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(54) **CONTENT RECEIVING APPARATUS, CONTENT RECEIVING METHOD, AND CONTENT DISTRIBUTING SYSTEM**

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(57) **ABSTRACT**

[Object] To realize a content receiving apparatus and the like which can avoid a situation where content cannot be reproduced even when content receiving routes are switched from a broadcast wave to a communication network at an arbitrary timing.

[Means to achieve the object] A receiving route switch control unit (**112**) determinates which receiving route is selected from the broadcast wave (**20**) and the communication network (**30**) to obtain content, and switches receiving routes based on this determination. A DRM module (**140**) manages the copyright of the obtained content based on a digital rights management (DRM) method defined by a provider A when content is received via the broadcast wave (**20**). Likewise, a DRM module (**150**) manages the content of copyright based on a DRM method B defined by a provider B, and a DRM module (**160**) manages content copyrights based on a DRM method C defined by a provider C, respectively.

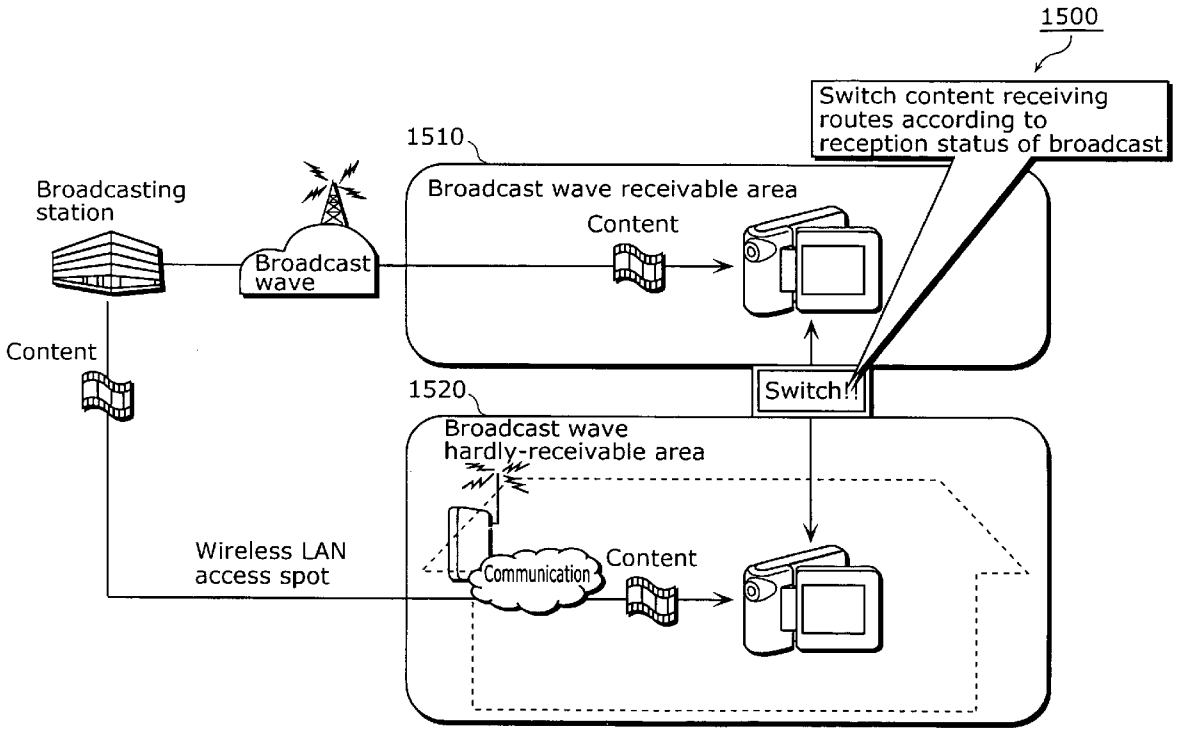


FIG. 1

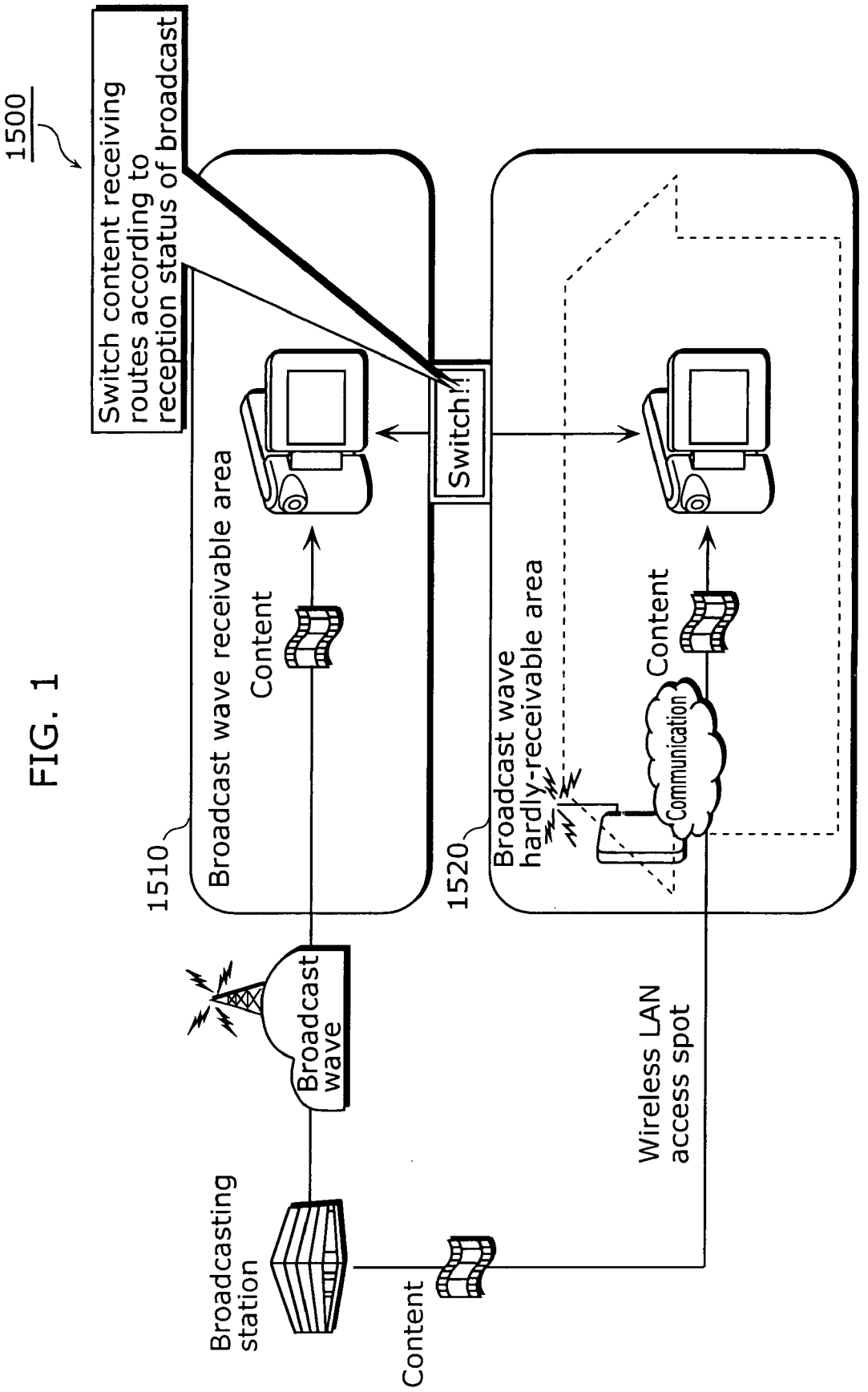

1500
Switch content receiving routes according to reception status of broadcast
Switch
Broadcast wave receivable area
Content
1510
Broadcast wave hardly-receivable area
Content
Communication
1520
Broadcast wave
Broadcasting station
Content
Wireless LAN access spot

FIG. 2

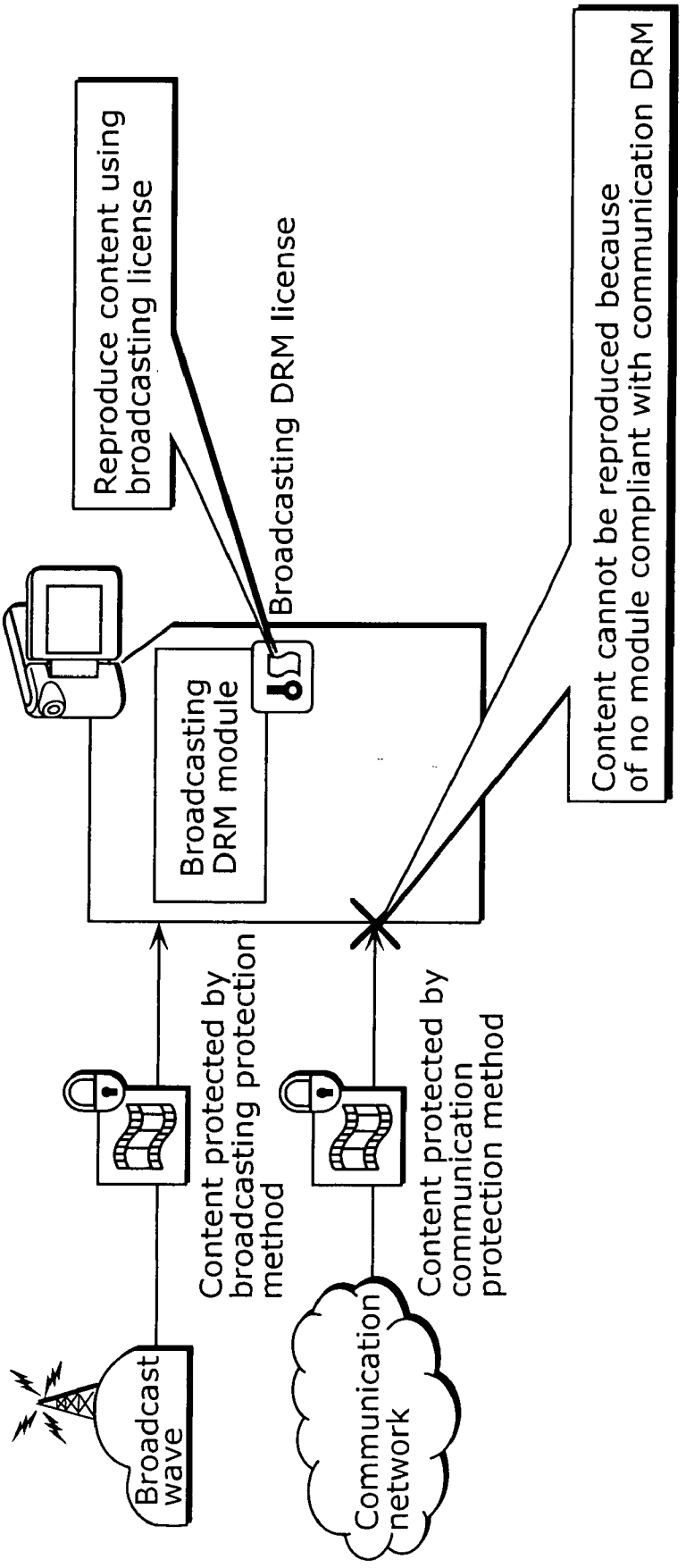

Broadcast wave
Communication network
Content protected by broadcasting protection method
Content protected by communication protection method
Broadcasting DRM module
Broadcasting DRM license
Reproduce content using broadcasting license
Content cannot be reproduced because of no module compliant with communication DRM

FIG. 3

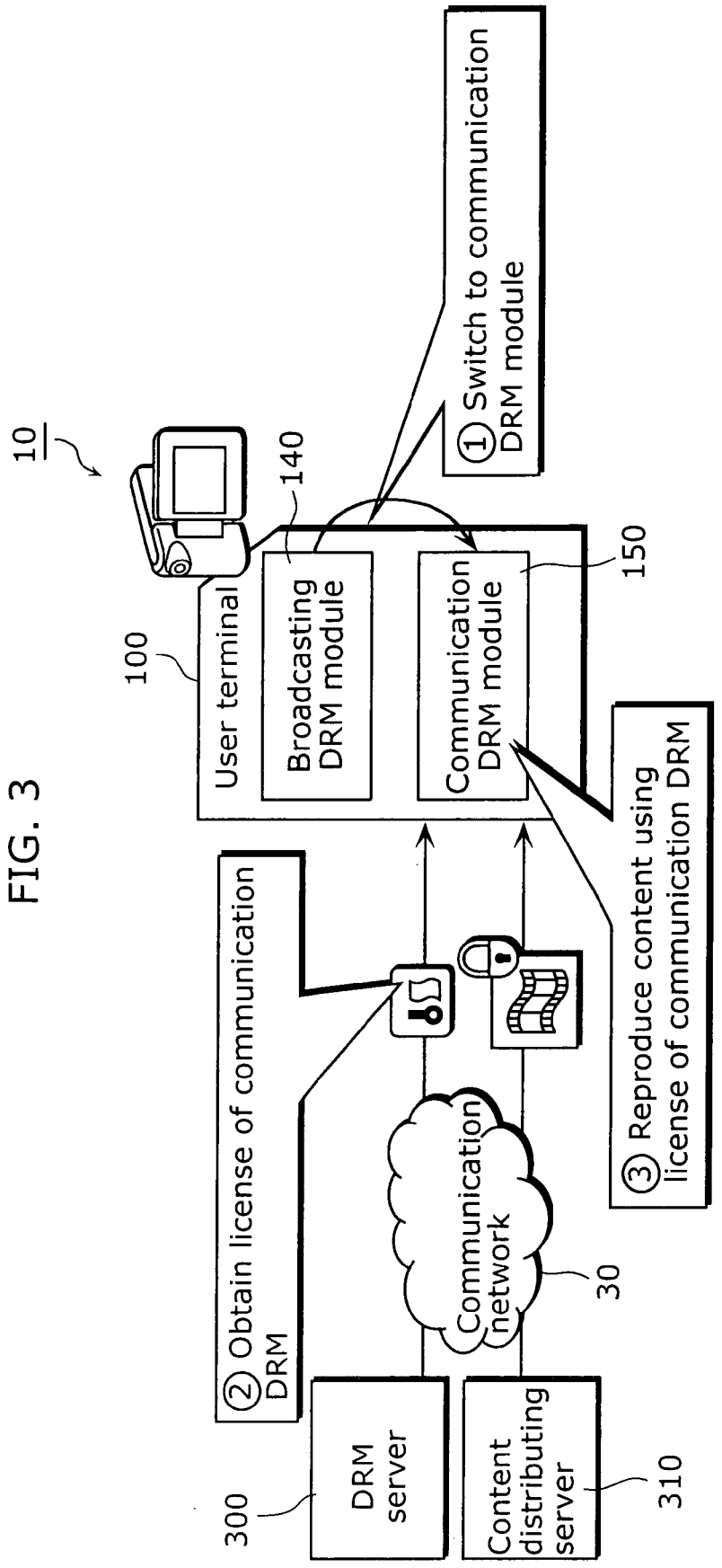
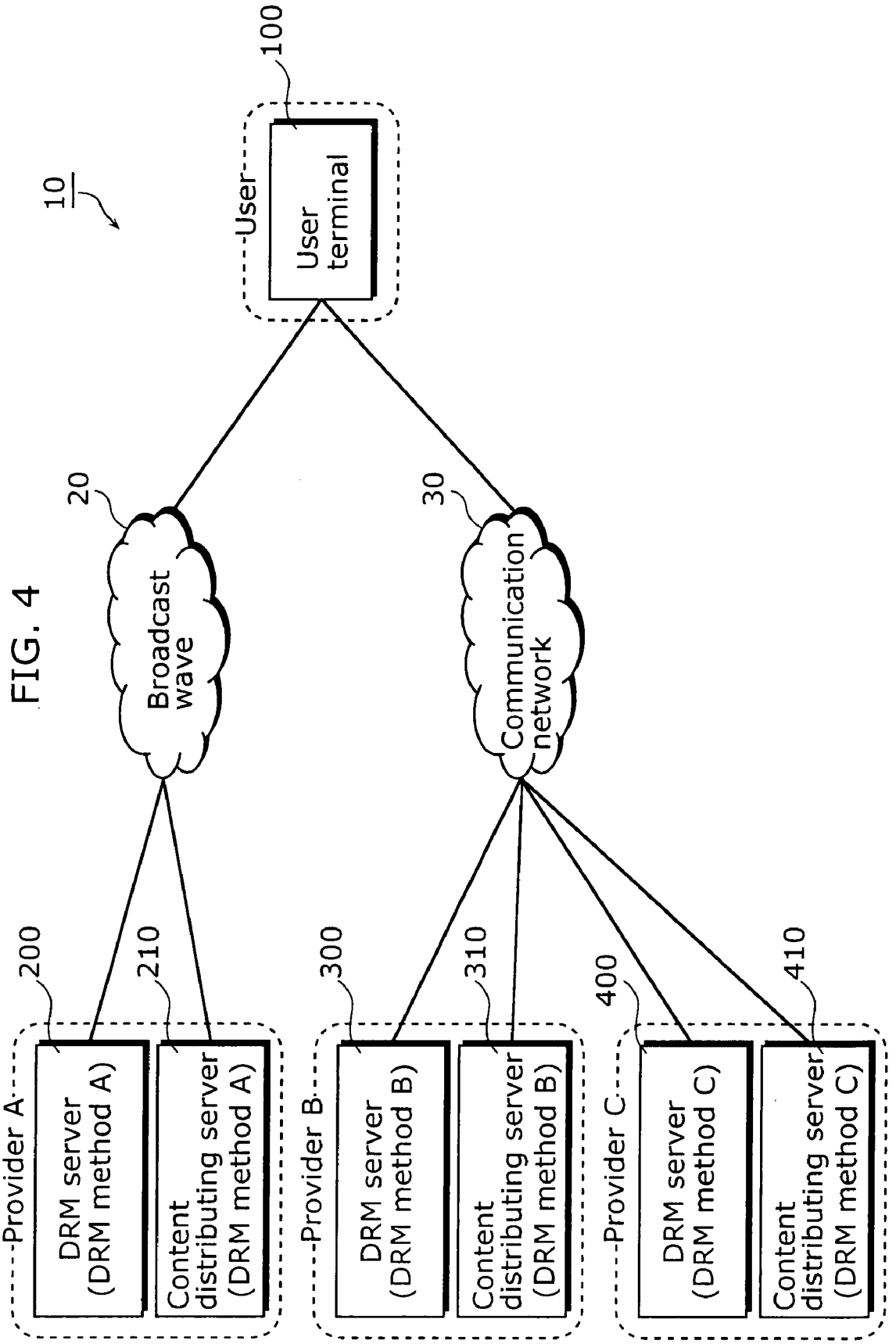

10
100
User terminal
140
Broadcasting DRM module
150
Communication DRM module
① Switch to communication DRM module
② Obtain license of communication DRM
③ Reproduce content using license of communication DRM
Communication network
30
300
DRM server
Content distributing server
310

FIG. 4


10
User
User terminal
100
20
Broadcast wave
30
Communication network
Provider A
DRM server (DRM method A)
Content distributing server (DRM method A)
200
210
Provider B
DRM server (DRM method B)
Content distributing server (DRM method B)
300
310
Provider C
DRM server (DRM method C)
Content distributing server (DRM method C)
400
410

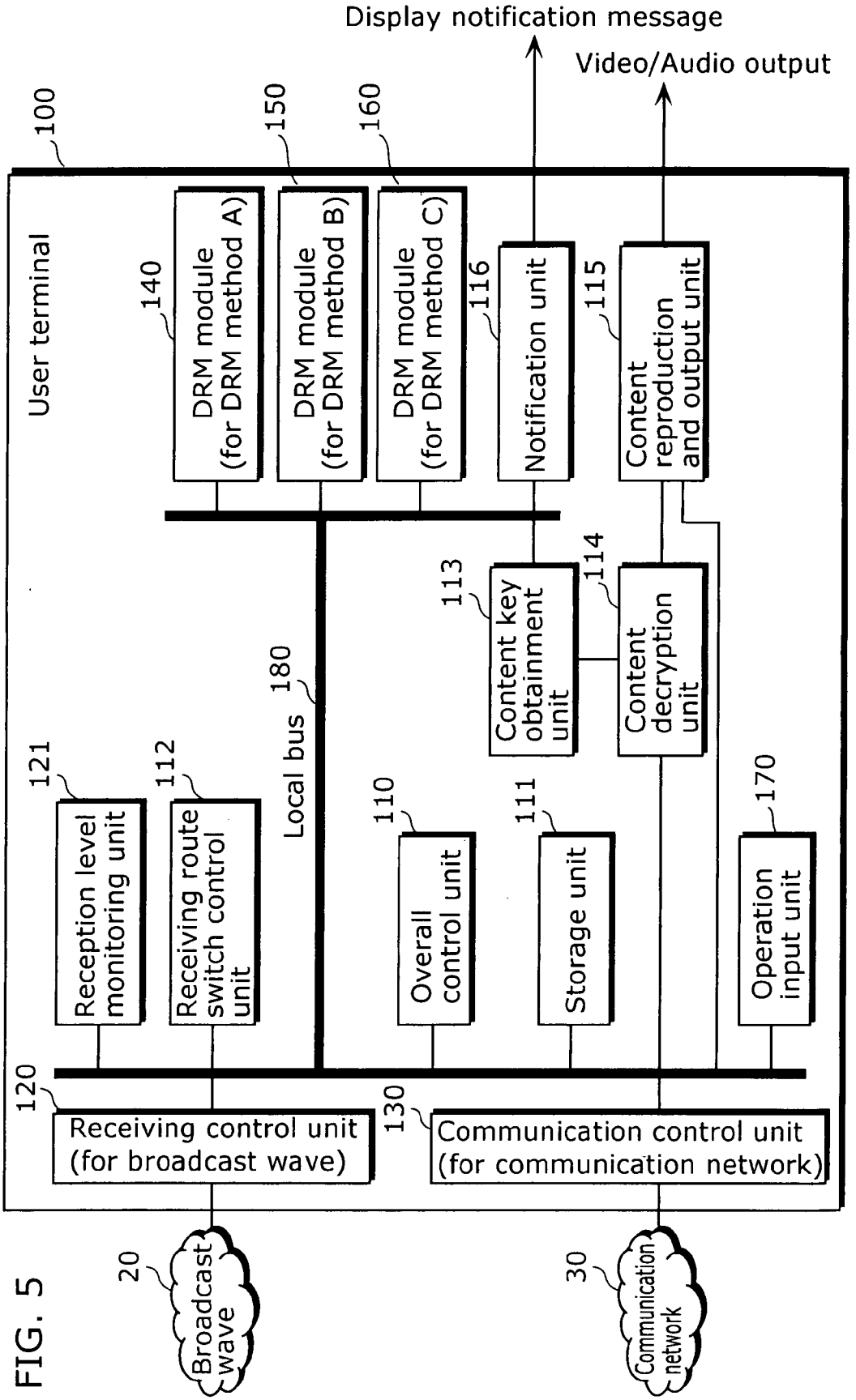

Display notification message
Video/Audio output
100
User terminal
150
160
140
DRM module (for DRM method A)
DRM module (for DRM method B)
DRM module (for DRM method C)
116
Notification unit
115
Content reproduction and output unit
113
Content key obtainment unit
114
Content decryption unit
180
Local bus
121
Reception level monitoring unit
112
Receiving route switch control unit
110
Overall control unit
111
Storage unit
170
Operation input unit
120
Receiving control unit (for broadcast wave)
130
Communication control unit (for communication network)
20
Broadcast wave
30
Communication network

FIG. 5

FIG. 6

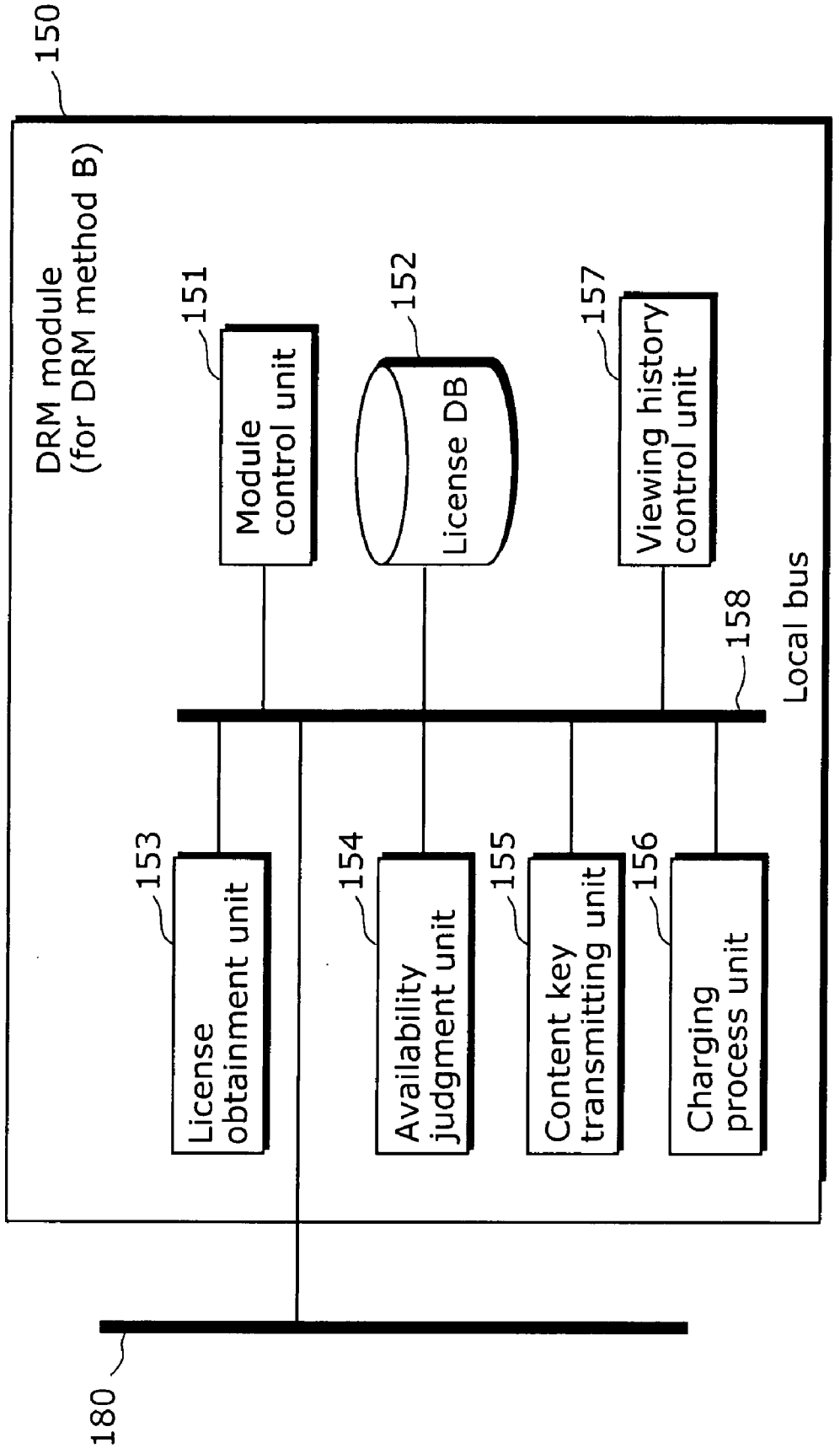

150
DRM module
(for DRM method B)
151
Module control unit
152
License DB
157
Viewing history control unit
158
Local bus
153
License obtainment unit
154
Availability judgment unit
155
Content key transmitting unit
156
Charging process unit
180

FIG. 7

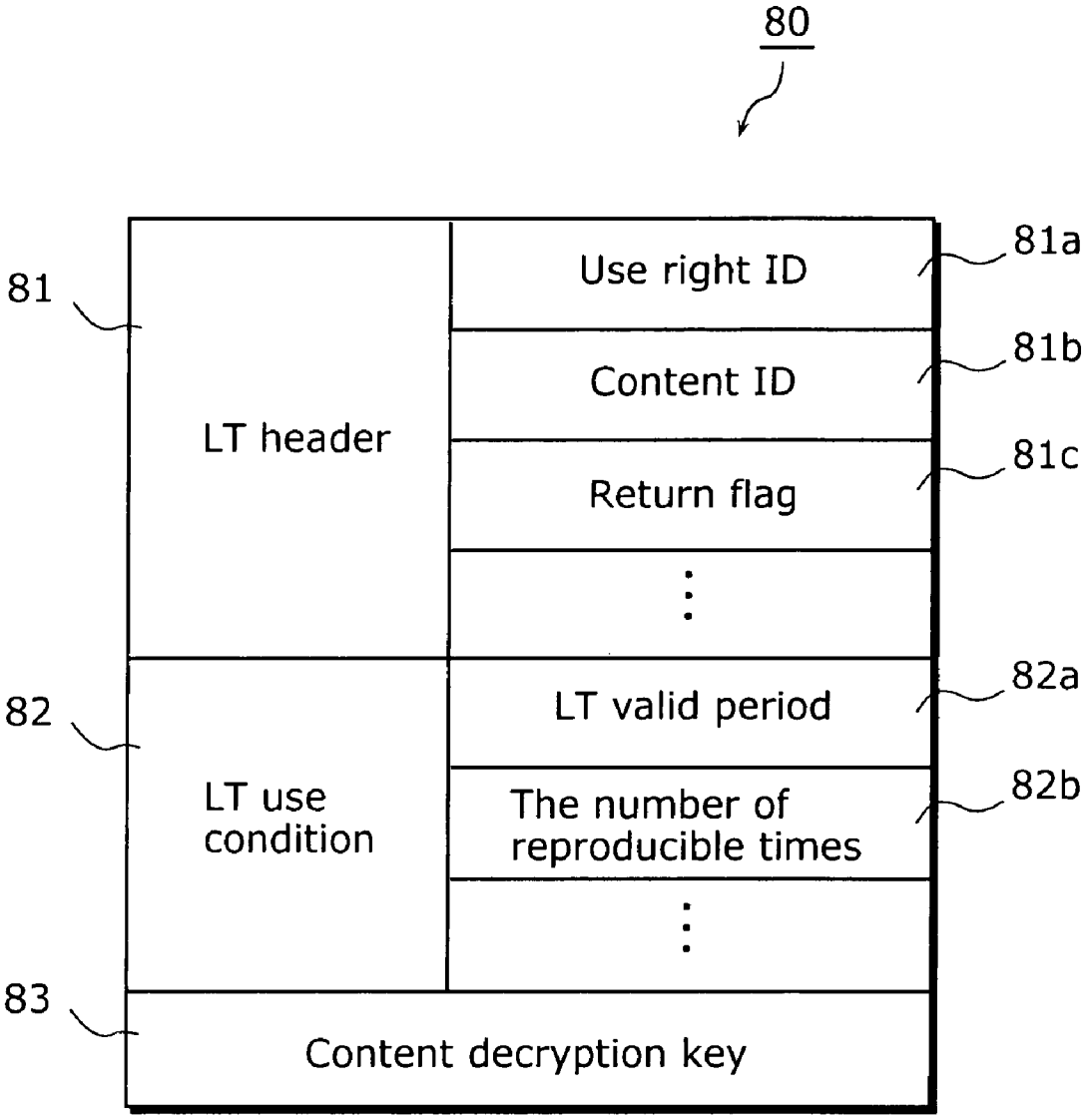

80
81
LT header
Use right ID
Content ID
Return flag
81a
81b
81c
82
LT use condition
LT valid period
The number of reproducible times
82a
82b
83
Content decryption key

FIG. 8

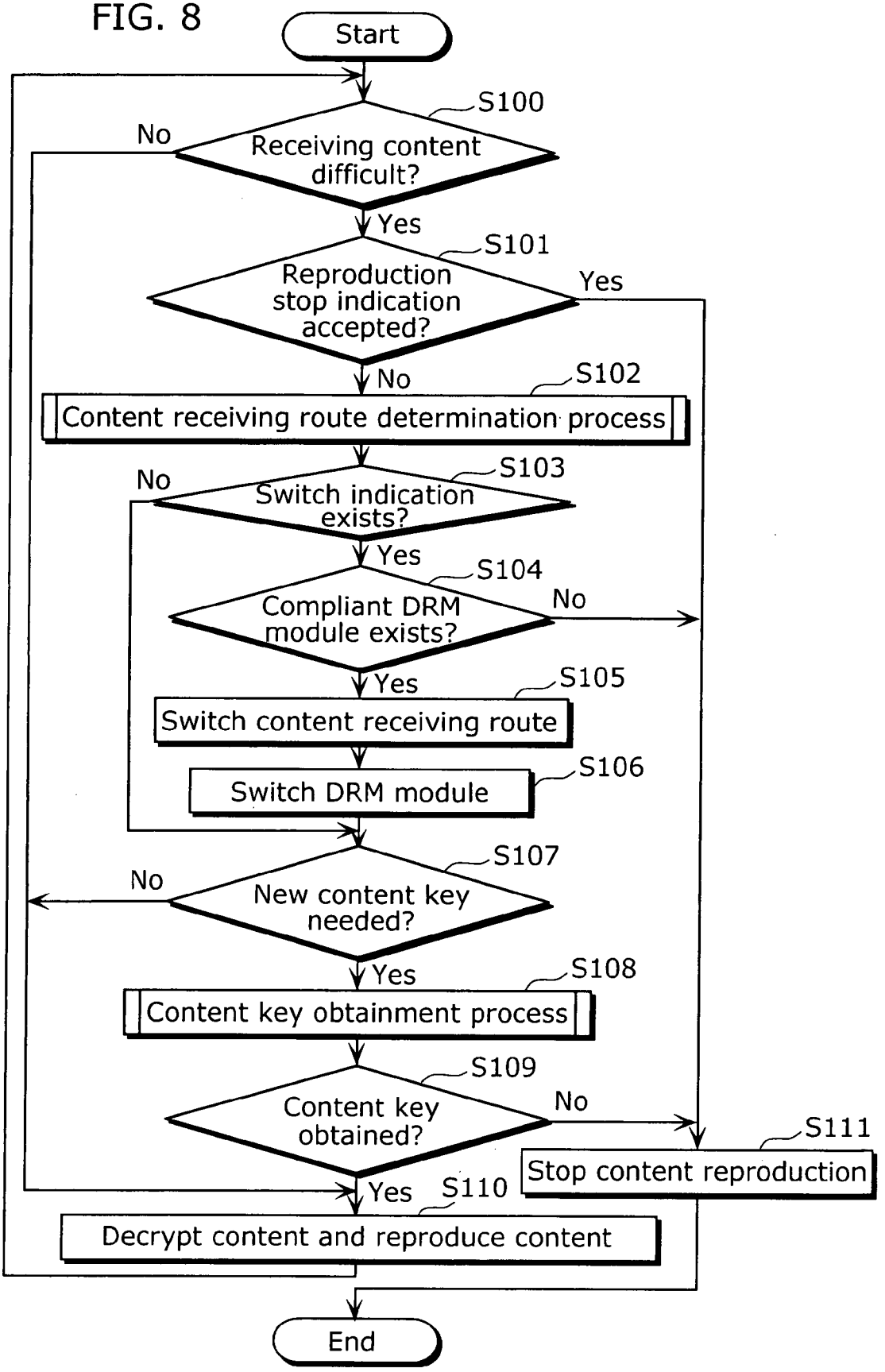

Start
S100
Receiving content difficult?
No
Yes
S101
Reproduction stop indication accepted?
Yes
No
S102
Content receiving route determination process
S103
Switch indication exists?
No
Yes
S104
Compliant DRM module exists?
No
Yes
S105
Switch content receiving route
S106
Switch DRM module
S107
New content key needed?
No
Yes
S108
Content key obtainment process
S109
Content key obtained?
No
Yes
S110
Decrypt content and reproduce content
S111
Stop content reproduction
End

FIG. 9

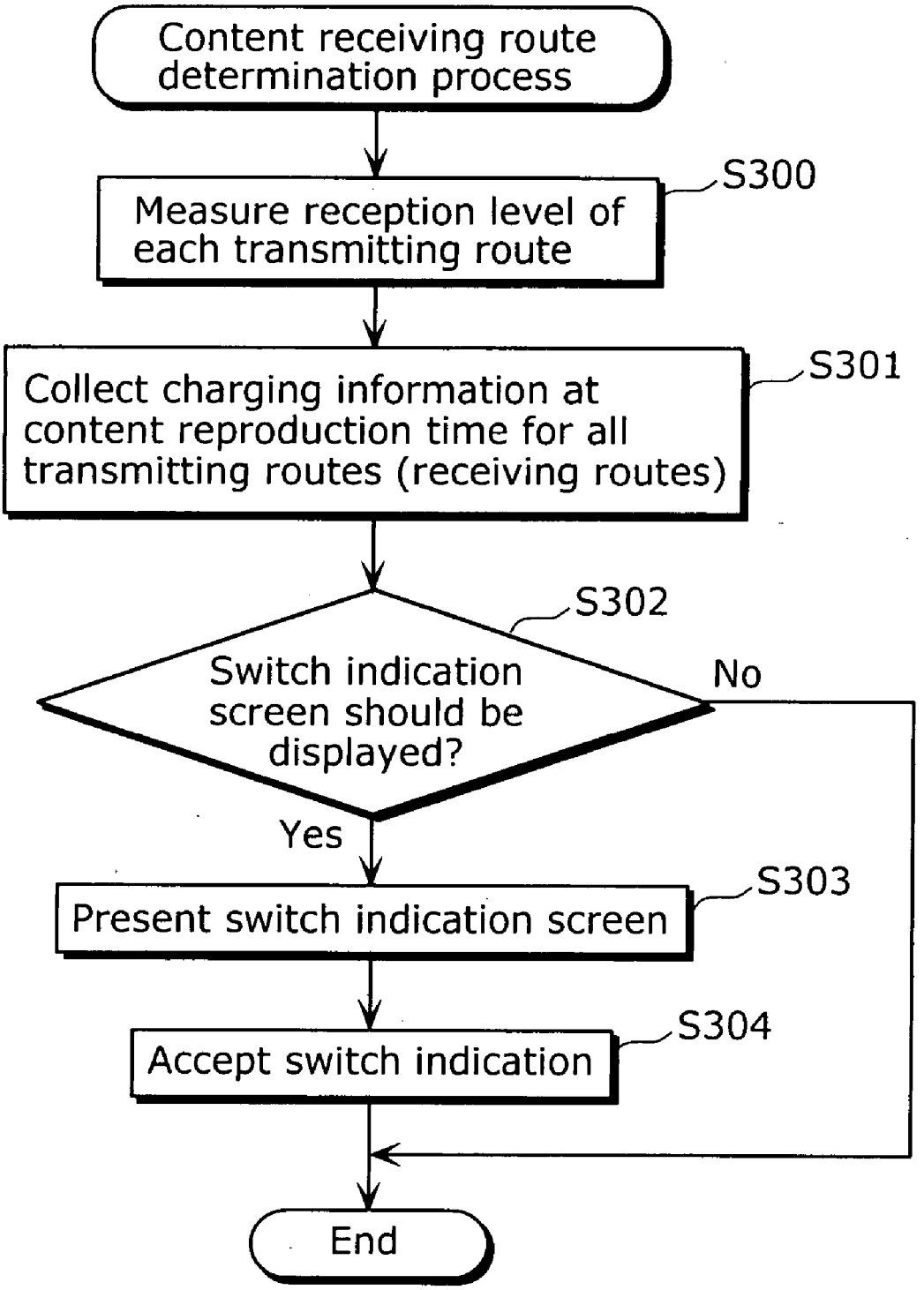

Content receiving route determination process
S300
Measure reception level of each transmitting route
S301
Collect charging information at content reproduction time for all transmitting routes (receiving routes)
S302
Switch indication screen should be displayed?
No
Yes
S303
Present switch indication screen
S304
Accept switch indication
End

FIG. 10

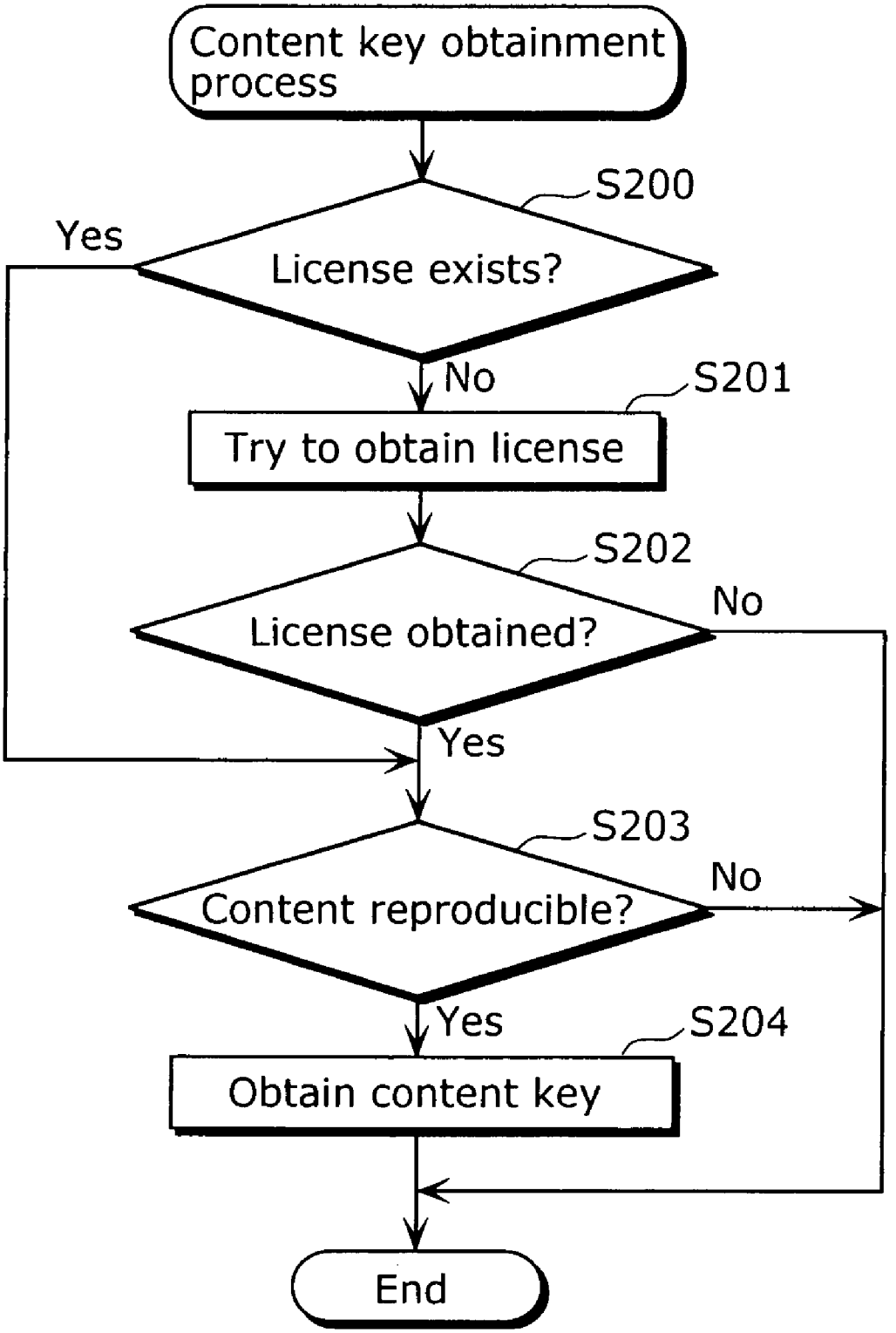

Content key obtainment process
S200
License exists?
Yes
No
S201
Try to obtain license
S202
License obtained?
No
Yes
S203
Content reproducible?
No
Yes
S204
Obtain content key
End

FIG. 11

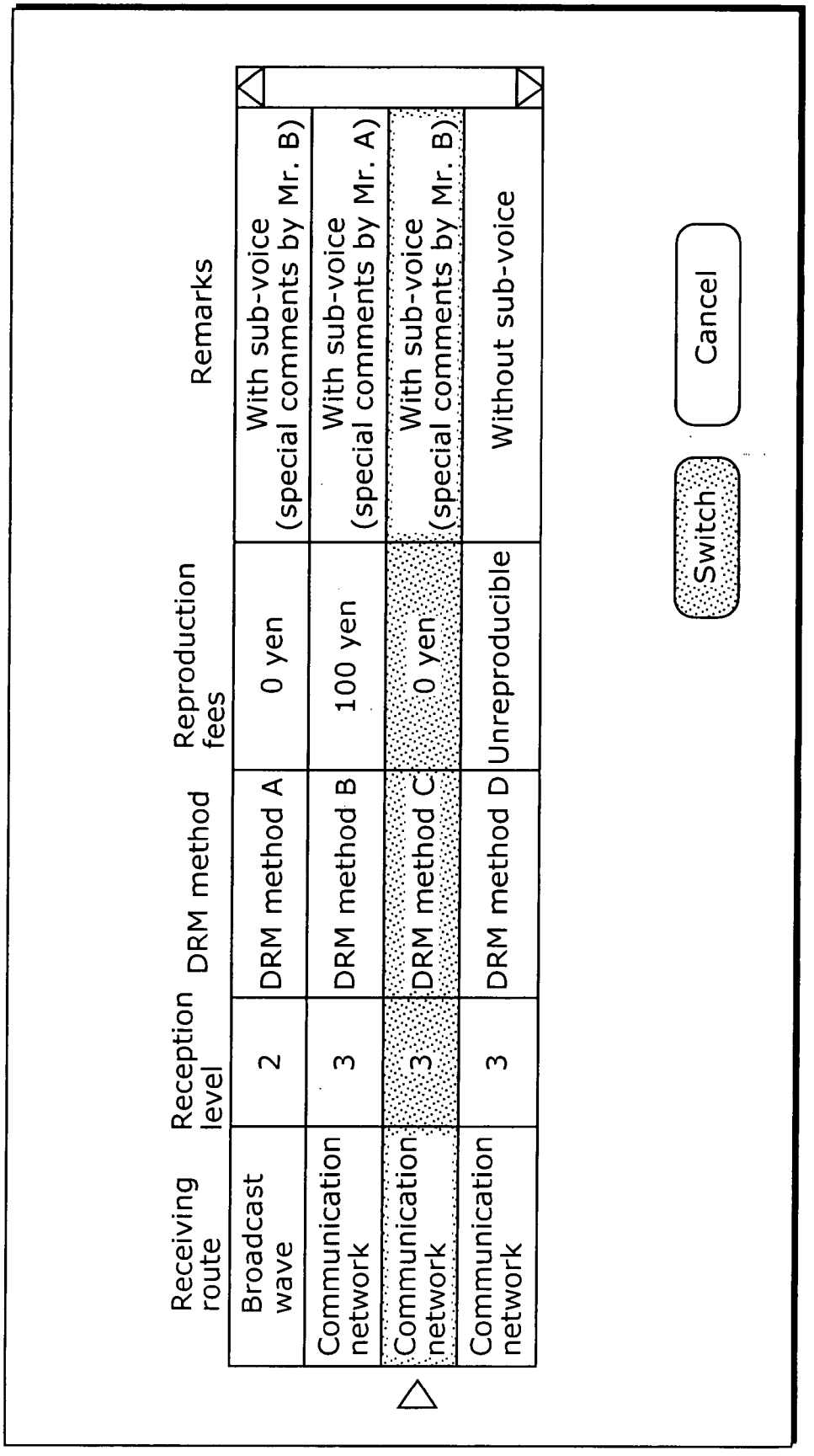

Receiving route
Reception level
DRM method
Reproduction fees
Remarks
Broadcast wave
2
DRM method A
0 yen
With sub-voice (special comments by Mr. B)
Communication network
3
DRM method B
100 yen
With sub-voice (special comments by Mr. A)
Communication network
3
DRM method C
0 yen
With sub-voice (special comments by Mr. B)
Communication network
3
DRM method D
Unreproducible
Without sub-voice
Switch
Cancel

FIG. 12

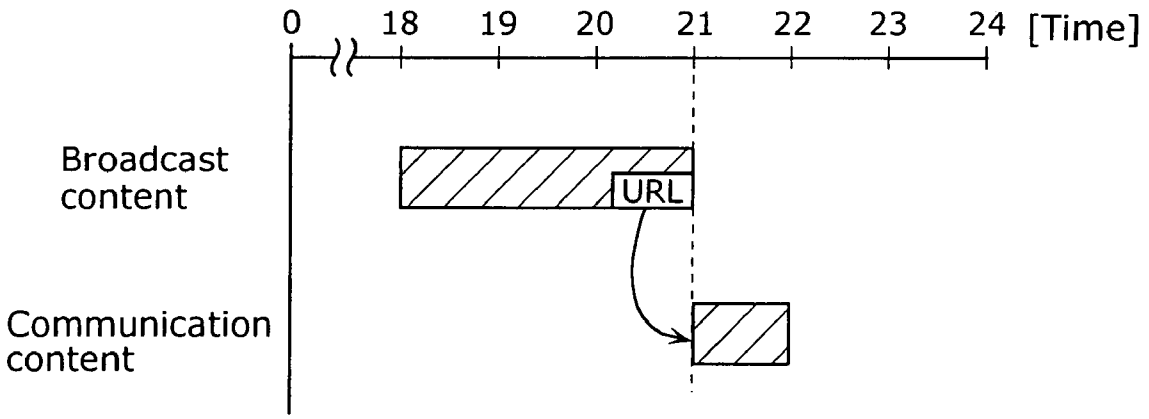

0
18
19
20
21
22
23
24
[Time]
Broadcast content
URL
Communication content

FIG. 13

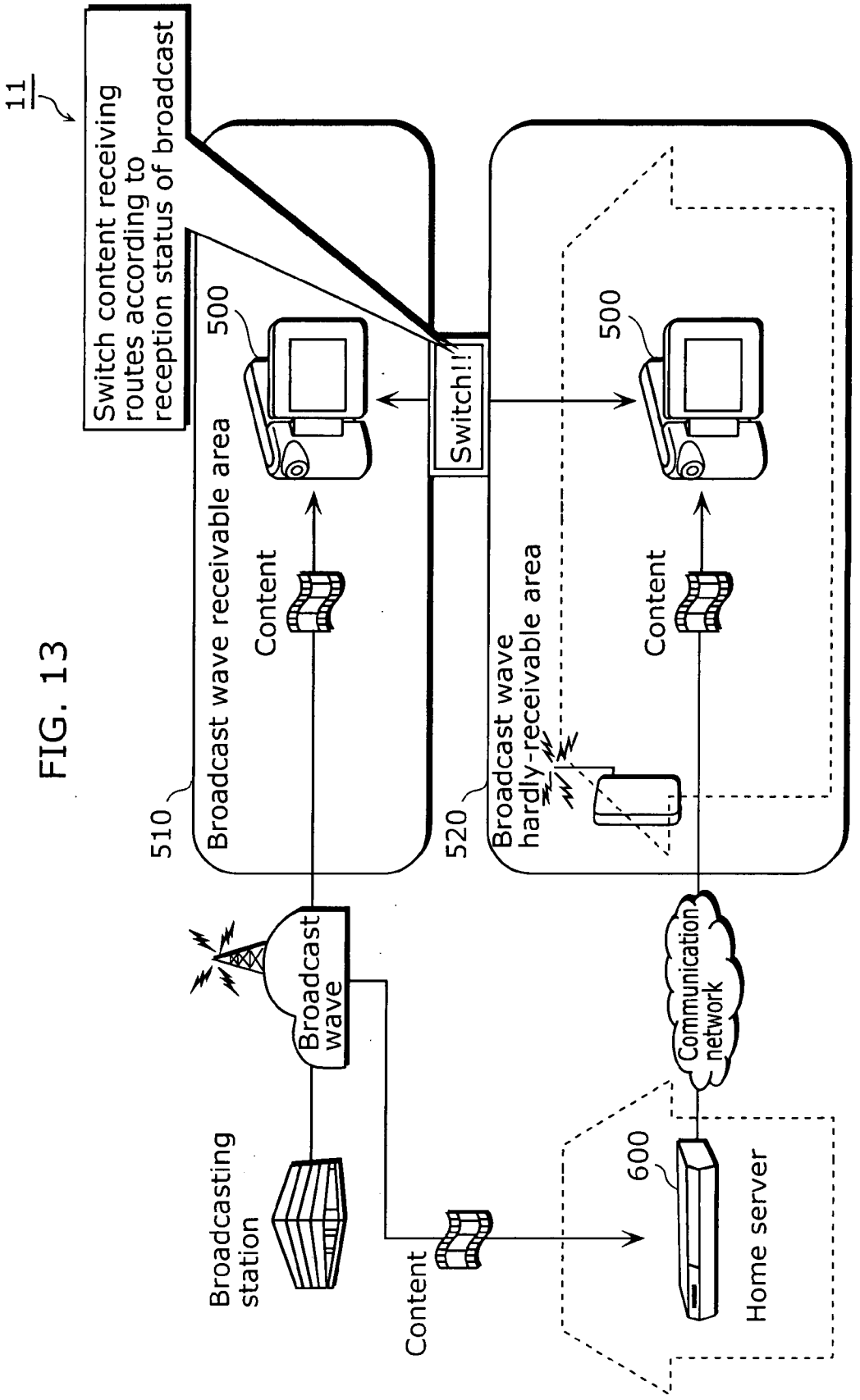

11
Switch content receiving routes according to reception status of broadcast
500
Switch!!
500
Broadcast wave receivable area
Content
Content
510
Broadcast wave hardly-receivable area
520
Broadcast wave
Communication network
Broadcasting station
Content
600
Home server

FIG. 14

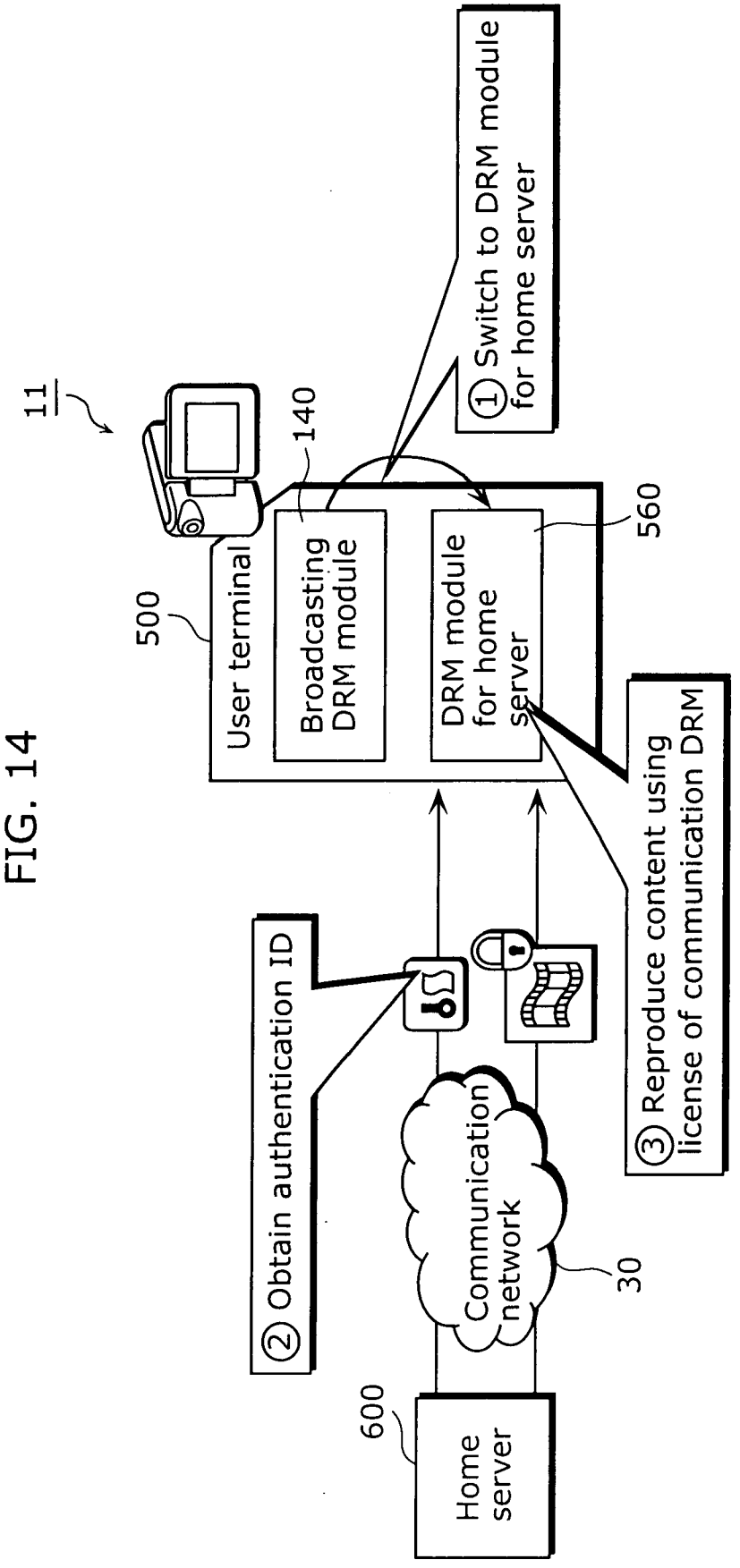
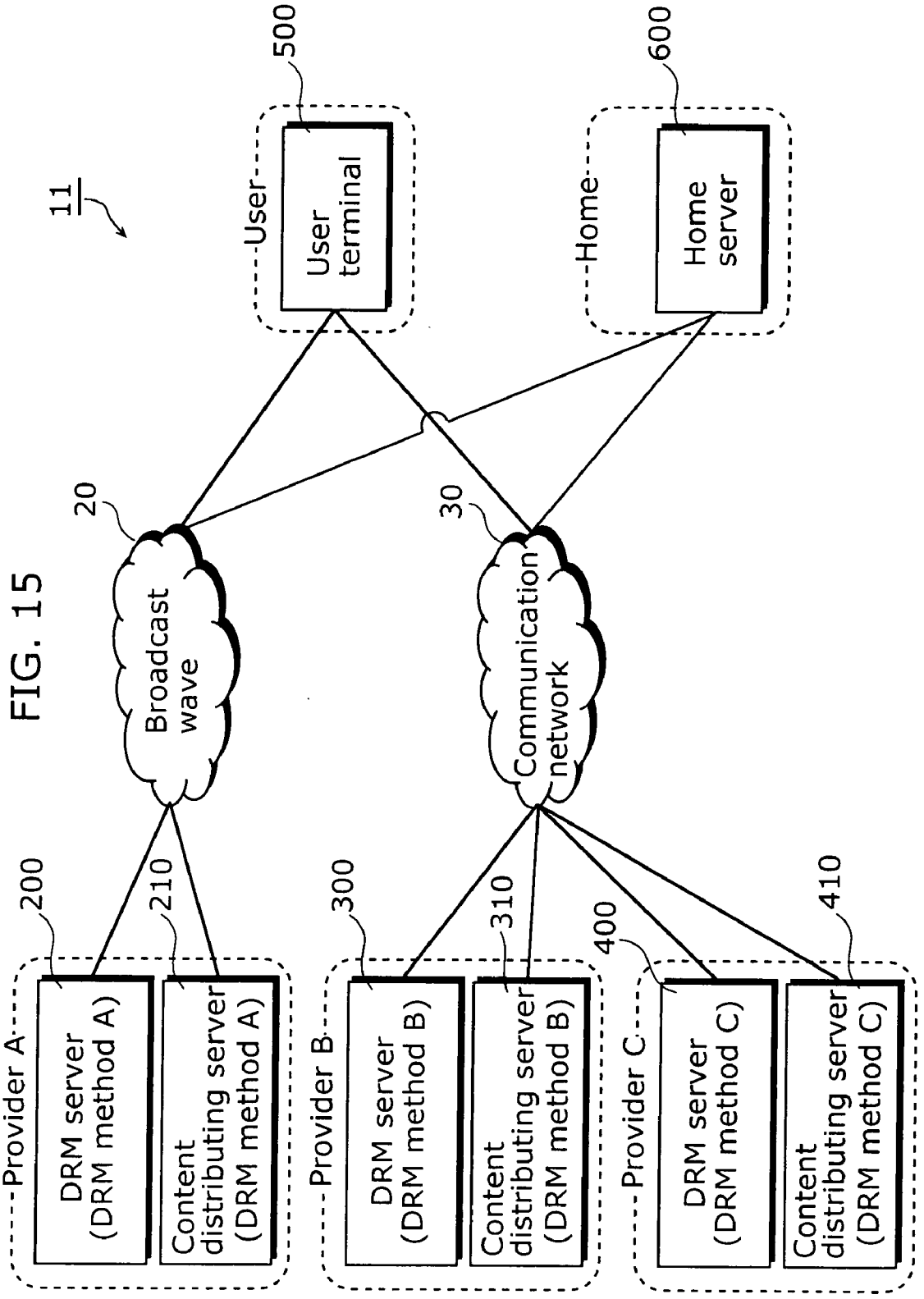

11
140
① Switch to DRM module for home server
560
500
User terminal
Broadcasting DRM module
DRM module for home server
② Obtain authentication ID
③ Reproduce content using license of communication DRM
Communication network
30
600
Home server

FIG. 15


11
User
User terminal
500
Home
Home server
600
20
Broadcast wave
30
Communication network
Provider A
DRM server (DRM method A)
200
Content distributing server (DRM method A)
210
Provider B
DRM server (DRM method B)
300
Content distributing server (DRM method B)
310
Provider C
DRM server (DRM method C)
400
Content distributing server (DRM method C)
410

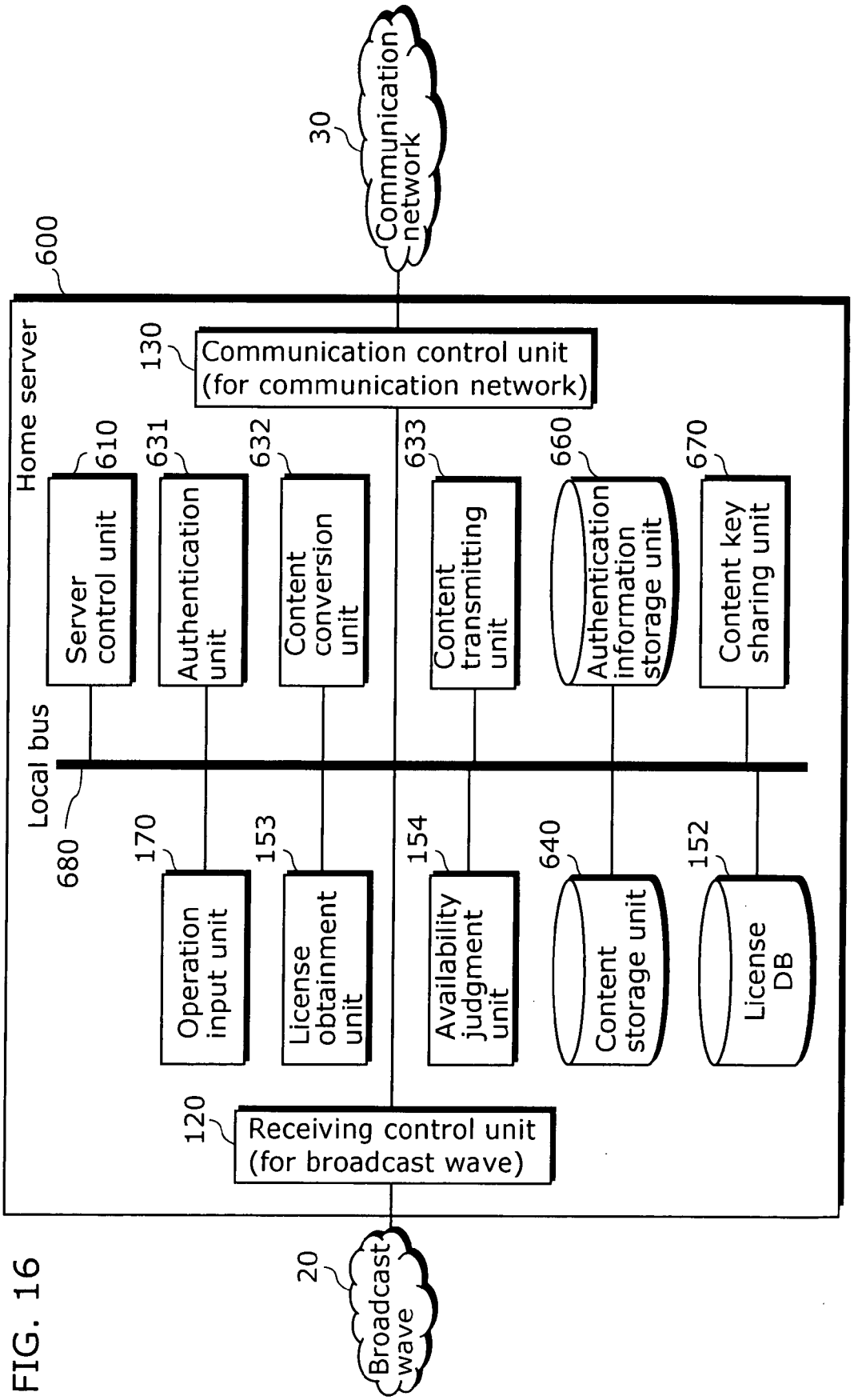

30
Communication network
600
Home server
130
Communication control unit (for communication network)
610
Server control unit
631
Authentication unit
632
Content conversion unit
633
Content transmitting unit
660
Authentication information storage unit
670
Content key sharing unit
Local bus
680
170
Operation input unit
153
License obtainment unit
154
Availability judgment unit
640
Content storage unit
152
License DB
120
Receiving control unit (for broadcast wave)
20
Broadcast wave

FIG. 16

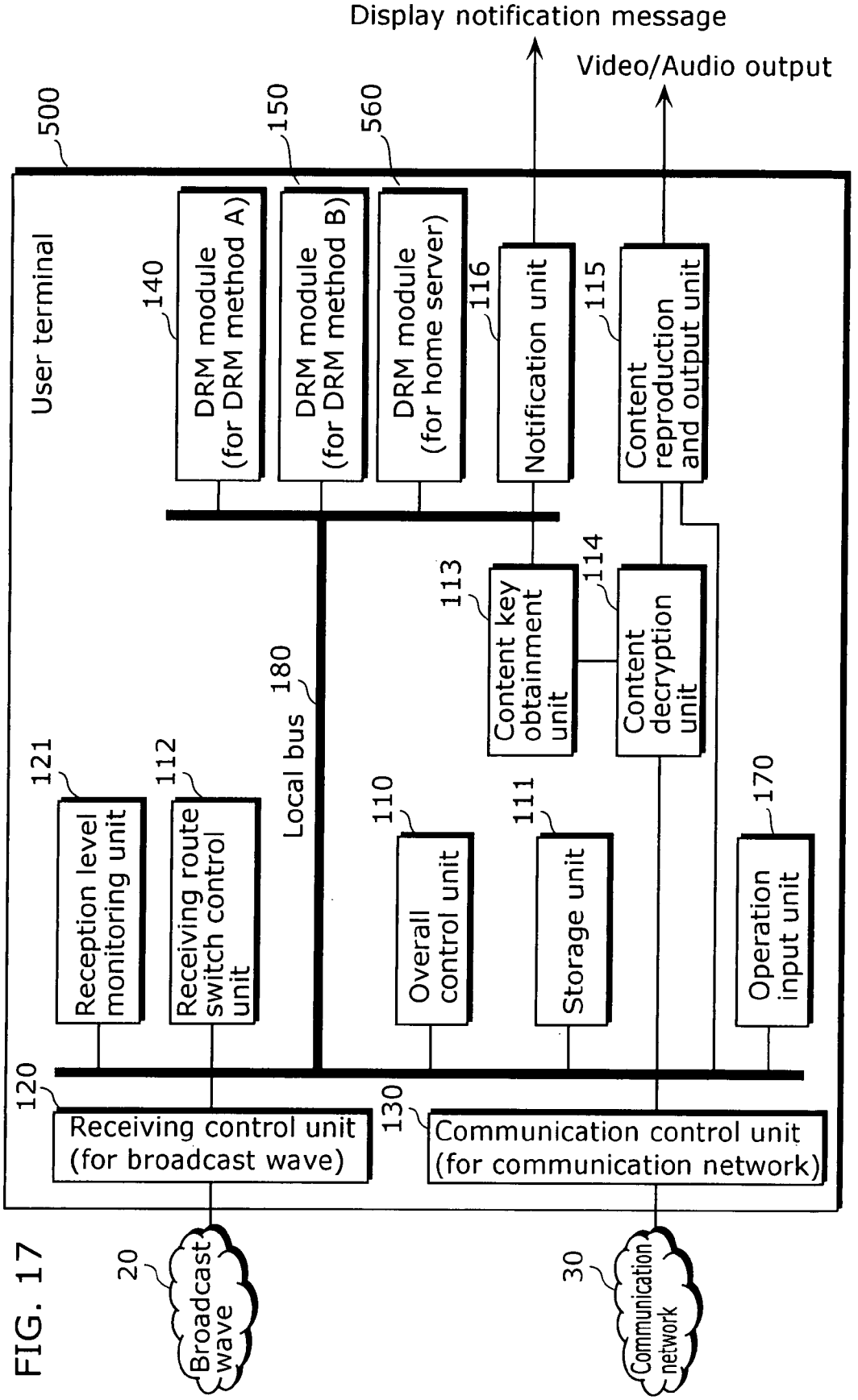

Display notification message
Video/Audio output
500
150
560
User terminal
140
DRM module (for DRM method A)
DRM module (for DRM method B)
DRM module (for home server)
116
Notification unit
115
Content reproduction and output unit
113
Content key obtainment unit
114
Content decryption unit
180
Local bus
121
Reception level monitoring unit
112
Receiving route switch control unit
110
Overall control unit
111
Storage unit
170
Operation input unit
120
Receiving control unit (for broadcast wave)
130
Communication control unit (for communication network)
20
Broadcast wave
30
Communication network

FIG. 17

FIG. 18

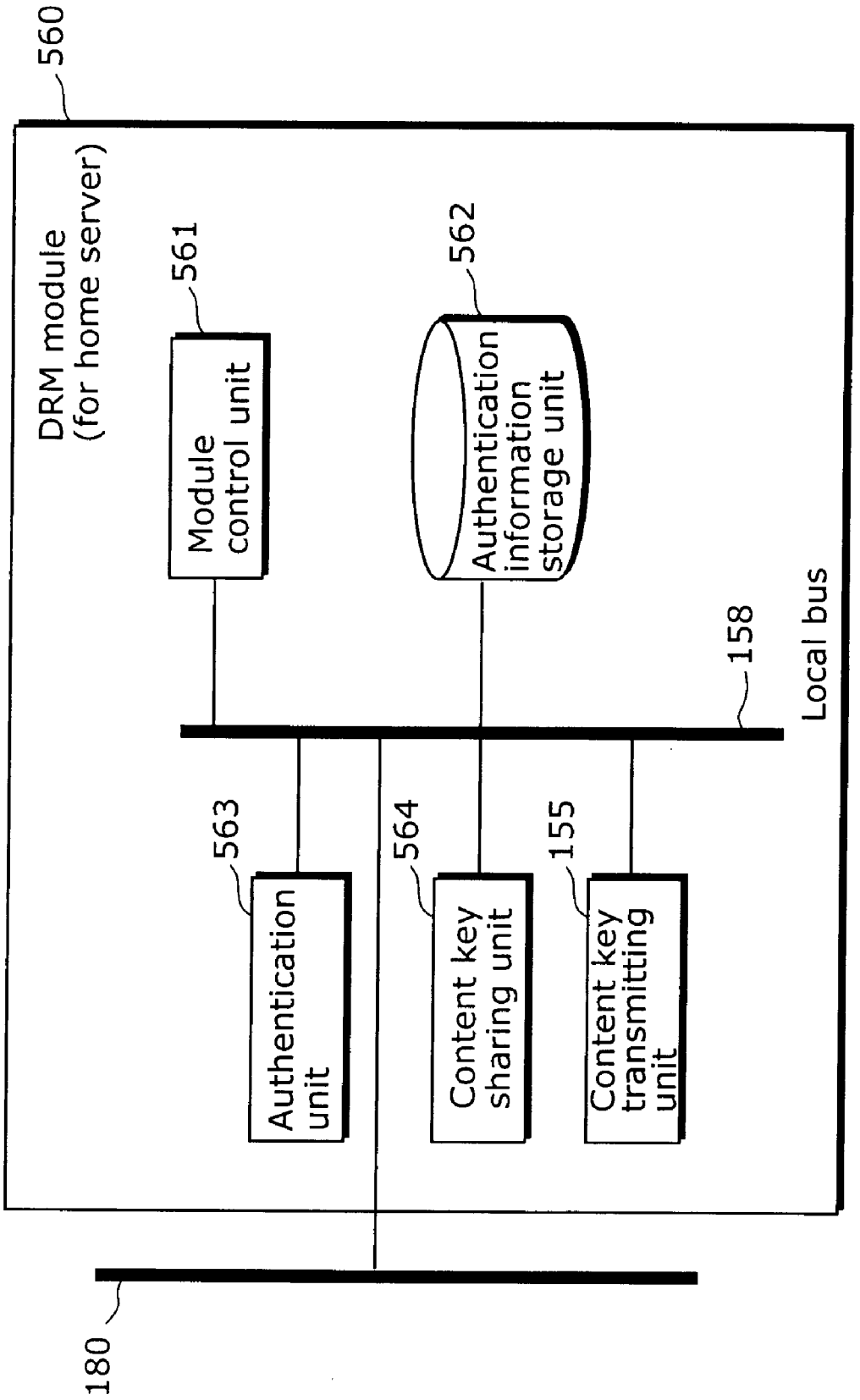
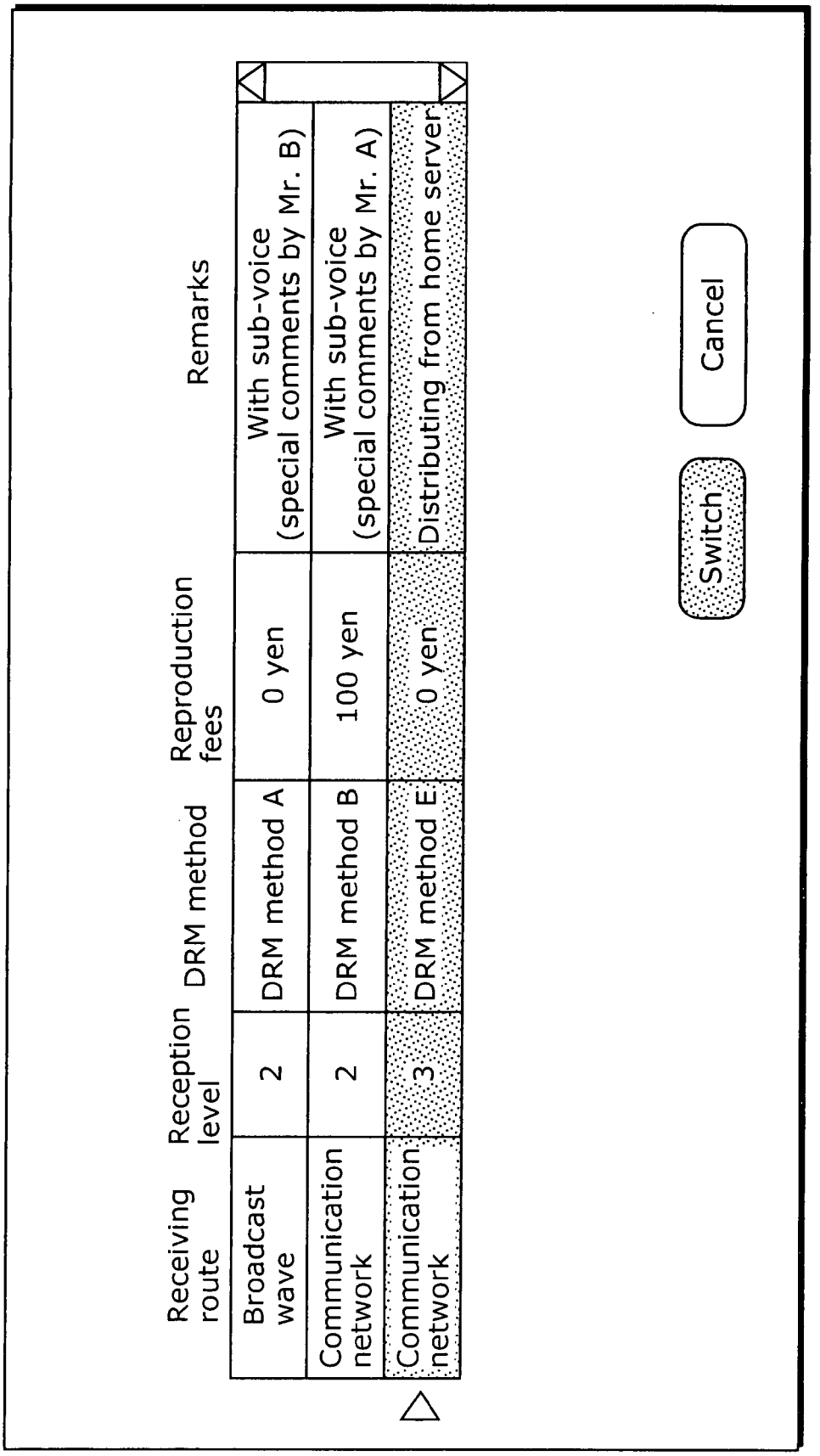

560
DRM module
(for home server)
561
Module control unit
562
Authentication information storage unit
158
Local bus
563
Authentication unit
564
Content key sharing unit
155
Content key transmitting unit
180

FIG. 19


Receiving route
Reception level
DRM method
Reproduction fees
Remarks
Broadcast wave
2
DRM method A
0 yen
With sub-voice (special comments by Mr. B)
Communication network
2
DRM method B
100 yen
With sub-voice (special comments by Mr. A)
Communication network
3
DRM method E
0 yen
Distributing from home server
Switch
Cancel

CONTENT RECEIVING APPARATUS, CONTENT RECEIVING METHOD, AND CONTENT DISTRIBUTING SYSTEM

TECHNICAL FIELD

[0001] The present invention relates to an apparatus which receives broadcast content in television broadcasting, and in particular relates to an apparatus which receives, via a communication network, content identical to that provided by a broadcast wave, in the case where it is difficult to receive the content from the broadcast wave.

BACKGROUND ART

[0002] In addition to analogue television broadcasting, "Digital terrestrial television broadcasting" has partially begun to be implemented. This digital terrestrial television broadcasting is provided using available analogue television channels. The frequency band of one channel is divided into 13 segments; the content details to be transmitted in each segment and the information amount of the content to be transmitted can be set separately. Additionally, multiplexed signals, including television broadcasting, plural units of audio, data, and the like, can be transmitted through one channel, and thus a variety of services can be provided.

[0003] Moreover, implementation of digital terrestrial television broadcasting in mobile terminals as typified by mobile phones is being planned. In this case, one-segment broadcasting which uses a segment of one channel, can be considered.

[0004] However, unlike a conventional stationary receiver, the above-mentioned mobile terminal is often used by a user who is moving on foot or in a car. Therefore, there is the possibility that television broadcasting cannot be received or clear pictures and audio cannot be obtained indoors, underground, or behind buildings where the electric field intensity of electric wave is small.

[0005] A conceivable method to solve the above-mentioned problem is to receive content identical to that of television broadcasting via a wireless LAN in areas where broadcast waves are difficult to be received (See Patent Reference 1, for example).

[0006] FIG. **1** is an external view of a content distributing system **1500** which allows the receiving of broadcast content via wireless LAN in the area where broadcast waves are difficult to be received. As shown in FIG. **1**, when the user moves from a broadcast wave receivable area **1510** to a broadcast wave hardly-receivable area **1520**, the content distributing system **1500** switches content receiving routes for a user terminal according to a reception status. Patent Reference 1: Japanese Laid-Open Patent Application No. 2003-274214

DISCLOSURE OF INVENTION

Problem that the Invention is to Solve

[0007] However, broadcast content provided through digital terrestrial television broadcasting is expected to include content encrypted based on broadcast content copyright protection. In addition, the copyright of content distributed via a wireless LAN may be protected through, for example, an encryption system unique to wireless LAN. Therefore, in this case, even if the user terminal has a broadcasting Digital Rights Management (DRM) module and a license to reproduce the broadcast content, content obtained via wireless LAN cannot be reproduced.

[0008] FIG. **2** is a diagram illustrating problems in the above-mentioned conventional system, and shows a typical case where content obtained via a communication network cannot be reproduced because the content protection method is different, even if the DRM module and the license compliant with broadcast content are included in the user terminal. As shown in FIG. **2**, the broadcasting DRM module allows reproduction of content obtained via a broadcast wave because the module has a license for the content obtained via a broadcast wave, but the module cannot handle content obtained via a communication network and the content cannot be reproduced. Moreover, there is a problem that the conventional system cannot handle storage-type broadcasting (server-based broadcasting), either.

[0009] Having been concerned in light of the above-mentioned problems, an object of the present invention is to realize a content receiving apparatus which can avoid a situation where content cannot be reproduced if the content receiving route is switched from a broadcast wave to a communication network at an arbitrary timing.

Means to Solve the Problems

[0010] To achieve the above-mentioned purpose, a content receiving apparatus according to the present invention includes a first receiving unit which receives broadcast content via a broadcast wave and a second receiving unit which receives communication content identical to the broadcast content via a communication network. The apparatus includes a first judgment unit which judges whether or not switching from the first receiving unit to the second receiving unit is appropriate; an availability judgment unit which judges whether or not the communication content is available when the switching to the second receiving unit is performed; and a receiving route switch unit which switches content receiving routes from the first receiving unit to the second receiving unit when the first judgment unit judges that the switching is appropriate and the availability judgment unit judges that the communication content is available.

[0011] This allows avoiding a situation where content cannot be reproduced if the content receiving route is switched from a broadcast wave to a communication network at an arbitrary timing.

[0012] The first judgment unit may judge that the switching is appropriate when the electric field intensity of the broadcast wave falls to a certain level or below.

[0013] The first judgment unit may further judge that the switching is appropriate when the usage fee of the communication content is lower than a usage fee of the broadcast content.

[0014] The first judgment unit may further judge that the switching is appropriate when information which is different from the information added to the broadcast content is added to the communication content.

[0015] The availability judgment unit may judge that the switching is possible when a license compliant with the communication content is available.

[0016] The content receiving apparatus further may include a holding unit which holds the license compliant with the communication content. The availability judgment unit may further judge whether or not the license held by the holding unit is valid. The receiving route switch unit may switch content receiving routes from the first receiving unit to the second receiving unit when the first unit judges that the switching is appropriate and the availability judgment unit judges that the communication content is available.

[0017] The content receiving unit may further include: an information collection unit which collects pieces of information on the receiving of the communication content via the broadcast wave and the communication network; an information presentation unit which presents the collected information to a user; and an operation acceptance unit which accepts the selection of a piece of information among the presented pieces of information. The first judgment unit may judge that the switching based on the accepted information is appropriate.

[0018] The first judgment unit may make the judgment based on the termination time of the broadcast content, and the receiving route switch unit may switch the receiving routes using address information regarding a website included in the broadcast content. The website is connected to the communication network and provides the communication content.

[0019] The first receiving unit may receive broadcast content encrypted by a first copyright protection method. The second receiving unit may receive communication content encrypted by a second copyright protection method. The receiving route switch unit may switch the content receiving routes and the copyright protection methods from the first receiving unit to the second receiving unit when the first judgment unit judges that the switching is appropriate and the availability judgment unit judges that the communication content is available.

[0020] Moreover, the present invention can be realized as the content receiving method which includes the steps compliant with unique configuration units in the above-mentioned content receiving apparatus and as a program causing a personal computer and the like to execute these steps. Obviously, the program can be widely distributed via storage media such as DVDs and transmission media such as the Internet and the like.

EFFECTS OF THE INVENTION

[0021] As described above, the content distributing system according to the present invention allows avoiding a situation where content cannot be reproduced if the content receiving route is switched from a broadcast wave to a communication network at an arbitrary timing. Additionally, the content distributing system has remarkable effects as mentioned above when copyright protection is provided for the content.

BRIEF DESCRIPTION OF DRAWINGS

[0022] FIG. **1** is an external view of a conventional content distributing system which can receive content via a wireless LAN.

[0023] FIG. **2** is a diagram indicating a conventional problem when the content obtained via the communication network is reproduced.

[0024] FIG. **3** is a diagram showing the general outline of the content distributing system in a first embodiment.

[0025] FIG. **4** is a diagram showing the content distributing form in a content distributing system according to the first embodiment.

[0026] FIG. **5** is a block diagram showing the functional configuration of a user terminal in the first embodiment.

[0027] FIG. **6** is a block diagram showing the functional configuration of the DRM module for the DRM method B in the first embodiment.

[0028] FIG. **7** is a diagram showing an example of the license data structure in the first embodiment.

[0029] FIG. **8** is a flow chart showing an operation flow of the user terminal in the first embodiment.

[0030] FIG. **9** is a flow chart showing a content provider determination process in FIG. **8**.

[0031] FIG. **10** is a flow chart showing a content key obtainment process in FIG. **8**.

[0032] FIG. **11** is an example of display on a switch indication screen in the first embodiment.

[0033] FIG. **12** is an example of broadcast content including the URL information in a second embodiment.

[0034] FIG. **13** is an external view of the content distributing system in a third embodiment.

[0035] FIG. **14** is a diagram showing the general outline of the content distributing system in the third embodiment.

[0036] FIG. **15** is a diagram showing the content distributing form in the content distributing system according to the third embodiment.

[0037] FIG. **16** is a block diagram showing the functional configuration of a home server in the third embodiment.

[0038] FIG. **17** is a block diagram showing the functional configuration of the user terminal in the third embodiment.

[0039] FIG. **18** is a block diagram showing the functional configuration of the DRM module for the home server in the third embodiment.

[0040] FIG. **19** is an example of display on a switch indication screen in the third embodiment.

NUMERICAL REFERENCES

[0041] **10**, **11** Content distributing system

[0042] **80** License ticket (LT)

[0043] **100** User terminal

[0044] **110** Overall control unit

[0045] **111** Storage unit

[0046] **112** Receiving route switch control unit

[0047] **113** Content key obtainment unit

[0048] **114** Content decryption unit

[0049] **115** Content reproduction and output unit

[0050] **116** Notification unit

[0051] **120** Receiving control unit

[0052] **130** Communication control unit

[0053] **140** DRM module

[0054] **150** DRM module

[0055] **151**, **561** Module control unit

[0056] **152** License DB

[0057] **153** License obtainment unit

[0058] **154**, **623** Availability judgment unit

[0059] **155** Content key transmitting unit

[0060] **156** Charging process unit

[0061] **157** Viewing history management unit

[0062] **160** DRM module

[0063] **170** Operation input unit

[0064] **180**, **680** Local bus

[0065] **200** DRM server

[0066] **210** Content distributing server

[0067] **300** DRM server

[0068] **310** Content distributing server

[0069] **400** DRM server

[0070] **410** Content distributing server

[0071] **500** User terminal

[0072] **510**, **1510** Broadcast wave receivable area

[0073] **520**, **1520** Broadcast wave hardly-receivable area

[0074] **560** DRM module

[0075] **562**, **660** Authentication information storage unit

[0076] **563**, **631** Authentication unit

[0077] **564**, **670** Content key sharing unit

[0078] **600** Home server

[0079] **610** Server control unit

[0080] **621** Content receiving unit

[0081] **632** Content conversion unit

[0082] **633** Content transmitting unit

[0083] **640** Content storage unit

[0084] **1500** Content distributing system

BEST MODE FOR CARRYING OUT THE INVENTION

[0085] Embodiments according to the present invention are described in reference to diagrams as follows. Note that the present invention is described using the diagrams in the following embodiments, but the following embodiments are not intended to limit the present invention.

FIRST EMBODIMENT

[0086] FIG. **3** is a diagram showing the general outline of a content distributing system **10** in the embodiment. As shown in FIG. **3**, a user terminal **100** of the content distributing system **10** obtains content from a content distributing server **310** and information about a license for the above-mentioned content (the information includes a content key for decrypting content, hereinafter the information is simply referred to as a "license") from a DRM server **300** via a communication network **30**, respectively. Additionally, the user terminal **100** has a communication DRM module **150** for controlling the obtained content and information. This allows the switching of content receiving routes from the broadcast wave to a communication network **30**. This also allows the obtaining of the license compliant with the content to be received via a communication network and the use of content (including reproduction, the same applies hereafter) by using this license. Specifically, the user terminal **100** (1) switches the control modules for content use from a broadcasting DRM module **140** to the communication DRM module **150** when the reception level of a broadcast wave is reduced to a certain level or below. Moreover, the user terminal **100** obtains (2) the communication DRM license necessary for the use of content obtained via the communication network **30**. Accordingly, the user terminal **100** uses (3) content obtained via the communication network **30** using the obtained communication DRM license.

[0087] Here, the broadcasting Digital Rights Management (DRM) module is a unit for performing control related to reproduction restriction and the like in order to protect the copyright of digital content received via a broadcast wave. Likewise, the communication DRM module is a unit for performing control on copyright protection for digital content received via the communication network. Each module is configured with a ROM, which stores control programs, a dedicated processor, and the like.

[0088] FIG. **4** is a diagram showing a content distributing form of the content distributing system according to the embodiment. As shown in FIG. **4**, the user terminal **100** of the content distributing system **10** obtains (receives), via a broadcast wave **20**, the license and content from a DRM server **200** and a content distributing server **210** of a provider A, while the user terminal **100** can obtain content from provider A and the same content from providers B or C at almost the same timing via the communication network **30** including the Internet.

[0089] FIG. **5** is a block chart showing the functional configuration of the terminal **100** in the embodiment. As shown in FIG. **5**, the user terminal **100** has an overall control unit **110**, a storage unit **111**, a receiving route switch control unit **112**, a content key obtainment unit **113**, a content decryption unit **114**, a content reproduction and output unit **115**, a notification unit **116**, a receiving control unit **120**, a communication control unit **130**, the DRM module **140**, the DRM module **150**, a DRM module **160** and an operation input unit **170**, each of which is connected by a local bus **180**.

[0090] The overall control unit **110** is a CPU including ROM, RAM and the like. The overall control unit **110** controls the user terminal **100** entirely by causing the CPU to execute control programs stored in ROM and the like. Moreover, the overall control unit **110** collects information on the reception level of the currently being received electric wave and information on charging necessary at a content reproduction time in all transmitting routes (that is, receiv-

ing routes). Additionally, the overall control unit **110** judges whether or not the switch indication screen should be displayed in the content reproduction and output unit **115** (that is, it judges whether or not switching from the current receiving route to another receiving route is appropriate). The overall control unit **110** is an example of a first judgment unit and an information collection unit.

[**0091**] The storage unit **111** is a storage device such as RAM and the like, and stores content received via the broadcast wave **20** or the communication network **30**.

[**0092**] According to an indication of the overall control unit **110**, the receiving route switch control unit **112** decides between the broadcast wave **20** and the communication network **30** to be used as a receiving route to obtain content, and switches receiving routes based on this determination.

[**0093**] The content key obtainment unit **113** obtains a content key (also referred to as content decryption key) from the DRM module **140**, the DRM module **150** or the DRM module **160**, and transmits them to the content decryption unit **114**.

[**0094**] The content decryption unit **114** decrypts content stored in the storage unit **111**, using a content key received from the content key obtainment unit **113**.

[**0095**] The content reproduction and output unit **115** includes a liquid crystal panel, a speaker, and the like, and presents content decrypted by the content decryption unit **114** and necessary information to the user. Additionally, the content reproduction and output unit **115** is an example of the information presentation unit.

[**0096**] The notification unit **116** includes a liquid crystal panel and a speaker, and transmits a message such as an error message to the user, when necessary.

[**0097**] The receiving control unit **120** performs various controls and data processing to receive content via the broadcast wave **20**. This receiving control unit **120** is an example of a first receiving unit.

[**0098**] The communication control unit **130** performs various controls and data processing to receive content via the communication network **30**. This communication control unit **130** is an example of a second receiving unit.

[**0099**] Note that the above-mentioned receiving control unit **120** and the communication control unit **130** are feasible with the conventional technology, and they are not an essential part of the present invention. Thus, a detailed description is omitted.

[**0100**] A receiving level monitoring unit **121** measures the electric field intensity of the electric wave which is received periodically (for example, at an interval of a second). If the electric field intensity falls below a predetermined level, the status is notified to the overall control unit **110**.

[**0101**] When receiving content via the broadcast wave **20**, the DRM module **140** manages the copyright of the obtained content based on the Digital Rights Management (Hereinafter referred to as the DRM method) defined by provider A. Likewise, the DRM module **150** manages the copyright of content based on the DRM method B defined by provider B and the DRM module **160** based on the DRM method C defined by provider C. Although the DRM module **140**, the DRM module **150**, and the DRM module **160** have been described as configuration elements of the user terminal **100**, the configuration of the user terminal **100** is not limited to this configuration and all or some of these elements may be realized with secure and dedicated IC cards and the like.

[**0102**] The operation input unit **170** is configured with a keyboard and a mouse and the like, and receives a key entry and an indication from the user.

[**0103**] FIG. **6** is a block diagram showing a functional configuration in the DRM module **150**. As shown in FIG. **6**, the DRM module **150** includes a module control unit **151**, a license DB **152**, a license obtainment unit **153**, an availability judgment unit **154**, a content key transmitting unit **155**, a charging process unit **156**, and a viewing history management unit **157**. The functional configuration of the DRM module **160** includes the same functional configuration as that of the above-mentioned DRM module **150**. In addition, the functional configuration of the DRM module **140** is different in that a broadcast wave DRM is executed, but the basic functional configuration is the same as that of the above-mentioned DRM module **150**. The module control unit **151** controls the entire DRM module **150** by the dedicated processor and the like.

[**0104**] The license DB **152** is a storage device such as RAM and holds a license (in this case, the DRM method B license) necessary for the use of content obtained by purchase or the like. A specific example of license is described later.

[**0105**] According to an indication of the module control unit **151**, the license obtainment unit **153** obtains a license by purchase or the like for the content obtained via the communication network **30**.

[**0106**] The availability judgment unit **154** judges whether or not the obtained content is available based on the obtained license.

[**0107**] The content key transmitting unit **155** transmits a content key for decrypting content to the content key obtainment unit **113** when the content is judged to be available in the availability judgment unit **154**.

[**0108**] The charging process unit **156** performs the charging process according to the use form when content is used by the user.

[**0109**] A viewing history management unit **157** controls information indicating the content viewing history when content is viewed (including the case where the content is used) by the user.

[**0110**] FIG. **7** is a diagram showing an example of the data structure of a license ticket (hereinafter referred to as "LT") as a specific example of the license. As shown in FIG. **7**, an LT **80** is configured with an LT header **81**, an LT use condition **82**, and a content decryption key **83**.

[**0111**] The LT header **81** is configured with a use right ID **81***a*, a content ID **81***b*, and a return flag **81***c*.

[**0112**] The use right ID **81***a* stores an ID which uniquely identifies the LT **80**. The content ID **81***b* stores the content ID of content which is available by using the LT **80**. In the return flag **81***c*, information indicating if the LT **80** needs to be returned to the DRM server is described.

[0113] An LT use condition **82***a* is configured with an LT valid period **82***a*, and the number of reproducible times **82***b*.

[0114] The LT valid period **82***a* stores information indicating a valid period of the LT **80**. The reproducible frequency **82***b* stores information indicating how many times the content can be reproduced (including the case where the content is used; the same applies hereafter.)

[0115] The content decryption key **83** is a decryption key for the decryption of content specified by the content ID **81***b*.

[0116] Next, the operation of the user terminal **100** configured as mentioned above is described. FIG. **8** is a flow chart showing the operation flow of the user terminal **100** in the embodiment. A description is provided for the following case. The radio field intensity decreased because the user moved into a building while receiving the predetermined content (for example, the broadcast content of a baseball game). However, content identical to the content which was received via the broadcast wave **20** is received by the receiving route which is switched by choosing a receiving route (for example, a wireless RAN) among the communication network **30** based on the predetermined regulations.

[0117] The receiving level monitoring unit **121** measures the electric field intensity of electric wave to be received periodically (for example, at an interval of a second) and transmits a notification to the overall control unit **110** when the strength falls below a predetermined level (S**100**: Yes). When receiving the above-mentioned notification from the receiving level monitoring unit **121**, the overall control unit **110** directs the notification unit **116** to display the information that the electric field intensity of the electric wave is small.

[0118] Subsequently, when there is no indication of "reproduction stop" from the user via the operation input unit **170** (S**101**: No), the overall control unit **110** executes "the content provider determination process" (S**102**). On the other hand, when there is the indication of "reproduction stop" from the user (S**101**: Yes), the overall control unit **110** stops reproducing the content (S**111**) and terminates the process.

[0119] Moreover, when there is the switch indication of the content receiving routes from the user (S**103**: Yes) in the content provider determination process (S**102**), the overall control unit **110** checks when there is a DRM module indicated by the switch indication. When there is the compliant with DRM module (S**104**: Yes), the content receiving routes are switched based on the switch indication (S**105**), and switching to the DRM modules to be activated is performed (S**106**). When there is no switch indication (S**103**: No), the process proceeds to the process S**107**. Additionally, when there is no compliant with DRM module (S**104**: No), the process proceeds to the process S**111**.

[0120] Then, the newly switched DRM module checks when a new content key is necessary. When the new content key is necessary (S**107**: Yes), the content key obtainment process is executed (S**108**). Here, the case where a new content key is necessary is, for example, a case where content is encrypted by a time variable key.

[0121] When a new content key is not necessary (S**107**: No), the process proceeds to the process S**110**.

[0122] Next, when the overall control unit **110** can obtain a content key (S**109**: Yes) in the content key obtainment process (S**108**), it controls each unit to perform content decryption and reproduction (S**110**).

[0123] When the overall control unit **110** cannot obtain the content key in the content key obtainment process (S**108**) (S**109**: No), it stops reproducing the content (S**111**) and terminates the process.

[0124] The flow chart of FIG. **8** shows the embodiment where the content key obtainment process (S**108**) is executed after the content receiving route switching (S**105**) and the DRM module switching (S**106**) are performed. The content key obtainment process (S**108**) may also be performed when necessary after judging whether or not an available license is included before the content receiving route switching (S**105**) and the DRM module switching (S**106**) are performed.

[0125] FIG. **9** is a flow chart showing the content provider determination process (S**102**) in FIG. **8**.

[0126] First, the overall control unit **110** directs the receiving level monitoring unit **121** to measure reception levels on the respective receiving routes (S**300**).

[0127] Next, the overall control unit **110** collects information on charging necessary at a content reproduction time in all the transmitting routes (that is, receiving routes) (S**301**).

[0128] In addition, the overall control unit **110** judges whether or not the switch indication screen should be displayed in the content reproduction and output unit **115** (that is, judges whether or not switching from the current receiving route to other receiving route is appropriate) based on the information on the above-mentioned measurement results and charging (S**302**). Here, when it is judged that the switch screen should not be displayed (or its display is not necessary) (S**302**: No), the process is terminated.

[0129] Specific examples of criteria for judging whether or not the above-mentioned switch indication screen should be displayed include:

[0130] (1) the case where the reception level of the current content receiving route falls to a certain level or below, and another content receiving route, of which reception level is higher than the current content receiving route, exists;

[0131] (2) the case where there is a content provider which allows obtaining a license for content and a usage fee is lower than that of the current content provider (or a certain amount and below);

[0132] (3) the case where there is a content provider which distributes additional information (for example, audio information) that is different from the information added to the content which is currently being received. The above-mentioned judgment may be made based on one or a combination of the criteria.

[0133] Accordingly, the overall control unit **110** directs the content reproduction and output unit **115** to display the switch indication screen which shows a list of information on the receiving routes (S**303**). Moreover, the overall control unit **110** receives the indication on receiving route switching from the user (S**304**), and terminates the process.

[0134] FIG. **10** is a flow chart showing the content key obtainment process (S**108**) in FIG. **8**.

[0135] First, with reference to the license DB **152**, the availability judgment unit **154** judges whether or not the license including the content key for content to be reproduced is included and whether or not the license is appropriate (for example, about an expiration date and the consumption status of a frequency license and the like) (S**200**). When the license DB **152** does not have the license (S**200**: No), the availability judgment unit **154** directs the license obtainment unit **153** to obtain the license via the communication network **30** (S**201**).

[0136] When the license can be obtained (S**202**: Yes), the availability judgment unit **154** judges whether or not the obtained license allows the use of content (S**203**). When the content is available (S**203**: Yes), the availability judgment unit **154** obtains the content key (which is, for example, attached to the obtained license) based on the license (S**204**).

[0137] When the license cannot be obtained (S**202**: No) and it is judged that content cannot be reproduced with the obtained license (S**203**), the process is terminated.

[0138] Moreover, when the license is already obtained (S**200**: Yes), the process proceeds directly to the process which judges whether or not content can be reproduced (S**203**).

[0139] FIG. **11** is a display example of the switch indication screen in the content reproduction and output unit **115**. The switch indication screen in FIG. **11** has the sections of "Receiving route", "reception level", "DRM method", "Reproduction fees" and "Remarks". The section of "Receiving route" displays a list of receiving forms (for example, "Broadcast wave", "Communication network") which are available for receiving content in the user terminal **100**. The section of "reception level" displays the information indicating the strength of the reception levels (for example, numeric values such as "3", "2" and "1" in the descending order of the reception level) based on the electric field intensity of electric wave and the like. The section of "DRM method" displays the DRM method types (for example, "DRM method B") which are available in the user terminal **100**. The section of "Reproduction fees" displays the information showing the usage fee for content (for example, "100 yen" or "Cannot be reproduced"). The section of "Remarks" displays the information on special privilege for the content use and content (for example, "with sub-voice (special comments by Mr. A)") and the like via a certain receiving route.

[0140] Additionally, in the above-mentioned switch indication screen,

[0141] (1) the receiving route switch control unit **112** determines a receiving route to be recommended and highlights a text line showing the receiving route;

[0142] (2) the receiving route information may be displayed in descending order of recommendation (that is, the most recommended receiving route information is placed in the top of the list) so as to be user-friendly.

[0143] By allowing to specify the priority of parameters (for example, reception level/reproduction fees) for the preliminary switching of the receiving routes by the user, the receiving route to be recommended in the above-mentioned (1) and (2) may be determined based on this priority.

[0144] This allows the user to switch to a desirable receiving route in reference to the list of the switchable receiving routes.

Second Embodiment

[0145] The above-mentioned first embodiment shows an example of switching the content receiving routes when prescribed conditions are met. However, this embodiment shows an example of adding, to a part of the received content, information indicating a receiving route to be switched for increasing the convenience of the content receiving route switching.

[0146] FIG. **12** is a diagram showing an example where the information which identifies a receiving route via a communication network is added to a part of content obtained using a broadcast wave. As shown in FIG. **12**, for example, when the broadcast content of a baseball game which is being received via the broadcast wave **20** ends at 21:00, because the URL of an Internet site which provides the baseball game content after 21:00 is attached to a part of this broadcast content, a user can continuously obtain the baseball game content based on this URL.

[0147] Although the above-mentioned embodiment shows an example of switching the receiving route using a broadcast wave to the receiving route using a communication network, it is also possible to switch from the receiving route using a communication network to the receiving route using a broadcast wave.

Third Embodiment

[0148] The first embodiment shows an example of switching content receiving routes from a broadcast wave to a communication network which is provided by a general provider. In addition to the content receiving routes in the first embodiment, this embodiment shows an example of receiving content via a broadcast wave by a home server installed in a home, and adding a receiving route for transmitting the content to a user terminal.

[0149] FIG. **13** is an external view of a content distributing system **11** in the embodiment. As to the same functional elements as the content distributing system **10** in the first embodiment, a description of these is omitted, and the additional functional elements in this embodiment are described in detail.

[0150] As shown in FIG. **13**, the content distributing system **11** allows the receiving of content via a communication network **30** of a wireless LAN and the like from a home server **600** when the user moves from a broadcast wave receivable area **510** to a broadcast wave hardly-receivable area **520**. In this case, the home server **600** receives content (stores the content when necessary) via a broadcast wave, converts the content to be used for a user terminal **500**, and transmits the converted content to the user terminal **500** via the communication network **30**.

[0151] FIG. **14** is a diagram showing a general outline of the content distributing system **11** in the embodiment. As shown in FIG. **14**, the user terminal **500** in the content distributing system **11** has a new DRM module for home

servers **560** so as to obtain content and the decryption key of the content from the home server **600** via the communication network **30**. Accordingly, the user terminal **500** can switch content receiving routes from a broadcast wave to a communication network **30** via the home server **600** so as to obtain a license and the decryption key of the license, and then the user terminal **500** can decrypt content using this decryption key and reproduce it. More specifically, the user terminal **500** (1) switches from a DRM module **140** for a broadcast wave to a DRM module **560** for the home server if the reception level of a broadcast wave falls to a certain level or below. Moreover, the user terminal **500** (2) performs mutual authentication with the home server **600**. Additionally, the user terminal **500** is described as a device which performs mutual authentication with the home server **600**. However, as the mutual authentication is not always necessary, either of the user terminal **500** and the home server **600** may authenticate the other. If the mutual authentication normally ends, the user terminal **100** (3) obtains content and its decryption key from the home server **600** via the communication network **30**, and decrypts the content by using the obtained decryption key.

[**0152**] FIG. **15** is a block diagram showing a distributing form of content in the content distributing system **11** according to the embodiment. As shown in FIG. **15**, the user terminal **500** in the content distributing system **11** obtains (receives) a license and content from a DRM server **200** and a content distributing server **210** of a provider A via a broadcast wave **20**. On the other hand, the home server **600** obtains (receives) a license and content from the DRM server **200** and the content distributing server **210** of provider

[**0153**] A via the broadcast wave **20**. The home server **600** also converts and encrypts the obtained content into a format for transmission to the user terminal **500**, and transmits the converted and encrypted content and its decryption key to the user terminal **500** via the communication network **30**. Accordingly, the user terminal **500** can receive the same content from the home server **600** via the communication network **30** even if it becomes difficult to receive content via the broadcast wave **20** while the terminal is moving.

[**0154**] FIG. **16** is a block diagram showing the functional configuration of the home server **600** in the embodiment. As shown in FIG. **16**, the home server **600** has a server control unit **610**, a receiving control unit **120**, a communication control unit **130**, an operation input unit **170**, a license obtainment unit **153**, an availability judgment unit **154**, an authentication unit **631**, a content conversion unit **632**, a content transmitting unit **633**, a content storage unit **640**, a license DB **152**, an authentication information storage unit **660**, and a content key sharing unit **670**, each of which is connected by an local bus **680**. Note that the same functional elements in the home server **600** as the user terminal **100** or the DRM module **150** in the first embodiment are provided with the same numerical references, and a description of these is omitted.

[**0155**] The server control unit **610** is configured with CPU including ROM, RAM and the like. The home server **600** is entirely controlled by causing the CPU to execute control programs stored in ROM and the like.

[**0156**] The authentication unit **631** performs mutual authentication between the home server **600** and the user terminal **500**, or device authentication for the user terminal **500**.

[**0157**] The content conversion unit **632** decrypts the content received via the receiving control unit **120** using a license stored in the license DB **152**, and converts the decrypted content into a format for transmission to the user terminal **500**. Additionally, the content conversion unit **632** performs an operation for encrypting the converted content using the key shared between the user terminal **500** and the content key sharing unit **670**.

[**0158**] The content transmitting unit **633** controls transmission of content to the user terminal **500**.

[**0159**] The content storage unit **640** is, for example, HD and DVD devices, and stores pre-decryption or post-decryption content which is received via the receiving control unit **120**.

[**0160**] The authentication information storage unit **660** is a RAM or the like, and stores information necessary for mutual authentication between the home server **600** and the user terminal **500**, or device authentication for the user terminal **500**.

[**0161**] The content key sharing unit **670** holds the latest content key obtained via the license obtainment unit **153**, and performs control for sharing the content key with the user terminal **500**.

[**0162**] FIG. **17** is a block diagram showing the functional configuration of the user terminal **500** in the embodiment. The user terminal **500** has functions equivalent to those of the above-mentioned user terminal **100** except that it has the DRM module **560** instead of the DRM module **160** in the user terminal **100** of the first embodiment.

[**0163**] The DRM module **560** controls reception of content from the home server **600** via the communication network **30** such as a wireless LAN and the like when the user terminal **500** moves from the broadcast wave receivable area **510** to the broadcast wave hardly-receivable area **520**.

[**0164**] FIG. **18** is a block diagram showing the functional configuration of the above-mentioned DRM module **560**. As shown in FIG. **18**, the DRM module **560** has a module control unit **561**, an authentication information storage unit **562**, an authentication unit **563**, a content key sharing unit **564**, and a content key transmitting unit **155**.

[**0165**] Note that the same functional elements in the DRM module **560** as the DRM module **150** in the first embodiment are provided with the same numerical references, and a description of these is omitted.

[**0166**] The module control unit **561** controls the entire DRM module **560** by an dedicated processor and the like.

[**0167**] The authentication information storage unit **562** is a RAM or the like, and stores necessary information for mutual authentication between the user terminal **500** and the home server **600**.

[**0168**] The authentication unit **563** performs mutual authentication between the user terminal **500** and the home server **600**.

[0169] The content key sharing unit **564** follows direction from the content key sharing unit **670**, and performs control for sharing the content key between the home server **600** and the user terminal **500**.

[0170] The operation of the user terminal **500** according to the embodiment is basically the same as the operation of the user terminal **100** according to the first embodiment. However, the user terminal **500** is different from the user terminal **100** in that the content distributing system **11** has the home server **600** between the broadcast wave **20** and the user terminal **500** which receives content via the communication network **30**; and broadcast content is stored and the license of the content is controlled by the home server **600**; and in that the control on the license is omitted if the user terminal **500** receives content from the home server **600**.

[0171] FIG. **19** is an example of display on the switch indication screen in the content reproduction and output unit **115** of the user terminal **500** according to the embodiment. Like in the first embodiment, the switch indication screen shown in FIG. **19** displays a list of receiving forms which is available for receiving content in the user terminal **500**. Accordingly, the user can switch to a receiving route via the home server **600** in reference to a list of the switchable receiving routes.

[0172] Additionally, the respective configurations in the first, second and third embodiments include the content key obtainment unit **113**, the content decryption unit **114**, and the content reproduction and output unit **115** outside the DRM modules. However, configurations are not limited to these configurations, and each DRM module may include plural content obtainment unit **113**, the content decryption unit **114**, and the content reproduction and output unit **115** outside the DRM modules. In addition, these units may be included in each of the DRM modules.

[0173] The third embodiment shows that the home server **600** receives a license via a broadcast wave **20**, but it may also receive a license via the communication network **30**.

[0174] The third embodiment shows that the home server **600** performs the process on a license and the user terminal **500** receives a decryption key for the content encrypted by the home server **600**. However, such processes on a license do not always need to be performed. The home server **600** may transmit content and a license to the user terminal **500**, and cause the DRM module **560** of the user terminal **500** to perform the process on a license.

[0175] If the user terminal **500** cannot receive the broadcast wave **20**, it may cause the home server **600** to record the content via the communication network **30**.

INDUSTRIAL APPLICABILITY

[0176] The present invention can be used in television broadcasting systems such as digital terrestrial television broadcasting and the like. In addition, the present invention can be used in network systems such as the Internet and the like which complement the above-mentioned television broadcasting system.

1. A content receiving apparatus including a first receiving unit which receives broadcast content via a broadcast wave and a second receiving unit which receives communication content identical to the broadcast content via a communication network, said apparatus comprising:

a first judgment unit operable to judge whether or not switching from said first receiving unit to said second receiving unit is appropriate;

an availability judgment unit operable to judge whether or not the communication content is available when the switching to said second receiving unit is performed; and

a receiving route switch unit operable to switch content receiving routes from said first receiving unit to said second receiving unit when said first judgment unit judges that the switching is appropriate and said availability judgment unit judges that the communication content is available.

2. The content receiving apparatus according to claim 1,

wherein said first judgment unit is operable to judge that the switching is appropriate when the electric field intensity of the broadcast wave falls to a certain level or below.

3. The content receiving apparatus according to claim 2,

wherein said first judgment unit is further operable to judge that the switching is appropriate when a usage fee of the communication content is lower than a usage fee of the broadcast content.

4. The content receiving apparatus according to claim 2,

wherein said first judgment unit is further operable to judge that the switching is appropriate when information which is different from information added to the broadcast content is added to the communication content.

5. The content receiving apparatus according to claim 1,

wherein said availability judgment unit is operable to judge that the switching is possible when a license compliant with the communication content is available.

6. The content receiving apparatus according to claim 1, further comprising

a holding unit operable to hold the license compliant with the communication content,

wherein said availability judgment unit is further operable to judge whether or not the license held by said holding unit is valid, and

said receiving route switch unit is operable to switch content receiving routes from said first receiving unit to said second receiving unit when said first unit judges that the switching is appropriate and said availability judgment unit judges that the communication content is available.

7. The content receiving unit according to claim 1, further comprising:

an information collection unit operable to collect pieces of information about the receiving of the communication content via the broadcast wave and the communication network;

an information presentation unit operable to present the collected information to a user; and

an operation acceptance unit operable to accept the selection of a piece of information among the presented pieces of information,

wherein said first judgment unit is operable to judge that the switching based on the accepted information is appropriate.

8. The content receiving apparatus according to claim 1,

wherein said first judgment unit is operable to make the judgment based on a termination time of the broadcast content, and

said receiving route switch unit is operable to switch the receiving routes using address information regarding a website included in the broadcast content, the website being connected to the communication network and providing the communication content.

9. The content receiving apparatus according to claim 1,

wherein said first receiving unit is operable to receive broadcast content encrypted by a first copyright protection method,

said second receiving unit is operable to receive communication content encrypted by a second copyright protection method, and

said receiving route switch unit is operable to switch the content receiving routes and the copyright protection methods from said first receiving unit to said second receiving unit when said first judgment unit judges that the switching is appropriate and said availability judgment unit judges that the communication content is available.

10. A content receiving method for a content receiving apparatus including a first receiving unit which receives broadcast content via a broadcast wave and a second receiving unit which receives communication content identical to the broadcast content via a communication network, said method comprising:

a first judging step of judging whether or not the switching from the first receiving unit to the second receiving unit is appropriate;

a judging step of judging whether or not the communication content is available when switching to the second receiving unit is performed; and

a switching step of switching content receiving routes from the first receiving unit to the second receiving unit when the switching is judged to be appropriate in said first judging step and the communication content is judged to be available in said availability judging step.

11. A program for a content receiving apparatus including a first receiving unit which receives broadcast content via a broadcast wave and a second receiving unit which receives communication content identical to the broadcast content via a communication network, said program causing a computer to execute:

a first judging step of judging whether or not the switching is from the first receiving unit to the second receiving unit is appropriate;

a judging step of judging whether or not the communication content is available when switching to the second receiving unit is performed; and

a switching step of switching content receiving routes from the first receiving unit to the second receiving unit when the switching is judged to be appropriate in said first judging step and the communication content is judged to be available in said availability judging step.

12. A content distributing system which includes a content transmitting apparatus and a content receiving apparatus, said system comprising:

said content transmitting apparatus which includes

a content transmitting unit operable to transmit information on broadcast content or communication content, and a license to a content receiving apparatus via a broadcast wave or a communication network, and

said content receiving apparatus which includes

a first receiving unit operable to receive broadcast content via a broadcast wave;

a second receiving unit operable to receive communication content identical to the broadcast content via a communication network;

a first judgment unit operable to judge whether or not switching from said first receiving unit to said second transmitting unit is appropriate;

an availability judgment unit operable to judge whether or not the communication content is available when switching to said second receiving unit is performed; and

a receiving route switch unit operable to switch content receiving routes from said first receiving unit to said second receiving unit when said first judgment unit judges that the switching is appropriate and said availability judgment unit judges that the content is available.

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