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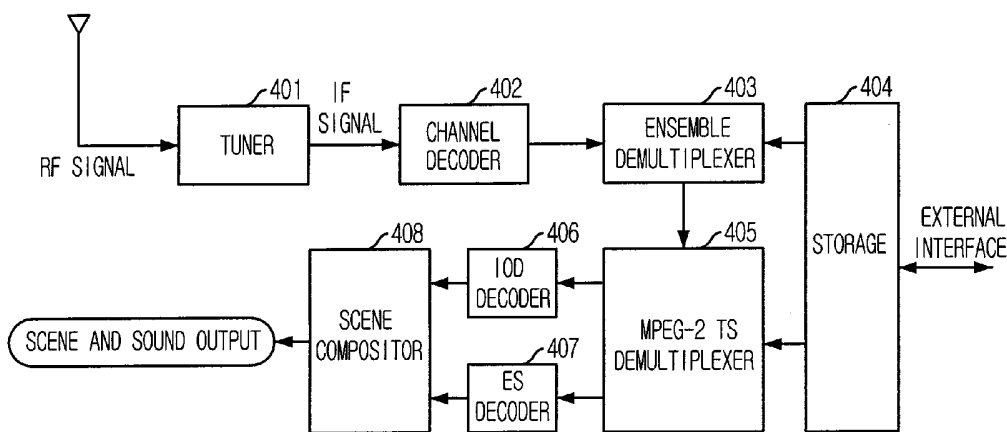
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- (71) Applicants (for all designated States except US): ELEC-TRONICS AND TELECOMMUNICATIONS RE-SEARCH INSTITUTE [KR/KR]; 161, Gajeong-dong, Yuseong-gu, Daejeon 305-350 (KR). NET & TV INC. [KR/KR]; #802 Hanseo Bldg., 1582-6, Seocho-dong, Seocho-gu, Seoul 137-875 (KR).
- (72) Inventors; and
- (75) Inventors/Applicants (for US only): CHEONG, Won-Sik [KR/KR]; #208-1101 Expo Apt., Jeonmin-dong, Yuseong-gu, Daejeon 305-761 (KR). KIM, Kyu-Heon [KR/KR]; #201-904 Saemmeori Apt., Dunsan-dong, Seo-gu, Daejeon 302-120 (KR). LIM, Young-Kwon [KR/KR]; #206-2402 Sandeulmaeul Site 2 Apt., Ilsan 2-dong, Ilsanseo-gu, Goyang-si, Gyeonggi-do 411-776 (KR).
- (74) Agent: SHINSUNG PATENT FIRM; 2-3F, Line Bldg., 823-30, Yeoksam-dong, Kangnam-ku, Seoul 135-080 (KR).
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(54) Title: TERMINAL FOR DECODING DMB CONTENTS AT HIGH SPEED AND METHOD THEREOF



(57) Abstract: Provided is a digital multimedia broadcasting (DMB) receiving terminal for decoding broadcasting contents at a high speed, the terminal including: a tuner for selecting broadcasting signals of a predetermined channel based on a user request from a wireless broadcasting signal inputted from the outside; a tuner and channel decoder for acquiring ensembles by performing channel decoding on the broadcasting signals of the channel; a storage for storing decoding information required for decoding broadcasting contents of the channel selected by a user; an ensemble and transport stream demultiplexer for acquiring transport streams from the ensembles by using the decoding information stored in the storage, extracting transport stream demultiplexer (PMT) and elementary stream (ES) from the transport streams by using the decoding information, and extracting Initial Object Descriptor (IOD) included in the PMT; a decoder for decoding the ES and the IOD; and a scene compositor for forming a broadcasting contents scene by using the information decoded in the decoder.

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TERMINAL FOR DECODING DMB CONTENTS AT HIGH SPEED AND METHOD
THEREOF

Description

5 Technical Field

The present invention relates to a terminal for decoding Digital Multimedia Broadcasting (DMB) contents at a high speed and a method thereof; and, more particularly, to a DMB receiving terminal that can minimize delay time required for normally decoding broadcasting contents transmitted through a broadcasting channel selected by a user by pre-storing decoding information which is required for decoding contents of the broadcasting channel selected by the user, and a method thereof.

Background Art

Fig. 1 is a block diagram showing a conventional terrestrial Digital Multimedia Broadcasting (DMB) terminal and Fig. 2 is a diagram showing a transmission frame for transmitting an ensemble in the conventional terrestrial DMB. Fig. 3 is a flowchart describing a DMB receiving method in a conventional terrestrial DMB receiving terminal and it shows a general operation of the conventional broadcasting terminal of Fig. 2. Figs. 1 to 3 will be described hereinafter.

As shown in Fig. 1, the conventional terrestrial DMB receiving terminal includes a tuner 101, a channel decoder 102, an ensemble demultiplexer 103, a Moving Picture Experts Group-2 (MPEG-2) transport stream (TS) demultiplexer 104, an Initial Object Descriptor (IOD) decoder 105, elementary stream (ES) decoders 106, and a scene compositor 107.

35 Herein, each of the ES decoders includes a decoder for

decoding object descriptor (OD) stream and BInary Format for Scene (BIFS) stream, which are defined in an MPEG-4 Systems standard, a decoder for decoding video stream, a decoder for decoding audio stream, and a decoder for decoding ESSs such as still image stream except the above-mentioned ESSs.

An operation of the general terrestrial DMB receiving terminal formed as above will be described in detail hereinafter.

When a Radio Frequency (RF) broadcasting signal is inputted through an antenna at step 301, the tuner 101 selects broadcasting signals of a predetermined channel from the inputted RF broadcasting signal by tuning in to a channel frequency selected by a user and outputs intermediate frequency (IF) broadcasting signals at step 302, and the channel decoder 102 performs a channel decoding on the channel-coded IF signals, which come out as a result of the tuning, and passes over the result, i.e., an ensemble, to the ensemble demultiplexer 103 at step 303.

Herein, the ensemble includes more than one service, and the service includes more than one service component. The ensemble also includes information on the services and the service components.

When the ensemble is considered based on a transmission standard, a transmission frame for transmitting the ensemble includes a synchronization channel 201, a fast information channel (FIC) 202 and a main service channel (MSC) 203 as shown in Fig. 2. Herein, the synchronization channel 201 is for synchronizing a transmitting signal and the FIC 202 includes data for controlling multiplexing, information on each service and other FIC data. Meanwhile, the main service channel MSC 203 includes information on a service and data required for a real service, e.g., audio, video and other data, and the MSC includes a plurality of sub-channels.

A demultiplexing process of steps 304, 305 and 307 in the ensemble demultiplexer 103 will be described hereinafter.

The ensemble demultiplexer 103 extracts information and data conforming to a service selected by a user among services, which are included in the ensemble, by demultiplexing the ensemble. Herein, identification (ID) information of the service selected by the user, the number of components included in the service and ID information of a sub-channel storing each component are required to extract data for the service selected by the user, and the ensemble demultiplexer 103 acquires the information through analysis of the FIC. When the ensemble is demultiplexed in the terrestrial DMB, MPEG-2 TS is acquired as the result.

The MPEG-2 TS demultiplexer 104 separates diverse ESs and IOD out of the TS, by analyzing the MPEG-2 TS. Herein, the ES included in the MPEG-2 TS includes audio and video stream included in contents, Binary Format for Scene (BIFS) stream having screen composition information on provided contents and OD stream having information on media streams included in the contents, and still image stream can be included if necessary.

The IOD decoder 105 initializes a terminal by analyzing the IOD, and the ES decoders 106 decodes a plurality of ESs included in the contents. The decoding informations are put together in the scene compositor 107 and used to output the screen and sound.

A process from an operation performed in the MPEG-2 TS demultiplexer 104 to an operation of the screen and sound output will be described in detail hereinafter.

A Program Association Table (PAT) having Packet Identifier (PID) of 0 is sought for in the MPEG-2 TS at step 309. The PID of Program Map Table (PMT) is acquired by analyzing the PAT at step 310, and the PMT is acquired from a TS packet having the PID by using the acquired PID

at step 311. The PMT stores the IOD, a stream type of the media streams included in the TS and the PID of each media stream.

5 The IOD is acquired from the PMT, and ES_IDs of BIFS stream and ES_IDs of the OD stream are acquired from the ES Descriptors included in the IOD.

10 The PID of the BIFS stream is acquired at step 312 by comparing information included in the PMT with the ES_IDs of the BIFS stream, and the BIFS stream is obtained by using the PID from the TS at step 313 and decoded at step 314. Then, a scene is composed at step 315.

15 Also, the PID of the OD stream is acquired at step 312 by comparing information included in the PMT with the ES_IDs of the OD stream, and the OD stream is acquired by using the PID at step 313 and decoded at step 314. The ES Descriptors of the media streams included in the TS is acquired from the decoded OD stream and the PID of the media streams is obtained by comparing the information included in the PMT with the information of the ES
20 Descriptors.

The media streams is acquired from the TS at step 313 by using the PIDs of the media streams and decoded at step 314. Then, the scene composition is completed at step 315, and the screen and sound are outputted at step 316.

25 When the user turns on a terminal or changes a channel in the above-mentioned DMB receiving terminal, delay time for normally outputting the screen and sound by receiving terrestrial DMB contents will be described hereinafter.

30 A frequency channel selected by a user is tuned in and the FIC information should be searched for. Herein, a transmission cycle of the FIC information depends on an application service and delay time conforming to the FIC transmission cycle of each application service is required.

35 The PAT should be decoded to decode the MPEG-2 TS and a delay time of up to 500mS can be generated from the

decoding of the PAT since the PAT has a transmission cycle shorter than 500mS.

After decoding the PAT, the PMT should be decoded by using the PID of the PMT acquired from the decoding of the PAT, and the delay time of up to 500mS can be generated for decoding the PMT since the PMT has the transmission cycle shorter than 500mS.

After the decoding of the PMT, the OD stream and the BIFS stream should be decoded and the delay time of up to 500mS can be generated to decode each of the OD stream and the BIFS stream since each of the OD stream and the BIFS stream has the transmission cycle shorter than 500mS.

That is, when a channel desired by a user is selected, many delays can be generated by the time required for decoding each information since diverse information should be decoded in order to normally display contents, which are provided in the selected channel, in a receiving terminal.

Disclosure

20 Technical Problem

It is, therefore, an object of the present invention to provide a digital multimedia broadcasting (DMB) receiving terminal that can decode a DMB contents at a high speed, minimize delay time required for normally decoding contents transmitted through a broadcasting channel selected by a user by pre-storing information required for decoding contents of the broadcasting channel selected by the user in a broadcasting receiving terminal, and a method thereof.

Other objects and advantages of the invention will be understood by the following description and become more apparent from the embodiments in accordance with the present invention, which is set forth hereinafter. It will be also apparent that objects and aspects of the invention

can be embodied easily by the means defined in the claims and combinations thereof.

Technical Solution

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In accordance with one aspect of the present invention, there is provided a digital multimedia broadcasting (DMB) receiving terminal for decoding broadcasting contents at a high speed, including: a tuner for selecting broadcasting signals of a predetermined channel based on a user request from a wireless broadcasting signal inputted from the outside; channel decoder for acquiring ensembles by performing channel decoding on the broadcasting signal of the channel; a storage for storing decoding information required for decoding broadcasting contents of the channel selected by a user; an ensemble and transport stream demultiplexer for acquiring transport streams from the ensembles by using the decoding information stored in the storage, extracting Program Map Table (PMT) and elementary stream (ES) from the transport streams by using the decoding information, and extracting Initial Object Descriptor (IOD) included in the PMT; a decoder for decoding the ES and the IOD; and a scene compositor for forming a broadcasting contents scene by using the information decoded in the decoder.

In accordance with another aspect of the present invention, there is provided a DMB receiving method for decoding broadcasting contents at a high speed, including the steps of: a) selecting broadcasting signals of a predetermined channel based on a user request from a wireless broadcasting signal inputted from outside and acquiring ensembles by performing channel decoding on the broadcasting signals of the channel; b) separating a sub-channel from the ensemble by using sub-channel identification (ID) information stored in the storage and

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acquiring transport stream by demultiplexing the ensemble based on the sub-channel; c) extracting a PMT from the transport stream by using a Packet Identifier (PID) of the PMT stored in the storage, extracting an IOD included in the PMT and extracting an object descriptor (OD) stream, 5 BINARY Format for Scene (BIFS) stream, and media streams from the transport stream by using PIDs of the OD stream, BIFS stream, and media streams stored in the storage; and d) decoding the OD stream, BIFS stream, media streams and the IOD, and forming a broadcasting contents scene by using 10 the decoding information.

Advantageous Effects

15 When a terrestrial Digital Multimedia Broadcasting (DMB) user first turns on a terminal or changes a channel while the user watches a content with the terminal, the technology of the present invention can decrease time required for decoding contents transmitted through a 20 channel and provide a method that can provide EPG information on terrestrial DMB.

In other words, the present can minimize delay time by shortening time required for normally decoding contents transmitted through a broadcasting channel selected by a user by pre-storing information required for decoding 25 contents of the broadcasting channel selected by the user in a broadcasting terminal.

Description of Drawings

30 The above and other objects and features of the present invention will become apparent from the following description of the preferred embodiments given in conjunction with the accompanying drawings, in which:

35 Fig. 1 is a block diagram showing a conventional

terrestrial Digital Multimedia Broadcasting (DMB) receiving terminal;

Fig. 2 is a diagram showing a transmission frame for transmitting an ensemble in the conventional terrestrial
5 DMB;

Fig. 3 is a flowchart describing a DMB receiving method in a conventional terrestrial DMB receiving terminal;

Fig. 4 is a block diagram showing a DMB receiving
10 terminal for decoding broadcasting contents at a high speed in accordance with an embodiment of the present invention; and

Fig. 5 is a flowchart describing a DMB receiving method for decoding broadcasting contents at a high speed
15 in accordance with the embodiment of the present invention.

Best Mode for the Invention

Other objects and advantages of the present invention
20 will become apparent from the following description of the embodiments with reference to the accompanying drawings. Therefore, those skilled in the art that the present invention is included can embody the technological concept and scope of the invention easily. In addition, if it is
25 considered that detailed description on prior art may blur the points of the present invention, the detailed description will not be provided herein. The preferred embodiments of the present invention will be described in detail hereinafter with reference to the attached drawings.

30 Fig. 4 is a block diagram showing a digital multimedia broadcasting (DMB) receiving terminal for decoding broadcasting contents at a high speed in accordance with an embodiment of the present invention.

The present invention, which relates to a terminal for
35 receiving a terrestrial DMB, pre-stores information

required for normally decoding contents transmitted through a channel selected by a user in a terminal, thereby minimizing delay time required for normally decoding contents transmitted through the channel selected by the user.

In other words, the present invention, which relates to a terrestrial DMB receiving terminal for receiving and restoring terrestrial DMB interactive contents, can reduce initial delay time required for decoding by using decoding information stored in storage by having the storage, which can store information required for reducing initial delay time required for decoding a program transmitted through the channel when a user turns on a terminal or changes a channel.

The terrestrial DMB receiving terminal of the present invention includes a storage 404 for storing information required for decoding the transmitted contents, and the storage 404 may be a permanent memory, e.g., a Read Only Memory (ROM) or a rewritable memory. When the storage 404 is the rewritable memory, the storage 404 includes an interface which can receive and store required information through a broadcasting network, a wired/wireless communication network, or wired/wireless internet, and an interface, in which a user can store information in off-line if necessary.

Also, an ensemble demultiplexer 403 and an MPEG-2 TS demultiplexer 405 of the terrestrial DMB receiving terminal as a function that can remarkably reduce initial delay time by using decoding information stored in the storage 404, as well as a function that a conventional terminal has.

It will be described in detail hereinafter with reference to Fig. 4.

The tuner 401 selects a broadcasting signal of a predetermined channel based on a user request from an RF broadcasting signal inputted from the outside through an

antenna and outputs the broadcasting signal as an intermediate frequency (IF) signal.

The channel decoder 402 acquires ensemble by performing channel decoding on the IF signal of the predetermined channel.

The storage 404 stores decoding information, which is required for decoding broadcasting contents of a predetermined channel selected by a user, such as sub-channel identification (ID) information, Packet Identifier (PID) of the PMT, the OD stream/Binary Format for Scene (BIFS) stream/media streams PID. The decoding information is stored directly from the user, or stored/updated by being downloaded from a server providing decoding information through the wired/wireless communication network.

The ensemble demultiplexer 403 separates a sub-channel from an ensemble by using sub-channel ID information stored in the storage 404 and acquires transport stream by demultiplexing the ensemble by using the sub-channel.

Meanwhile, the MPEG-2 TS demultiplexer 405 extracts PMT from the transport stream by using the PID of the PMT stored in the storage 404, extracts IOD included in the extracted PMT and separates the OD stream/BIFS stream/media streams from the transport stream by using each PID with respect to the OD stream/BIFS stream/media streams stored in the storage 404.

The ES decoder 407 decodes the OD stream/BIFS stream/media streams extracted from the TS demultiplexer 405 and an IOD decoder 406 decodes the IOD.

The scene compositor 408 composes a broadcasting content scene by using decoding information such as the OD stream/BIFS stream/media streams decoded in the decoders 406 and 407 and the IOD.

Fig. 5 is a flowchart describing a DMB receiving method for decoding broadcasting contents at a high speed

in accordance with an embodiment of the present invention and it shows a method executed in a DMB receiving terminal for decoding the broadcasting contents at a high speed as described in Fig. 4.

5 The present invention, which relates to a method for pre-storing information required for decoding transmitted contents in a broadcasting terminal and reducing delay time by using the stored information, can reduce initial delay time by storing sub-channel ID required for demultiplexing ensembles, PID of PMT required for MPEG-2 TS demultiplexing, 10 PID of OD stream, PID of the BIFS stream and PIDs of media streams in the storage 404 of the broadcasting receiving terminal and using the information when ensemble demultiplexing and TS demultiplexing are performed as shown 15 in Fig. 5.

The decoding information stored in the storage 404 can be selectively stored and used based on conditions, and all the information need not to be stored in the storage and used for decoding.

20 It will be described in detail hereinafter based on the flowchart of Fig. 5.

The broadcasting terminal processes a tuning for selecting a broadcasting signal of a predetermined channel based on a user request from a wireless broadcasting signal 25 inputted from the outside at steps 501 and 502, and acquires ensembles by performing channel decoding on the broadcasting signal of the predetermined channel at step 503.

When the ensemble demultiplexing is processed at step 30 504, sub-channels are separated from the ensembles at step 505 by using the sub-channel ID information stored in the storage 404 and transport streams are acquired by demultiplexing the ensembles by using the sub-channels.

An MPEG-2 TS demultiplexing process of step 506 35 includes the steps of extracting PMT from the transport

stream at step 507 by using PID of the PMT stored in the storage 404, extracting IOD included in the extracted PMT and extracting the OD stream, the BIFS stream and media streams from the transport stream by using each PID of the
5 OD stream/BIFS stream/media streams stored in the storage 404 at step 508.

The extracted OD stream, the BIFS stream, the media streams, and the IOD are decoded at step 509, and screen and sound are outputted at step 511 by composing
10 broadcasting contents scene at step 510 by using the decoded OD stream/BIFS stream/media streams.

As described in detail, the present invention can be embodied as a program and stored in a computer-readable recording medium, such as CD-ROM, RAM, ROM, a floppy disk,
15 a hard disk and a magneto-optical disk. Since the process can be easily implemented by those skilled in the art, further description will not be provided herein.

While the present invention has been described with respect to certain preferred embodiments, it will be
20 apparent to those skilled in the art that various changes and modifications may be made without departing from the scope of the invention as defined in the following claims.

What is claimed is:

1. A digital multimedia broadcasting (DMB) receiving terminal for decoding broadcasting contents at a high speed,
5 comprising:

a tuning means for selecting broadcasting signals of a predetermined channel based on a user request from a wireless broadcasting signal inputted from outside;

10 a channel decoding means for acquiring ensembles by performing channel decoding on the broadcasting signals of the channel;

a storing means for storing decoding information required for decoding broadcasting contents of the channel selected by a user;

15 an ensemble and transport stream demultiplexing means for acquiring transport streams from the ensembles by using the decoding information stored in the storing means, extracting Program Map Table (PMT) and elementary stream (ES) from the transport streams by using the decoding
20 information, and extracting Initial Object Descriptor (IOD) included in the PMT;

a decoding means for decoding the ES and the IOD; and

25 a scene forming means for forming a broadcasting contents scene by using the information decoded in the decoding means.

2. The DMB receiving terminal as recited in claim 1, wherein the decoding information is transmitted and stored directly from the user, or downloaded in the storing means
30 through a wired/wireless communication network.

3. The DMB receiving terminal as recited in claim 2, wherein the decoding information includes sub-channel identification (ID) information, a Packet Identifier (PID)
35 of the PMT, and PIDs of the OD stream/BINARY Format for

Scene (BIFS) stream/media streams.

4. The DMB receiving terminal as recited in claim 3,
wherein the ensemble and transport stream demultiplexing
5 means includes:

an ensemble demultiplexing unit for separating a sub-
channel from an ensemble by using the sub-channel ID
information stored in the storing means and acquiring the
transport stream by demultiplexing the ensemble based on
10 the sub-channel; and

a transport stream demultiplexing unit for extracting
the PMT from the transport stream by using PID of PMT
stored in the storing means, extracting IOD from the PMT
and separating the OD stream, BIFS stream, and media
15 streams from the transport stream by using the PIDs of the
OD stream, BIFS stream, and media streams stored in the
storing means.

5. A digital multimedia broadcasting (DMB) receiving
20 method for decoding broadcasting contents at a high speed,
comprising the steps of:

a) selecting broadcasting signals of a predetermined
channel based on a user request from a wireless
broadcasting signal inputted from the outside and acquiring
25 ensembles by performing channel decoding on the
broadcasting signals of the channel;

b) separating a sub-channel from an ensemble by using
sub-channel identification (ID) information stored in the
storing means and acquiring transport stream by
30 demultiplexing the ensemble based on the sub-channel;

c) extracting a Program Map Table (PMT) from the
transport stream by using a Packet Identifier (PID) of the
PMT stored in the storing means, extracting an Initial
Object Descriptor (IOD) included in the PMT and extracting
35 an object descriptor (OD) stream, BINARY Format for Scene

(BIFS) stream, and media streams from the transport stream by using PIDs of the OD stream, BIFS stream, and media streams stored in the storing means; and

5 d) decoding the OD stream, BIFS stream, media streams and the IOD, and forming a broadcasting contents scene by using the decoded information.

6. The method as recited in claim 5, wherein the storing means stores sub-channel ID information, PID of the PMT and PIDs of the OD stream, BIFS stream, and media streams.

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FIG. 1

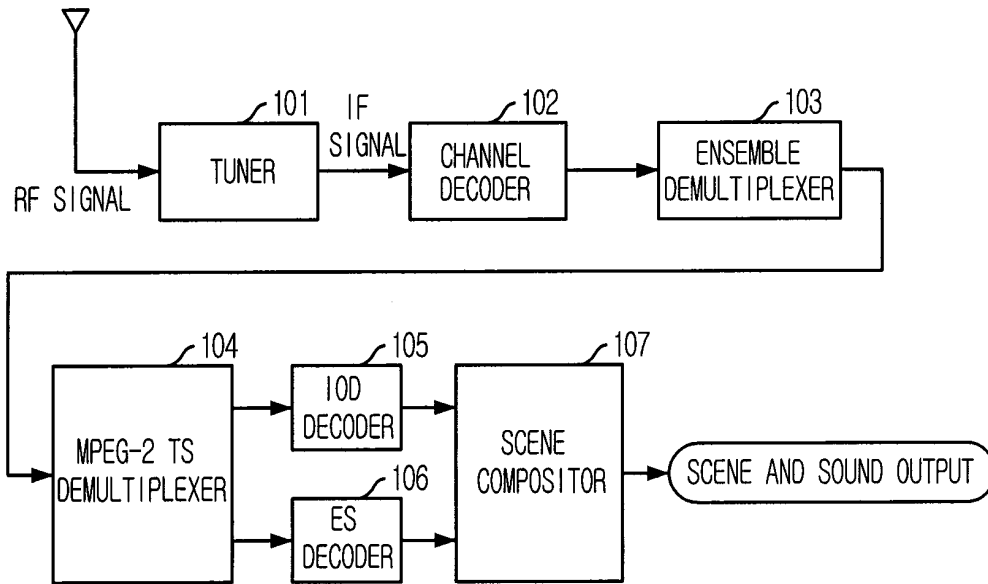
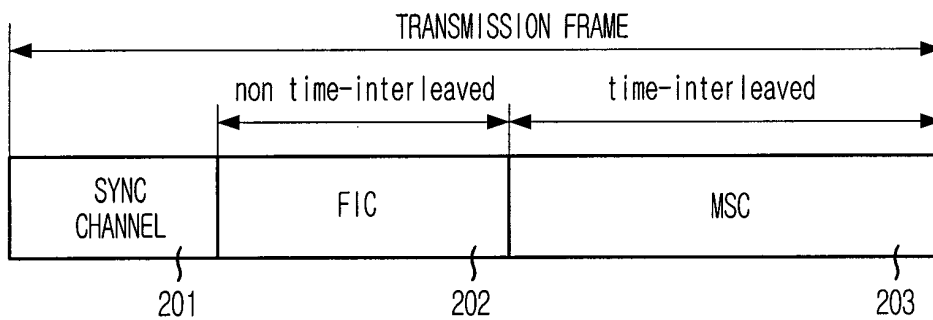


FIG. 2



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FIG. 3

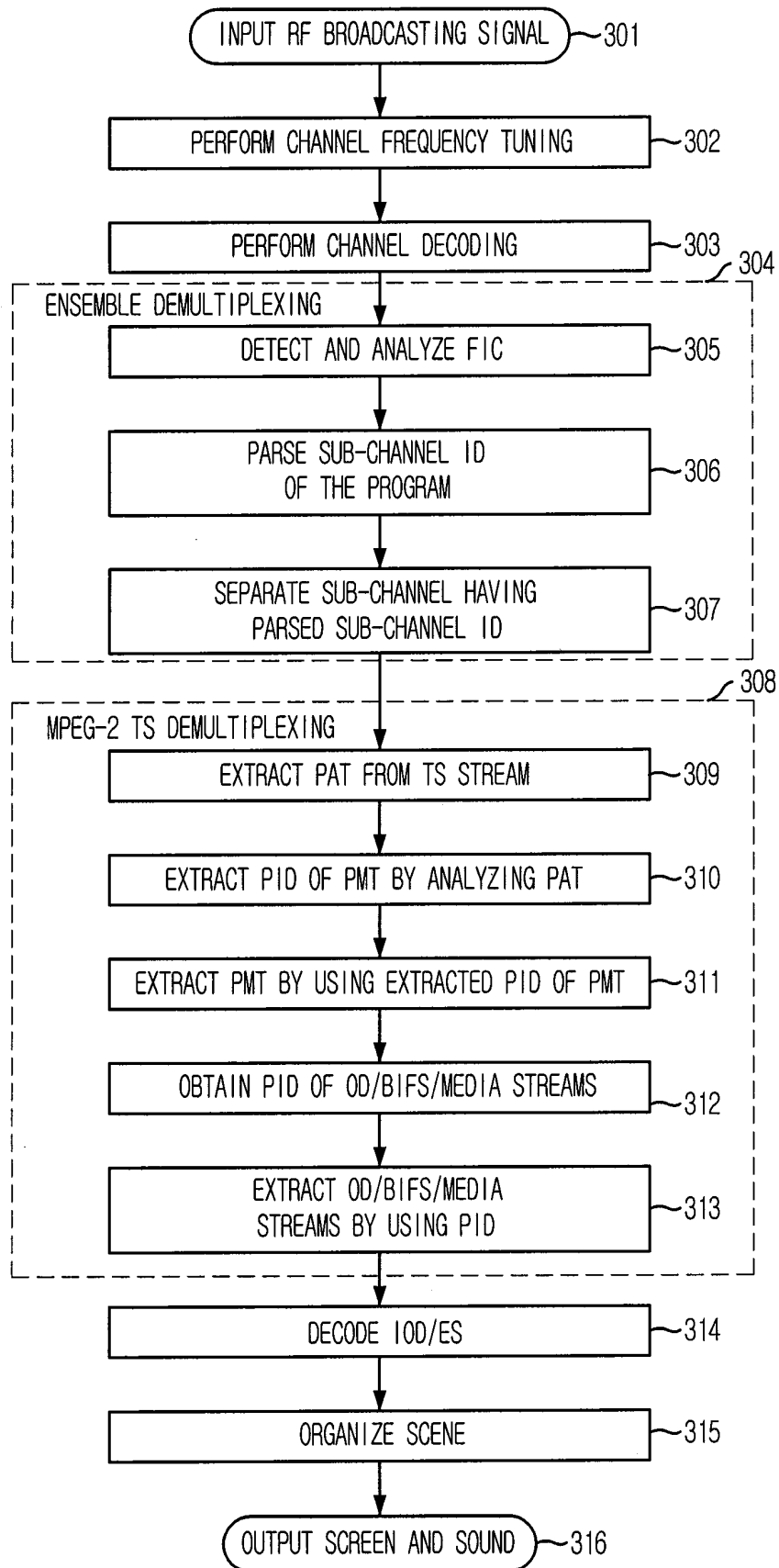
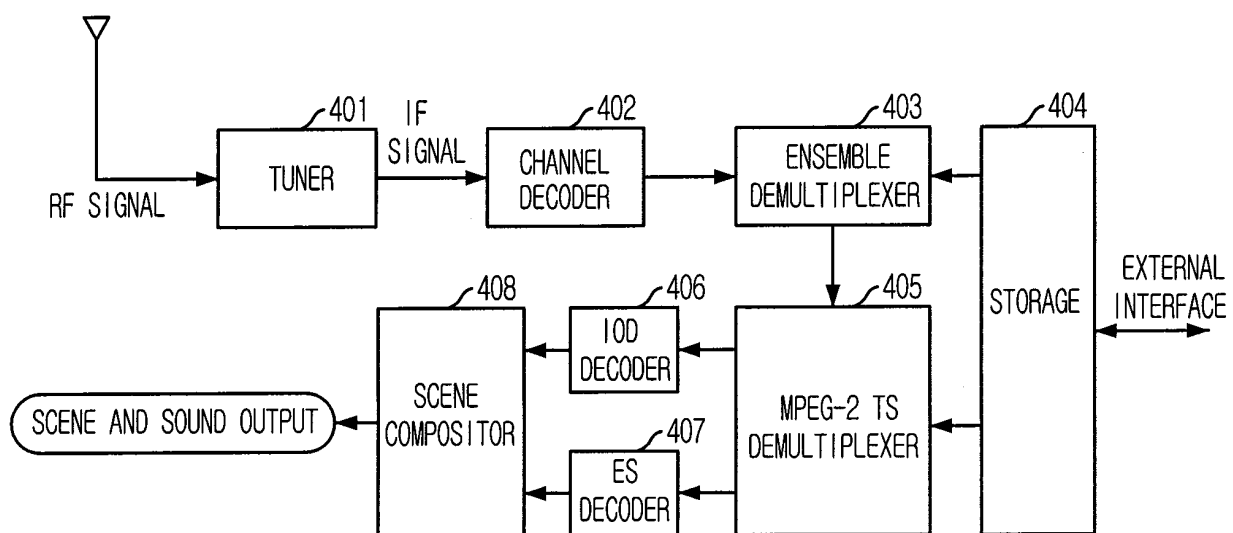
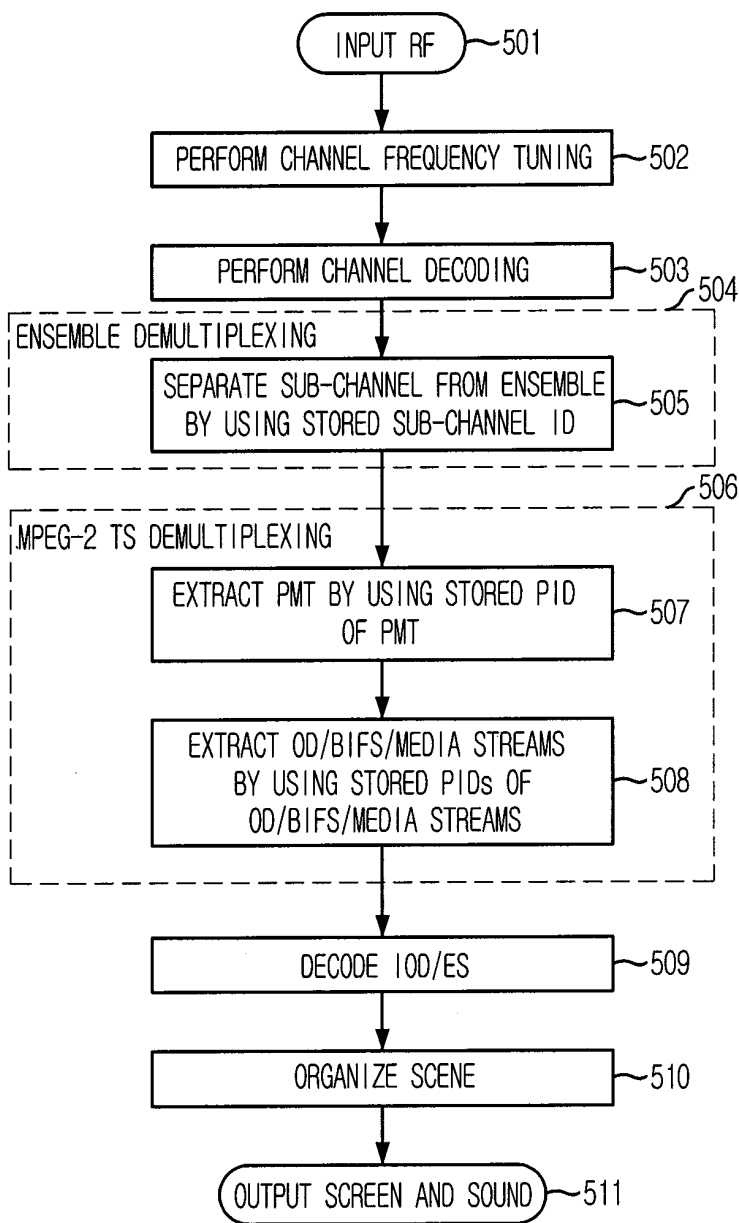


FIG. 4



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FIG. 5



INTERNATIONAL SEARCH REPORT

International application No.
PCT/KR2005/004195**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

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

eKIPASS, SEARCH TERMS:DECODING INFORMATION, STORAGE, CHANNEL

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO 9746009A1 (THOMSON CONSUMER ELECTRONICS), 04 December 1997 See the whole document	1-6
A	WO 02069629A2 (THOMSON LICENSING SA), 06 September 2002 See the whole document	1-6
A	JP 11-168729 (TOSHIBA CORP), 22 June 1999 See the whole document	1-6
A	US 5594492A (BELL ATLANTIC NETWORK SERVICES), 14 January 1997 See the whole document	1-6
A	JP 08-140055 (TOSHIBA CORP), 31 May 1996 See the whole document	1-6

 Further documents are listed in the continuation of Box C. See patent family annex.

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Date of the actual completion of the international search

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Korean Intellectual Property Office
920 Dunsan-dong, Seo-gu, Daejeon 302-701,
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SHIN, Jae Chul

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INTERNATIONAL SEARCH REPORT

Information on patent family members

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