logical frame unit.
The OFDM symbols outputted from the OFDM demodulator (505) are decoded by the broadcasting signal decoder (510). The broadcasting signal decoder (510) transmits to the FTC provider (530) the FIC inputted from the OFDM demodulator (505), decodes the MSC to output a broadcasting program, separates the EPG information included in the MSC and outputs the EPG information to the EPG provider (540).

The FTC provider (530) comprises a FIC decoder (531) and a FIC memory (533). The FTC decoder (531) decodes the FTC provided by the broadcasting signal decoder (510) to extract Sid, PNum, Rfa, Rfu, continuation flag, update flag, New Sid and New PNum contained in the FTX 0/XX and then stores in the FTC memory (533).

The EPG provider (540) comprises a MOT (Multimedia Object Transfer) decoder (541), an EPG engine (543) and an EPG memory (545). The MOT decoder (541) MOT-decodes the EPG information inputted from the broadcasting signal decoder (510). The EPG engine parses the MOT-decoded data to extract the Service Information and Program Information, and then inserts into a corresponding field of an EPG table stored in the EPG memory (545) to form program organizing information. Furthermore, the EPG engine parses each channel information, program information, information on program start time and finish time included in the EPG information along with trigger type, and then stores in the EPG memory (545) according to the broadcasting programs.

The first controller (550) receives an operation command from outside to control operation of a broadcasting receiver in response to the received operation command.

If the operation command received from the outside is a viewing command of a predetermined program broadcasted via a predetermined channel, the first controller (550) controls the second controller (580), and the second controller (580) controls the tuner (503) and the broadcasting signal decoder (510) in response to the control thereof. Successively, the tuner (503) tunes the broadcasting signal of a predetermined channel, and the tuned broadcasting signal is demodulated by the demodulator (505), and the demodulated broadcasting signal is decoded by the broadcasting signal decoder (510), whereby an AV signal of a predetermined program is outputted.

The AV signal of a predetermined program outputted from the broadcasting signal decoder (510) is inputted into the AV signal decoder (570) via a switch (560), where the AV signal is decoded, and the decoded AV signal is outputted to enable a viewer to
view.

[93]
[94] Under this circumstance, the first controller (550) continuously monitors the FIG
0/XX stored in the FIC memory (533) to determine whether the update flag value is 1. In other words, the first controller (550) determines whether the currently viewed program is extensively being broadcasted on other channel.

[95]
[96] If the update flag value is 1, the first controller (550) reads from the FIC memory New Sid which is a service ID of a channel on which the program is extensively broadcasted and New PNum which is a code composed of a date, an hour and a minute on which the extensive broadcasting starts. Furthermore, the first controller (550) continuously monitors the FIC 0/XX to determine whether the PNum has been changed, and if the PNum has been changed, the controller (550) switches over to a channel corresponding to the New Sid and New PNum to enable a viewer to continuously view the predetermined program extensively broadcasted.

[97]
[98] In other words, the second controller (580) controls the tuner (503) and the broadcasting signal decoder (510) in response to the control of the first controller (550) to allow the tuner (503) to receive a broadcasting signal of a channel corresponding to the New Sid, and the broadcasting signal decoder (510) outputs a program corresponding to the New PNum, to enable a viewer to continuously view the extensively broadcasted program.

[99]
[100] If a recording command is received from outside, the first controller (550) checks the PNum of a program to be recorded in the EPG memory (545) and monitors the FIC 0/XX stored in the FIC memory (533) to determine whether the PNum of the FIC 0/XX is the same as the PNum of the program to be recorded. As a result of the determination, if both PNums are identical, meaning that the broadcasting of a program to have received the recording command has started, the first controller (550) controls the recorder (520) to allow the program having received the recording command to be recorded.

[101]
[102] Under this state, the first controller (550) continuously monitors the FIG 0/XX to determine whether the continuation flag or the update flag value is 1. As a result of the determination, if the continuation flag value is 1, the currently recorded program is temporarily stopped, meaning that other programs such as urgent news or the like are to be broadcasted, and the first controller (550) determines whether the PNum has been changed in the FIG 0/XX.
As a result of the determination, if the PNum contained in the FIG 0/XX has been changed, which means that programs different from the currently recorded program are being broadcasted, the first controller (550) controls the recorder (520) to temporarily stop the recording operation. Thereafter, the first controller (550) determines whether the PNum contained in the FIG 0/XX is the identical to the PNum of the program whose recording has been temporarily stopped, and if they are identical, the program of a broadcasting such as the urgent news is finished, and the original program is broadcasted again, where the first controller (550) controls the recorder (520) to continue the recording of the program.

As a result of the determination, if the update flag value is 1, which means notifying that the currently recording program is changed to and broadcasted on other channel, the first controller (550) checks the New Sid and New PNum contained in FIG 0/XX, and checks the PNum of the FIG 0/XX to determine whether the PNum contained in the FIG 0/XX has been changed.

As a result of the determination, if the PNum included in the FIG 0/XX has been changed, which defines that the currently recorded program has been changed to other channel and the broadcasting has started, the first controller (550) receives programs corresponding to the New Sid and New PNum contained in FIG 0/XX to allow the recorder (520) to continuously record the program being extensively broadcasted on other channel.

Furthermore, if both the continuation flag and update flag values contained in the FIG 0/XX are not 1, the first controller (550) determines whether the PNum of FIG 0/XX has been changed. The change of the PNum contained in the FIG 0/XX means that the broadcasting of a program currently being recorded has been finished, where the first controller (550) controls the recorder (520) to stop recording.

Meanwhile, FIG.6 is a flowchart illustrating a program viewing method according to the present invention.

Referring to FIG.6, the first controller (550) determines whether a viewing command of a predetermined program has been inputted from outside (S600). If it is determined that the viewing command of a predetermined program has been inputted, the first controller (550) controls the second controller (580), and the second controller (580) controls the tuner (503) and the broadcasting signal decoder (510) in response to the control thereof to prompt the tuner (503) to tune a broadcasting signal of a pre-
determined channel, whereby a predetermined program contained in the tuned broadcasting signal is decoded by the broadcasting signal decoder (510) to enable a view to view the program (S602).

At this time, the FIC outputted by the broadcasting signal decoder (510) is decoded by the FIC decoder (531) to be stored in the FIC memory (533).

Under this state, the first controller (550) keeps monitoring the FIG 0/XX stored in the FIC memory (533) (S604), and determines whether the update flag value contained in the FIG 0/XX is 1 (S606). In other words, determination is made as to whether the program currently being viewed by a view has been switched over to another channel and extensively broadcasted.

If it is determined that the update flag value is 1, the first controller (550) reads New Sid which is a service ID of a channel extensively broadcasting the program contained in the FIC memory (533), and the New PNum which is a code composed of a date, an hour and a minute on which the extensive broadcasting starts (S608). Furthermore, the first controller (550) determines whether the PNum of the FIG 0/XX has been changed (S610).

If it is determined that the PNum has been changed, the first controller (550) controls the second controller (580) to allow a program corresponding to the New Sid and the New PNum to be received and viewed (S612). In other words, that the PNum has been changed means that the program having been viewed by a viewer is finished and another program is being broadcasted. Therefore, the first controller (550) so controls as to receive a program corresponding to the New Sid and the New PNum, whereby the viewer can continuously view the program extensively broadcasted on the other channel.

FIG.7 is a drawing explaining in detail a program viewing method.

Referring to FIG.7, if the update flag value is 1 while a predetermined program whose PNum is 200905 is received and viewed on a channel 7 whose Sid is 7, the controller (550) ascertains 9 and 201000 which are New Sid and New PNum values.

Under this circumstance, the first controller (550) keeps ascertaining the PNum value, and if it is determined that the PNum value has been changed, i.e., if the PNum value has been changed from 200905 to 201000, the controller (550) receives a
program whose New PNum value is 201000 corresponding to channel 9 corresponding to the New Sid to allow a viewer to keep viewing the predetermined program that has been viewed so far.

[128]

FIGS. 8 and 9 are a flowchart illustrating a program recording method.

[130]

Referring to FIG.8, the first controller (550) determines whether a recording command has been inputted from outside (S800). If the recording command has been inputted, the first controller (550) ascertains PNum of a program to be recorded in the recording command contained in the EPG memory (545) (S802). Successively, the first controller (550) monitors the FIG 0/XX stored in the FIC memory (533) (S804) to determine whether the PNum of FIG 0/XX is the same as the PNum of the program to be recorded and ascertained by the EPG memory (545) (S806).

[132]

If both PNums are identical, the first controller (550) controls the recorder (520) to record a predetermined program corresponding to PNum outputted from the broadcasting signal decoder (510) (S808).

[134]

Under this condition, the first controller (550) keeps monitoring the FIG 0/XX (S810) to determine whether the continuation flag value is 1 (S812). If it is determined that a continuation flag value is 1, the currently recorded program is temporarily stopped (Which is for broadcasting other programs such as urgent news, etc.), the first controller (550) determines whether the PNum contained in FIG has been changed (S814).

[136]

As a result of the determination, if the PNum of FIG 0/XX has been changed, which means that programs other than the currently recorded program are being broadcasted, the first controller (550) controls the recorder (520) to temporarily stop the recording operation (S816) and determines whether the PNum of FIG 0/XX is the same as the PNum of the program that has been temporarily stopped (S818).

[138]

If it is determined that both PNums are identical, the broadcasting of program such as urgent news and the like is completed, and the original program is broadcasted again, where the first controller (550) controls the recorder (520) to keep recording the program (S820).

[140]

If the continuation flag value is not 1, the first controller (550) determines whether the update flag value of FIG 0/XX is 1, as illustrated in FIG.9 (S900).
If the update flag value of FIG 0/XX is 1, which defines that the broadcasting of the currently recorded program is changed to another channel and kept broadcasting, the first controller (550) ascertains New Sid and New PNum of FIG 0/XX (S902), and ascertains PNum of FIG 0/XX (S904) to determine whether the PNum of FIG 0/XX has been changed (S906).

If the PNum of FIG 0/XX has been changed (which means that the program currently being recorded has been changed to another channel and broadcasting has started), the first controller (550) receives a program corresponding to the New Sid and New PNum of FIG 0/XX to allow the recorder to keep recording the program extensively broadcasted on the other channel (S908).

If the continuation flag value and the update flag value of FIG 0/XX are not 1, the first controller (550) determines whether the PNum of FIG 0/XX has been changed (S910). The change of the PNum contained in FIG 0/XX defines that the broadcasting currently being recorded has been terminated, so that the first controller (550) controls the recorder (520) to stop the recording (S912) and terminates the operation.

FIGS. 10 and 11 are drawings explaining in detail a program recording method according to the present invention.

Referring to FIG. 10, if a continuation flag value is 1 while a predetermined program whose PNum is 200905 is received and recorded on a channel 7 whose Sid is 7 by the recorder (520), the controller (550) puts a recording temporary stop on hold.

Under this circumstance, the first controller (550) keeps ascertaining the PNum, and if the PNum is changed to 200930, the first controller (550) controls the recorder (520) to temporarily stop the recording operation.

The first controller (550) keeps ascertaining the PNum, and if the PNum is the same as the PNum of a program whose recording has been temporarily stopped, i.e., if the PNum has been changed to 200905, the first controller (550) controls the recorder (520) to perform the recording operation again.

Furthermore, if the PNum has been changed to 201000, while the continuation flag value and the update flag value are not 1, the first controller (550) determines that broadcasting of the program under recording has been terminated, and controls the
recorder (520) to stop the recording.

[158] Referring to FIG. 11, if an update flag value is 1 while a predetermined program whose PNum is 200905 is received and recorded on a channel 7 whose Sid is 7 by the recorder (520), the controller (550) puts change of the received channel on hold, and ascertains 9 and 201000 which are values of New Sid and New PNum.

[160] Under this state, the first controller (550) keeps ascertaining the value of PNum, and if it is determined that the value of the PNum has been changed as a result of the ascertainment, i.e., if the value of the PNum has been changed from 200905 to 201000, the first controller (550) receives a program whose New PNum value is 201000 on channel 9 which corresponds to the New Sid to allow a view to continuously view the predetermined program the recorder (520) has been currently recorded.

[162] As apparent from the foregoing, there is an advantage in the digital multimedia broadcasting receiver thus described according to the present invention in that a viewer can continuously view a relevant program if a predetermined program under current viewing is switched over to and continuously broadcasted on another channel, so that the viewer can continuously view or record the predetermined program without using a separate key manipulation.

[164] Another advantage is that if other programs such as urgent news and the like are broadcasted in the midst of a predetermined program being recorded, the other programs are not recorded, but the original predetermined program can be continuously recorded again without recording the other programs if the original program is broadcasted again.

**Industrial Applicability**

[166] If a predetermined program under current viewing or recording is switched over to and extensively broadcasted on another channel in a digital multimedia broadcasting receiver, a viewer can continuously view or record a relevant program being extensively broadcasted on the other channel without a separate key manipulation by the viewer.

[167] If other programs such as urgent news and the like are broadcasted in the midst of a predetermined program being recorded, the other programs are not recorded, but the original predetermined program can be continuously recorded again without recording the other programs if the original program is broadcasted again.
Claims

[1] A digital multimedia broadcasting receiver comprising: a broadcasting signal receiver receiving a digital multimedia broadcasting signal; a broadcasting signal decoder decoding the digital multimedia broadcasting signal received by the broadcasting signal receiver; an Audio Video (AV) signal decoder decoding streams of AV signals outputted by the broadcasting signal decoder; a Fast Information Channel (FIC) provider parsing and storing an FIC outputted from the broadcasting signal decoder; an Electronic Program Guide (EPG) provider parsing and storing EPG information outputted from the broadcasting signal decoder; a first controller controlling a viewing of a relevant program in response to a viewing command of a predetermined program inputted from outside, and controllably switching of a receiving channel to an extensively broadcasted other channel when a relevant program is to be extensively broadcasted to the extensively broadcasted other channel; and a second controller controlling the broadcasting signal receiver and the broadcasting signal decoder in response to the control of the first controller to enable a viewer to view the predetermined program.

[2] The receiver as claimed in claim 1, wherein the FIC provider comprises: a FIC decoder decoding the FIC outputted from the broadcasting signal decoder; and a FIC memory storing information decoded by the FIC decoder and providing the information to the first controller.

[3] The receiver as claimed in claim 1, wherein the EPG provider comprises: an MOT (Multimedia Object Transfer) demodulator MOT-demodulating the EPG information outputted from the broadcasting signal decoder; an EPG engine parsing an output signal of the MOT demodulator; and an EPG memory storing the EPG information parsed by the EPG engine and providing the information to the first controller.

[4] The receiver as claimed in claim 1, further comprising a recorder recording streams of AV signal outputted from the broadcasting signal decoder, wherein the first controller determines whether a recording-designated program has been received when a recording command is inputted, and controls the recorder to record the program when the recording-designated program is received.

[5] The receiver as claimed in claim 4, wherein the determination of receipt of the recording-designated program is performed by ascertainment of a number of the recording-designated program by the EPG provider, and receipt of the recording-designated program if PNum of FIG 0/XX stored in the FIC provider is the same as the number of the recording-designated program.
[6] The receiver as claimed in claim 4, wherein the first controller determines whether other programs are broadcasted by the FIG 0/XX stored in the FIG provider in the midst of the program being recorded, and controllably stops the recording by the recorder temporarily if other programs are broadcasted, and controllably performs the recording of the recorder again if the original program is re-broadcasted.

[7] The receiver as claimed in claim 4, wherein the first controller determines whether the program under recording is changed to another channel and broadcasted by the FIG 0/XX stored in the FIG provider, and controls in such a way that the second controller can receive the program that has been changed to another channel if it is determined that the program has been changed to another channel.

[8] A program viewing method of a digital multimedia broadcasting receiver comprising: receiving and processing a relevant program for a viewing when a viewing command of a predetermined program is inputted; determining whether the received program is to be extensively broadcasted to other channel; and switching over the receiving channel to the other channel to allow receiving the relevant program when the received program has been determined to be extensively broadcasted as a result of the determination.

[9] The method as claimed in claim 8, wherein the determination as to whether the received program is to be extensively broadcasted is performed by an update flag value in the FIG 0/XX received along with the program.

[10] The method as claimed in claim 8, wherein the switching over to other channel is realized if PNum is changed in the FIG 0/XX received along with the program.

[11] The method as claimed in claim 8, wherein the switching over to other channel is such that New SId, NEW PNum and PNum are ascertained in the FIG 0/XX received along with the program, and the received channel is switched over to channels corresponding to the New SId and the NEW PNum if the PNum is to be changed.

[12] A program recording method of a digital multimedia broadcasting receiver comprising: parsing received EPG information and storing the parsed EPG information in an EPG memory; checking a program number of a program recording-designated by the EPG memory when a recording command of a predetermined program is inputted; determining whether a program corresponding to the checked program number has been received; and recording the corresponding program when it is determined as a result of the determination that the corresponding program has been received.

[13] The method as claimed in claim 12, wherein the determination as to whether the
corresponding program has been received is realized if the PNum is the same as
the program number of the recording-designated program in the FIG OfXX
received along with the program.

[14] The method as claimed in claim 12, further comprising a step of stopping the
recording if the PNum is not the same as the program number of the
recording-designated program in the FIG OfXX received along with the program while the
program is being recorded.

[15] The method as claimed in claim 12, further comprising: determining whether
broadcasting of the program under recording is temporarily stopped and other
program is being broadcasted using the FIG OfXX received along with the
program; temporarily stopping the recording if the other program is being
broadcasted; and performing the recording again if the broadcasting of the other
program is completed and the original program is broadcasted again.

[16] The method as claimed in claim 15, wherein determination of the other program
is realized by a continuation flag value of the FIG OfXX.

[17] The method as claimed in claim 12, wherein determination of whether the
broadcasting of other program and the original program is realized by comparison
between the PNum of the FIG OfXX and the program number of the
recording-designated program.

[18] The method as claimed in claim 12, further comprising: determining whether the
broadcasting of the program under recording is to be extensively broadcasted to
other channel; and switching the received channel to the extensively broadcasted
channel to keep recording the recording-designated program if it is determined
that the broadcasting of the program under recording is to be extensively
broadcasted to other channel.

[19] The method as claimed in claim 18, wherein the determination of extensive
broadcasting is realized by an update flag value in the FIG OfXX received along
with the program.

[20] The method as claimed in claim 18, wherein the switching over of received
channel is such that PNum, New Std, New PNum are ascertained in the FIG
OfXX received along with the program, and the received channel is switched over
to channels corresponding to the New Std and the NEW PNum if the PNum is
dissimilar to the program number of the recording-designated program.
XML EPG STANDARD

- SI: SERVICE INFORMATION

- CORRESPONDING TO PI (PROGRAM INFORMATION)

- CORRESPONDING TO GI (GROUP INFORMATION)

---

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      </xs:complexType>
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START

S600

PROGRAM VIEWING COMMAND?

Yes

S602

RELATED PROGRAM RECEIPT & VIEWING

S604

FIG O/XX MONITORING

No

S606

UPDATE FLAG = 1?

Yes

S608

READ New SId & PNum

No

S610

PNum CHANGED?

Yes

S612

RECEIPT & VIEWING OF PROGRAM CORRESPONDING TO New SId & New PNum

FINISH

[Fig. 6]

<table>
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<tr>
<th>SId</th>
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[Fig. 7]

CHANNEL SWITCH ON HOLD

SWITCH TO CHANNEL 9 TO RECEIVE AN VIEW 201000
START

S800

RECORDING COMMAND INPUT?

No

S802

PNum ASCERTAINMENT IN EPG MEMORY

Yes

S804

FIG O/XX MONITORING

S806

PNum THE SAME?

No

S808

RECORDING START

Yes

S808

FIG O/XX MONITORING

S810

CONTINUATION FLAG = 1?

No

A

S812

Yes

S814

PNum CHANGED?

Yes

S816

RECORDING TEMPORARILY STOPPED

No

S818

PNum THE SAME?

Yes

S820

RECORDING PERFORMED AGAIN

No
[Fig. 9]

A

S900

UPDATE
FLAG = 1 ?

Yes

New SId & PNum ASCERTAINED

PNum OF FIG O/XX ASCERTAINED

No

S902

PNum CHANGED ?

Yes

RECORDING STOP

FINISH

No

S910

Yes

S912

S904

S906

S908

PROGRAM RECEIVED & RECORDED
CORRESPONDING TO New SId & New PNum

B

[Fig. 10]

<table>
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<tr>
<th>SId</th>
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- RECORDING START
- RECORDING TEMPORARY STOP ON HOLD
- RECORDING TEMPORARILY STOPPED
- RECORDING RE-PERFORMED
- RECORDING STOP

[Fig. 11]

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<tr>
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- RECORDING START
- CHANNEL SWITCH ON HOLD
- SWITCH TO CHANNEL 9 TO RECEIVE AND VIEW 201000
INTERNATIONAL SEARCH REPORT

PCT/KR2006/004992

A. CLASSIFICATION OF SUBJECT MATTER

H04N 7/00(2006.01)i

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

H04N

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Korean Patents and applications for inventions since 1975
Japanese Utility models and applications for Utility models since 1975

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
eKIPASS, SEARCH TERMS DIGITAL BROADCASTING, RECORDING, CHANNEL, SWITCHING, and similar terms

C. DOCUMENTS CONSIDERED TO BE RELEVANT

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Further documents are listed in the continuation of Box C

Date of actual completion of the international search
26 FEBRUARY 2007 (26 02 2007)

Date of mailing of the international search report
26 FEBRUARY 2007 (26.02.2007)

Name and mailing address of the ISA/KR
Korean Intellectual Property Office
920 Dunsan-dong, Seo-gu, Daejeon 302-701, Republic of Korea
Facsimile No 82-42-472-7140

Authorized officer
SHFN, Jae Chul
Telephone No 82-42-48 1-8215

Form PCT/ISA/210 (second sheet) (April 2005)
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