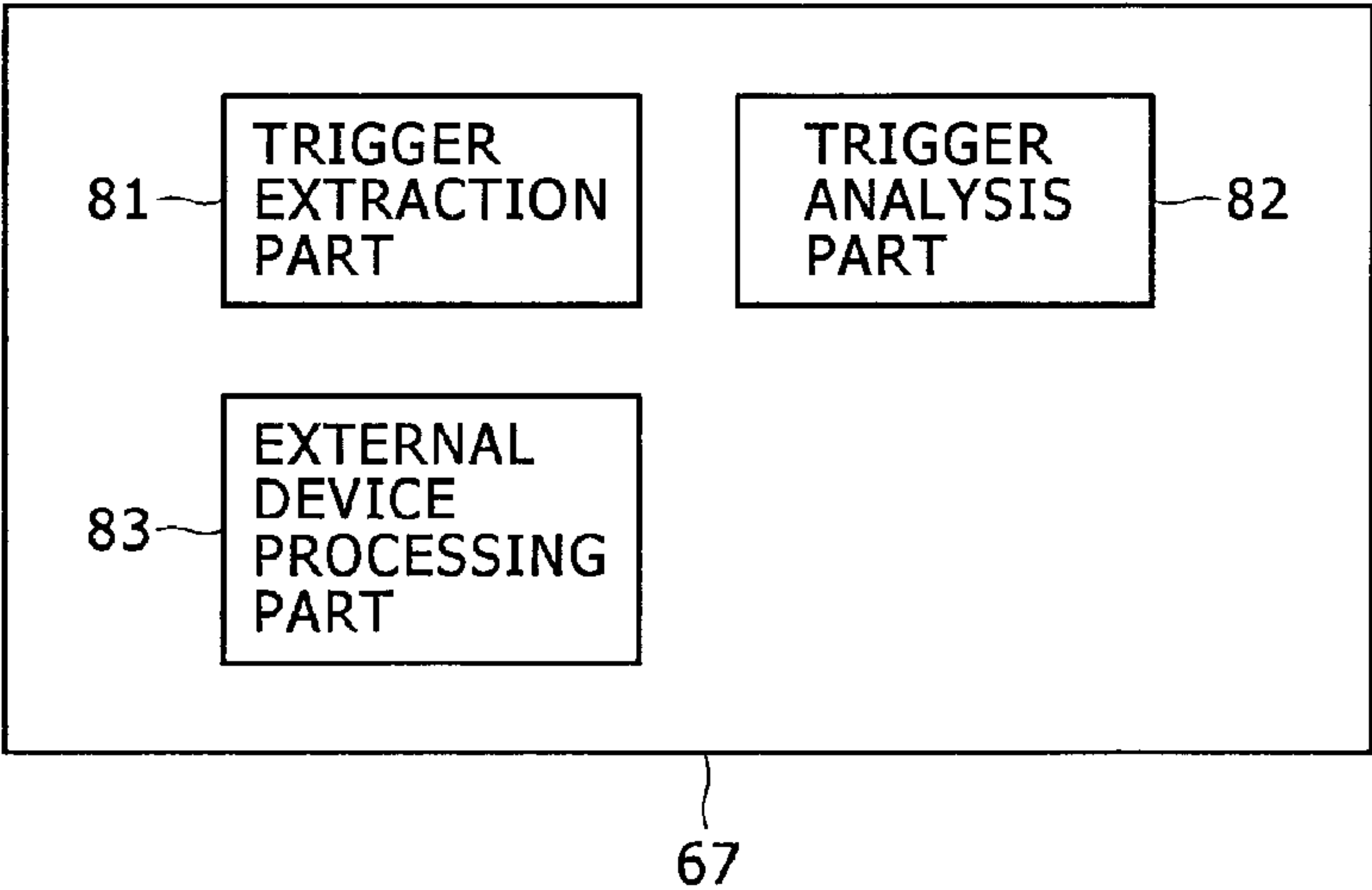




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(54) Titre : DISPOSITIF DE RECEPTION, PROCEDE DE RECEPTION, ET PROGRAMME ASSOCIE
(54) Title: RECEPTION DEVICE, RECEPTION METHOD, AND PROGRAM



(57) **Abrégé/Abstract:**
This invention relates to controlling the operation of an external device connected with a reception device in linkage with the progress of AV content. A trigger extraction part extracts trigger information about control of an application program to be executed either by the reception device or by the external device in linkage with the AV content, the trigger information being transmitted together with the AV content. If the extracted trigger information indicates a command addressed to the reception device proper, then a device proper control block controls the operation of the application program in accordance with the command. If the command indicated by the extracted trigger information is addressed to the external device, then an external device processing part transfers the command to the external device. This technology can be applied to a digital broadcast reception device that receives a digital TV broadcast signal, for example.

[ABSTRACT]

This invention relates to controlling the operation of an external device connected with a reception device in linkage with the progress of AV content.

A trigger extraction part extracts trigger information about control of an application program to be executed either by the reception device or by the external device in linkage with the AV content, the trigger information being transmitted together with the AV content. If the extracted trigger information indicates a command addressed to the reception device proper, then a device proper control block controls the operation of the application program in accordance with the command. If the command indicated by the extracted trigger information is addressed to the external device, then an external device processing part transfers the command to the external device. This technology can be applied to a digital broadcast reception device that receives a digital TV broadcast signal, for example.

[DESCRIPTION]

[Title]

RECEPTION DEVICE, RECEPTION METHOD, AND PROGRAM

[Technical Field]

[0001]

This technology relates to a reception device, a reception method, and a program. More particularly, this technology relates to a reception device, a reception method, and a program configured to control the operation of a predetermined application program in linkage with the progress of AV content such as a TV program.

[Background Art]

[0002]

In digital TV broadcasting, not only a service of broadcasting TV programs but also a service called data broadcasting has been implemented (for example, see Patent Literature 1). Studies are underway to introduce more sophisticated services utilizing the Internet for digital TV broadcasting in the future.

[0003]

The more advanced services under study involving the use of the Internet for digital TV broadcasting include, for example, one which would supply a reception device side via the Internet with an application program or the like

operating in linkage with the progress of AV content such as TV programs and control the operation of the reception device accordingly, and one which would operate an external device connected with the reception device in linkage with AV content.

[Citation List]

[Patent Literature]

[0004]

[PTL 1]

Japanese Patent Laid-open No. 2006-50237

[Summary]

[Technical Problem]

[0005]

However, a technology that would control the operation of an external device connected with a reception device in linkage with the progress of currently being received AV content has not been established yet.

[0006]

This technology has been made in view of the above circumstances and aims to control the operation of an external device connected with a reception device in linkage with the progress of AV content.

[Solution to Problem]

[0007]

According to one aspect of this technology, there is provided a reception device including: a reception block configured to receive transmitted AV content; a trigger extraction part configured to extract trigger information about control of an application program to be executed either by the reception device proper or by an external device connected to the reception device in linkage with the AV content, the trigger information being transmitted together with the AV content; a device proper control block configured such that if the extracted trigger information indicates a command addressed to the reception device proper, then the device proper control block controls the operation of the application program in accordance with the command indicated by the trigger information; and an external device processing part configured such that if the command indicated by the extracted trigger information is addressed to the external device, then the external device processing part transfers the command indicated by the trigger information to the external device.

[0008]

If the application program executed by the external device is the same as the application program currently executed by the reception device proper, the device

proper control block may terminate the application program currently executed by the reception device proper.

[0009]

If the application program executed by the external device is different from the application program currently executed by the reception device proper, the device proper control block may cause the reception device proper to execute continuously the application program.

[0010]

The device proper control block may prevent the reception device proper from executing the application program same as the application program currently executed by the external device.

[0011]

The command indicated by the trigger information may include information for designating either a specific device or part or all of the devices targeted by the command.

[0012]

The trigger information may include any one of commands to acquire, register, and execute a predetermined application program, a command to fire an event, a command to suspend the application program, and a command to terminate the application program.

[0013]

In response to each of the commands, the device proper control block may control acquisition, registration, or execution of the application program, firing of an event in the currently executing application program, suspension of the currently executing application program, or termination of the currently executing application program.

[0014]

The external device processing part may transfer to the external device any one of the commands to acquire, register, and execute the application program, the command to fire an event in the currently executing application program, the command to suspend the currently executing application program, and the command to terminate the currently executing application program.

[0015]

The reception device may be either an independent device or an internal block that makes up a single apparatus.

[0016]

According to other aspects of this technology, there are provided a reception method and a program corresponding to the above-outlined reception device embodying one aspect of the technology.

[0017]

According to the reception device, reception method, and program embodying the aspects of this technology, transmitted AV content is received. Trigger information transmitted together with the AV content is then extracted, the information being about control of an application program to be executed either by the reception device proper or by an external device connected to the reception device in linkage with the AV content. If the extracted trigger information indicates a command addressed to the reception device proper, the operation of the application program is controlled in accordance with the command indicated by the trigger information. If the command indicated by the extracted trigger information is addressed to the external device, then the command indicated by the trigger information is transferred to the external device.

[Advantageous Effect of Invention]

[0018]

According to the aspects of the present technology, an external device connected with the reception device can be operated in linkage with the progress of AV content.

[Brief Description of Drawings]

[0019]

[Fig. 1]

Fig. 1 shows a typical configuration of a broadcasting

system.

[Fig. 2]

Fig. 2 shows a typical structure of a broadcast unit.

[Fig. 3]

Fig. 3 shows a typical structure of a reception device.

[Fig. 4]

Fig. 4 shows a typical structure of a trigger processing block.

[Fig. 5]

Fig. 5 shows a typical structure of an external device.

[Fig. 6]

Fig. 6 lists items included in trigger information of a Register command.

[Fig. 7]

Fig. 7 lists items included in trigger information of an Execute command.

[Fig. 8]

Fig. 8 lists items included in trigger information of an Inject_event command.

[Fig. 9]

Fig. 9 lists items included in trigger information of a Suspend command.

[Fig. 10]

Fig. 10 lists items included in trigger information of a Terminate command.

[Fig. 11]

Fig. 11 shows a typical syntax of trigger information.

[Fig. 12]

Fig. 12 shows state transitions of a data broadcast application.

[Fig. 13]

Fig. 13 shows relations in state transitions between each command and a data broadcast application.

[Fig. 14]

Fig. 14 shows a typical operation scenario in effect when different data broadcast applications are acquired.

[Fig. 15]

Fig. 15 shows a typical operation scenario in effect when a same data broadcast application is acquired.

[Fig. 16]

Fig. 16 shows a typical operation sequence in effect when different data broadcast applications are acquired.

[Fig. 17]

Fig. 17 shows a typical operation sequence in effect when a same data broadcast application is acquired.

[Fig. 18]

Fig. 18 is a flowchart explaining a trigger handling process of the reception device.

[Fig. 19]

Fig. 19 is a flowchart explaining a trigger handling

process of the external device.

[Fig. 20]

Fig. 20 shows a typical coordination of data broadcast applications.

[Fig. 21]

Fig. 21 shows a typical structure of a computer.

[Description of Embodiment]

[0020]

An embodiment of this technology is explained below in reference to the accompanying drawings.

[0021]

[Typical Configuration of Broadcasting System]

Fig. 1 shows a typical configuration of a broadcasting system.

[0022]

A broadcasting system 1 is made up of a broadcast unit 21 and a server 22 set up on the sender side, and a reception device 23 and an external device 24 installed on the receiver side.

[0023]

The broadcast unit 21 is configured so as to transmit a digital TV broadcast signal via a broadcast network 2 such as a terrestrial digital broadcast network. The digital TV broadcast signal is used to transmit AV

content such as TV programs and CMs.

[0024]

Also, the broadcast unit 21 transmits trigger information, included in the digital TV broadcast signal, as a command regarding the operation of a data broadcast application program (also called the data broadcast application hereunder) in linkage with AV content. Specifically, the trigger information may be transmitted included in a transport stream (called the TS hereunder) of the digital TV broadcast signal or embedded in a video signal or an audio signal.

[0025]

In addition to information indicating a command type, the trigger information includes information indicative of a destination from which to acquire the data broadcast application or the like. The trigger information will be discussed later in detail.

[0026]

In response to a request from the reception device 23 or external device 24 having accessed the server 22 via the Internet 3, the server 22 supplies the data broadcast application.

[0027]

The reception device 23 receives the digital broadcast signal broadcast from the broadcast unit 21 and outputs

images and sounds of the received AV content to a monitor (not shown). The reception device 23 also accesses the server 22 via the Internet 3 to acquire the data broadcast application therefrom and execute the acquired data broadcast application.

[0028]

The reception device 23 is further connected with the external device 24, and controls the operation of the data broadcast application to be executed by the external device 24.

[0029]

Incidentally, the reception device 23 may be set up as an independent device or incorporated in a TV set or in a video recorder, for example.

[0030]

The external device 24 is connected with the reception device 23 and, under control thereof, accesses the server 22 via the Internet 3 to acquire the data broadcast application and execute the acquired data broadcast application.

[0031]

The external device 24 may be a smartphone, a portable information terminal, a digital TV set, or a video recorder, for example.

[0032]

The broadcasting system 1 is configured as explained above.

[0033]

[Typical Structure of Broadcast Unit]

Fig. 2 shows a typical structure of the broadcast unit.

[0034]

The broadcast unit 21 is made up of a trigger generation block 31, a video encoder 32, an audio encoder 33, a multiplexing block 34, and a transmission block 35.

[0035]

The trigger generation block 31 generates trigger information in keeping with the progress of a video stream containing TV programs and CMs input from a preceding stage, and outputs the generated trigger information to the video encoder 32 and multiplexing block 34.

[0036]

The video encoder 32 encodes the video stream of AV content such as TV programs input from the preceding stage in accordance with a predetermined encoding method, and supplies the encoded video stream to the multiplexing block 34. Typical encoding methods that may be adopted by the video encoder 32 include MPEG-2 (Moving Picture Experts Group phase 2) and the H.264 standard, for example.

[0037]

Also, upon encoding the video stream, the video encoder 32 embeds therein the trigger information coming from the trigger generation block 31 and performs encoding. The video encoder 32 outputs the video stream thus encoded to the multiplexing block 34.

[0038]

The audio encoder 33 encodes by a predetermined encoding method an audio stream corresponding to the video stream input to the video encoder 32, and outputs the encoded audio stream to the multiplexing block 34. Typical encoding methods that may be adopted by the audio encoder 33 include AC3 (Audio Code number 3) and AAC (Advanced Audio Coding), for example.

[0039]

The multiplexing block 34 is supplied with the encoded video stream from the video encoder 32, the encoded audio stream from the audio encoder 33, and the trigger information from the trigger generation block 31.

[0040]

The multiplexing block 34 multiplexes the encoded video stream, encoded audio stream, and trigger information, and supplies a resulting multiplexed stream to the transmission block 35. Specifically, the video and audio streams and the trigger information may be multiplexed

into the TS, for example. Alternatively, the streams and trigger information may be multiplexed into an ISO base media file format (MP4) suitable for the transmission of digital TV broadcasts over the network.

[0041]

The transmission block 35 transmits the multiplexed stream fed from the multiplexing block 34 as the digital TV broadcast signal.

[0042]

The broadcast unit 21 is structured as explained above.

[0043]

In the foregoing description, the trigger information was shown not only embedded in the video stream but also multiplexed into the multiplexed stream. Alternatively, the trigger information may be either embedded in the video stream, or multiplexed into the multiplexed stream. The trigger information may also be transmitted by an other method otherwise, such as in a manner embedded in the audio stream.

[0044]

[Typical Structure of Reception Device]

Fig. 3 shows a typical structure of the reception device.

[0045]

The reception device 23 is made up of a tuner 61, a demultiplexing block 62, an audio decoder 63, an audio

output block 64, a video decoder 65, a video output block 66, a trigger processing block 67, a device proper control block 68, a memory 69, an operation block 70, a communication interface 71, a cache memory 72, an application engine 73, an application memory 74, and an external interface 75.

[0046]

The tuner 61 receives and demodulates the digital TV broadcast signal corresponding to a service (i.e., channel) selected by a user, and supplies the multiplexed stream resulting from demodulation to the demultiplexing block 62.

[0047]

The demultiplexing block 62 demultiplexes an audio encoded signal and a video encoded signal from the multiplexed stream supplied from the tuner 61, and feeds the audio encoded signal to the audio decoder 63 and the video encoded signal to the video decoder 65.

[0048]

The audio decoder 63 decodes the audio encoded signal fed from the demultiplexing block 62, and supplies the decoded audio signal to the audio output block 64.

[0049]

The audio output block 64 outputs the audio signal fed from the audio decoder 63 to a subsequent stage such as a

speaker.

[0050]

The video decoder 65 decodes the video encoded signal fed from the demultiplexing block 62, and supplies the decoded video signal to the video output block 66 and trigger processing block 67.

[0051]

The video output block 66 outputs the video signal coming from the video decoder 65 to a subsequent stage such as a display unit. Also, the video output block 66 combines the video signal supplied from the video decoder 65 and a video signal of a data broadcast application fed from the application engine 73, and outputs to the subsequent stage.

[0052]

The trigger processing block 67 continuously monitors the video signal supplied from the video decoder 65 to extract the trigger information embedded in the video signal. The trigger processing block 67 analyzes the extracted trigger information and supplies the result of the analysis to the device proper control block 68.

[0053]

Also, based on the analyzed result of the trigger information, the trigger processing block 67 supplies the external interface 75 with a command included in the

trigger information and addressed to an external device (external device 24) and thereby controls the operation of the data broadcast application to be executed by the external device 24. Furthermore, the trigger processing block 67 records various items of information to the memory 69 or retrieves information stored in the memory 69 as needed.

[0054]

The trigger processing block 67 will be discussed later in more detail.

[0055]

The device proper control block 68 controls the operation of the components of the reception device 23 by executing control programs held in the memory 69. The device proper control block 68 is further supplied with the analyzed result of the trigger information from the trigger processing block 67. In accordance with a command included in the trigger information and addressed to the reception device proper (reception device 23), the device proper control block 68 performs control to acquire, register, or execute a data broadcast application, to fire an event, to suspend the data broadcast application, or to terminate the data broadcast application.

[0056]

The memory 69 records control programs and diverse items

of information. The operation block 70 accepts various operations performed by the user and supplies the device proper control block 68 with operation signals corresponding to the user's operations.

[0057]

The communication interface 71 under control of the application engine 73 connects to the server 22 via the Internet 3. Under control of the device proper control block 68, the application engine 73 acquires the data broadcast application from the server 22 via the communication interface 73 and the Internet 3 and retains the acquired data broadcast application in the cache memory 72.

[0058]

Under control of the device proper control block 68, the application engine 73 retrieves the data broadcast application held in the cache memory 72 and executes the retrieved data broadcast application. The video signal of the currently executing data broadcast application is supplied to the video output block 66.

[0059]

The application memory 74 is composed of a work memory 74A and a save memory 74B. The application engine 73 records data about the currently executing data broadcast application (specifically, data including a hierarchy of

information being displayed) to the work memory 74A. Also, upon suspending the currently executing data broadcast application, the application engine 73 moves data in the work memory 74A to the save memory 74B in the application memory 74. Upon resuming the suspended data broadcast application, the application engine 73 moves data from the save memory 74B to the work memory 74A to restore the state in effect before the suspension.

[0060]

The external interface 75 establishes connection with the external device 24 in wired or wireless fashion, and transmits to the connected external device 24 the command supplied from the trigger processing block 67 and addressed to the external device 24. Furthermore, the external interface 75 receives notifications sent from the external device 24 to the reception device 23 and supplies the received notifications to the trigger processing block 67.

[0061]

The reception device 23 is structured as explained above.

[0062]

[Typical Detailed Structure of Trigger Processing Block]

Fig. 4 shows a typical detailed structure of the trigger processing block indicated in Fig. 3.

[0063]

The trigger processing block 67 is made up of a trigger extraction part 81, a trigger analysis part 82, and an external device processing part 83.

[0064]

The trigger extraction part 81 continuously monitors the video signal supplied from the video decoder 65, extracts the trigger information embedded in the video signal, and feeds the extracted trigger information to the trigger analysis part 82.

[0065]

The trigger analysis part 82 analyzes the trigger information supplied from the trigger extraction part 81, and supplies the device proper control block 68 with the command included in the trigger information and addressed to the reception device proper. Also, the trigger analysis part 82 supplies the external device processing part 83 with the command included in the trigger information and addressed to the external device.

[0066]

The external device processing part 83 supplies the external interface 75 with the command fed from the trigger analysis part 82 and addressed to the external device so that the command may be transferred to the external device 24. The external device processing part 83 also performs various processes regarding the external

device 24.

[0067]

The trigger processing block 67 is structured as explained above.

[0068]

[Typical Structure of External Device]

Fig. 5 shows a typical structure of the external device.

[0069]

The external device 24 is made up of an external interface 91, a command analysis block 92, a control block 93, an operation block 94, a memory 95, an application engine 96, a communication interface 97, and an output block 98.

[0070]

The external interface 91 is connected with the external interface 75 of the reception device 23 in wired or wireless fashion, and receives the command sent from the reception device 23 and addressed to the external device. The external interface 91 feeds the received command to the command analysis block 92.

[0071]

The command analysis block 92 analyzes the command fed from the external interface 91 and addressed to the external device, and supplies the result of the analysis to the control block 93.

[0072]

The control block 93 controls the operation of the components of the external device 24 by executing control programs recorded in the memory 95. Also, in response to the command supplied from the command analysis block 92 and addressed to the external device, the control block 93 performs control to acquire, register, or execute a data broadcast application, to fire an event, to suspend the data broadcast application, or to terminate the data broadcast application.

[0073]

The operation block 94 accepts various operations performed by the user and supplies the control block 93 with operation signals corresponding to the user's operations.

[0074]

The application engine 96 under control of the control block 93 acquires the data broadcast application from the server 22 via the communication interface 97 and the Internet 3, and executes the acquired data broadcast application. The video signal and audio signal of the data broadcast application relating to the AV content currently being received by the reception device 23 are supplied to the output block 98.

[0075]

The communication interface 97 under control of the application engine 96 connects to the server 22 via the Internet 3 and acquires the data broadcast application.

[0076]

The output block 98 displays images corresponding to the video signal fed from the application engine 96 and outputs sounds corresponding to the audio signal.

[0077]

The external device 24 is structured as explained above.

[0078]

[Details of Trigger Information]

Trigger information is explained below in detail. The trigger information is information that controls the data broadcast application. For example, the trigger information may include a Register command, an Execute command, an Inject_event command, a Suspend command, and a Terminate command.

[0079]

Fig. 6 lists items included in the trigger information as the Register command. The Register command is a command that instructs the reception device 23 to acquire and register the data broadcast application.

[0080]

An item "Trigger_id" is information used to identify this trigger information. Where the trigger information of the

same substance is transmitted a plurality of number of times, the item "Trigger_id" remains the same in each trigger information transmitted.

[0081]

An item "Target_device_type" is information that indicates the type of a device targeted by the command. If "0xFF" is designated, the command is common to all device types. For example, the item "Target_device_type" may designate a specific device such as the reception device proper or the external device, or part or all of the devices involved, as the target (destination) of the command.

[0082]

An item "Protcol_version" indicates a protocol version of this trigger information. An item "Command_code" indicates the type of the command of this trigger information. In the case of Fig. 6, information indicative of the Register command is described.

[0083]

An item "Trigger_varidity" is a server access dispersion parameter value indicating the probability that each reception device 23 upon receipt of this trigger information will perform processing in accordance with the received trigger information.

[0084]

An item "App_id" is information used to identify the data broadcast application to be acquired in accordance with this trigger information. The item "App_id" also indicates a URL of a destination (server 22 in this case) from which to acquire the data broadcast application in accordance with this trigger information.

[0085]

An item "App_type" is information that indicates the type of the data broadcast application (e.g., HTML5, Java, and the like) corresponding to this trigger information. An item "App_life_span" is information that indicates the scope of operation of the data broadcast application.

[0086]

An item "Persistent_priority" indicates the priority applicable when the corresponding data broadcast application is to be acquired and retained. An item "Expire_date" is information that indicates an expiration date of the data broadcast application. When a data broadcast application is registered, the priority ("Persistent_priority") and expiration date ("Expire_date") are stored. The data broadcast application will then be managed in accordance with the priority and expiration date thus stored.

[0087]

Fig. 7 lists items included in the trigger information as

the Execute command. The Execute command is a command that instructs the reception device 23 to execute the data broadcast application.

[0088]

The items "Trigger_id," "Target_device_type," "Protocol_version," "Command_code," "Trigger_varidity," "App_id," "App_type," and "Expire_date" are the same as those included in the trigger information as the Register command shown in Fig. 6. It should be noted that the item "Command_code" describes information indicative of the Execute command. An item "TDO_life_scope" is information that indicates the scope of operation of the data broadcast application.

[0089]

Fig. 8 lists items included in the trigger information as the Inject_event command. The Inject_event command is a command that causes the reception device 23 to fire an event in the currently executing data broadcast application.

[0090]

The items "Trigger_id," "Target_device_type," "Protocol_version," "Command_code," "Trigger_varidity," "App_id," and "App_type" are the same as those of the trigger information as the Register command shown in Fig. 6. It should be noted that the item "Command_code"

describes information indicative of the Inject_event command.

[0091]

An item "Event_id" is information used to identify an event to be fired in the data broadcast application designated by the item "App_id." An item "Event Embedded Data" describes data to be referenced upon firing of the event.

[0092]

Fig. 9 lists items included in the trigger information as the Suspend command. The Suspend command is a command that causes the reception device 23 to suspend the currently executing data broadcast application.

[0093]

The items "Trigger_id," "Target_device_type," "Protocol_version," "Command_code," "Trigger_varidity," and "App_id" are the same as those of the trigger information as the Register command shown in Fig. 6. It should be noted that the item "Command_code" describes information indicative of the Suspend command.

[0094]

Fig. 10 lists items included in the trigger information as the Terminate command. The Terminate command is a command that causes the reception device 23 to terminate the currently executing data broadcast application.

[0095]

The items "Trigger_id," "Target_device_type," "Protocol_version," "Command_code," "Trigger_varidity," and "App_id" are the same as those of the trigger information as the Register command shown in Fig. 6. It should be noted that the item "Command_code" describes information indicative of the Terminate command.

[0096]

Fig. 11 shows a typical trigger information syntax applicable to the trigger information as each of the commands discussed above. It should be noted that the trigger information syntax is discretionary and is not limited to the example shown in Fig. 11.

[0097]

[State Transitions of Data Broadcast Application]

Fig. 12 is a state transition diagram of the data broadcast application operating in accordance with the trigger information as each of the Register, Execute, Inject_event, Suspend, and Terminate commands.

[0098]

As shown in Fig. 12, the data broadcast application is defined to be in one of four states: released state, ready state, active state, and suspended state.

[0099]

The released state indicates a state in which the data

broadcast application has yet to be acquired by the reception device 23. The ready state indicates a state in which the data broadcast application in question has been registered in the reception device 23 but has yet to be executed thereby. The active state indicates a state in which the data broadcast application is started and currently executed. The suspended state indicates a state in which the execution of the data broadcast application is suspended and the information indicative of the state in effect upon suspension is held in the save memory 74B.

[0100]

Fig. 13 shows relations in state transitions between each command and the data broadcast application.

[0101]

From the released state (in which the data broadcast application has yet to be acquired by the reception device 23), the data broadcast application transitions to the ready state when acquired, retained and registered in accordance with the trigger information of the Register command.

[0102]

From the ready state, the data broadcast application transitions to the active state when executed in accordance with the trigger information of the Execute command.

[0103]

Also from the released state (in which the data broadcast application has yet to be acquired by the reception device 23), the data broadcast application in question transitions to the active state when acquired, registered and executed in accordance with the trigger information of the Execute command. Furthermore, in the active state, the currently executing data broadcast application performs predetermined processes such as firing of an event or reading of updated data to be reflected in the display in accordance with the trigger information of the Inject_event command.

[0104]

From the active state, the currently executing data broadcast application transitions to the suspended state when suspended in accordance with the trigger information of the Suspend command. From the suspended state, the data broadcast application transitions to the ready state in accordance with the trigger information of the Terminate command.

[0105]

From the suspended state, the suspended data broadcast application transitions to the active state when resumed in accordance with the trigger information of the Execute command. Also, from the active state, the currently

executing data broadcast application transitions to the ready state when terminated in accordance with the trigger information of the Terminate command.

[0106]

When the data broadcast application is in the ready state, active state, or suspended state and when the expiration date of this data broadcast application has expired, this data broadcast application is deleted from the cache memory 72. With its registration also canceled, the data broadcast application in question then transitions to the released state.

[0107]

[Operation Scenarios]

Using the above-described trigger information makes it possible to operate data broadcast applications as shown in Figs. 14 and 15, for example.

[0108]

Fig. 14 shows a typical operation scenario in effect when different data broadcast applications are acquired by different devices.

[0109]

In accordance with the progress of a TV program (AV content), the broadcast unit 21 may transmit to the reception device proper the trigger information of the Register command that instructs acquisition and

registration of the data broadcast application corresponding to the TV program in question. Upon receipt of the transmitted trigger information, the reception device 23 acquires and registers the data broadcast application.

[0110]

Then in accordance with the progress of the TV program, the broadcast unit 21 may transmit to the reception device proper the trigger information of the Execute command regarding the data broadcast application corresponding to that TV program. Upon receipt of the transmitted trigger information, the reception device 23 executes the data broadcast application. The execution causes the data broadcast application to be displayed superimposed on an image of the TV program.

[0111]

Next, in accordance with the progress of the TV program, the broadcast unit 21 may transmit to the external device the trigger information of the Execute command targeting a data broadcast application different from that which is currently executed by the reception device 23 as the data broadcast application corresponding to that TV program. Upon receipt of the transmitted trigger information, the reception device 23 transfers the Execute command to the external device 24.

[0112]

On receiving the Execute command transferred from the reception device 23, the external device 24 acquires the data broadcast application different from that which is currently executed by the reception device 23, and executes the acquired data broadcast application.

[0113]

Next, in accordance with the progress of the TV program, the broadcast unit 21 may transmit the trigger information of the Inject_event command to the reception device proper. Upon receipt of the transmitted trigger information, the reception device 23 performs predetermined processes such as firing of an event in the currently executing data broadcast application or reading of updated data to be reflected in the display.

[0114]

Also, in a suitably timed manner, the broadcast unit 21 may transmit to the reception device proper the trigger information of the Suspend command regarding the data broadcast application. Upon receipt of the transmitted trigger information, the reception device 23 suspends the currently executing data broadcast application.

Thereafter, the broadcast unit 21 may transmit to the reception device proper the trigger information of the Execute command regarding the data broadcast application.

Upon receipt of the transmitted trigger information, the reception device 23 resumes the suspended data broadcast application.

[0115]

In synchronism with the end of the TV program, the broadcast unit 21 may transmit to the reception device proper and the external device the trigger information of the Terminate command to terminate the currently executing data broadcast application. Upon receipt of the transmitted trigger information, the reception device 23 terminates the currently executing data broadcast application. Also, the reception device 23 transfers the Terminate command to the external device 24.

[0116]

On receiving the Terminate command transferred from the reception device 23, the external device 24 terminates the currently executing data broadcast application.

[0117]

As explained above, where different data broadcast applications are acquired by different devices, the reception device 23 and external device 24 execute their respective data broadcast applications independently.

[0118]

Fig. 15 shows a typical operation scenario in effect when the same data broadcast application is acquired by

different devices.

[0119]

As in the case of Fig. 14, the broadcast unit 21 may transmit the trigger information of the Register command and Execute command to the reception device proper. The trigger information causes the data broadcast application in question to be acquired and registered before getting executed.

[0120]

Next, in accordance with the progress of a TV program, as the data broadcast application corresponding to the TV program, the broadcast unit 21 may transmit to the external device the trigger information of the Execute command regarding the same data broadcast application as that which is currently executed by the reception device 23. Upon receipt of the transmitted trigger information, the reception device 23 transfers the Execute command to the external device 24.

[0121]

On receiving the Execute command transferred from the reception device 23, the external device 24 acquires and executes the same data broadcast application as that which is currently executed by the reception device 23. Also, when the external device 24 executes the data broadcast application, the reception device 23 terminates

the currently executing data broadcast application.

[0122]

Next, in accordance with the progress of the TV program, the broadcast unit 21 may transmit the trigger information of the Inject_event command to all devices. Upon receipt of the transmitted trigger information, the reception device 23 ignores the Inject_event command because the data broadcast application has been terminated. The reception device 23 further transfers the Inject_event command to the external device 24.

[0123]

On receiving the Inject_event command transferred from the reception device 23, the external device 24 performs predetermined processes such as firing of an event in the currently executing data broadcast application or reading of updated data to be reflected in the display.

[0124]

Later, in a suitably timed manner, the broadcast unit 21 may transmit to the reception device proper the trigger information of the Suspend command or Execute command regarding the data broadcast application. Upon receipt of the transmitted trigger information, the reception device 23 ignores these commands because the data broadcast application has been terminated.

[0125]

Next, in synchronism with the end of the TV program, the broadcast unit 21 may transmit to all devices the trigger information of the Terminate command to terminate the currently executing data broadcast application. Upon receipt of the transmitted trigger information, the reception device 23 ignores the command because the data broadcast application has been terminated. Also, the reception device 23 transfers the Terminate command to the external device 24.

[0126]

On receiving the Terminate command transferred from the reception device 23, the external device 24 terminates the currently executing data broadcast application.

[0127]

As explained above, when the same data broadcast application is acquired by different devices, either the reception device 23 or the external device 24 alone executes the data broadcast application in question.

[0128]

[Operation Sequences]

Explained below in reference to Figs. 16 and 17 is how the devices making up the broadcasting system 1 typically operate when the above-described operation scenarios are carried out.

[0129]

Fig. 16 shows a typical operation sequence of each device in effect when different data broadcast applications are acquired by different devices.

[0130]

The reception device 23 currently receiving AV content such as a TV program transmitted from the broadcast unit 21 may receive the trigger information of the Execute command addressed to the reception device proper. Upon receipt of the trigger information, the reception device 23 requests the data broadcast application from the server 22 via the Internet 3. The reception device 23 acquires the data broadcast application transmitted from the server 22 as requested and executes the acquired data broadcast application.

[0131]

Incidentally, upon receipt of the Execute command, the reception device 23 may find that the program data for use by the data broadcast application identified by the application ID ("App_id") has yet to be acquired, i.e., that the program data does not reside in the cache memory 72. In that case, the reception device 23 acquires the program data before executing the data broadcast application.

[0132]

Next, the broadcast unit 21 may transmit the trigger

information of the Execute command addressed to the external device. At this point, however, the external device 24 has yet to be connected with the reception device 23, so that the reception device 23 upon receipt of the trigger information ignores the command in question.

[0133]

Later, the external device 24 may be coupled to the reception device 23, and a connection request may be transmitted. At this point, the connected external device 24 is subject to terminal authentication. If the coupled external device 24 is proved to be a valid terminal through terminal authentication, commands addressed to the external device from the broadcast unit 21 can be transferred to the external device 24 thereafter.

[0134]

That is, if the broadcast unit 21 again transmits the trigger information of the Execute command addressed to the external device, the reception device 23 notifies the external device 24 that the Execute command addressed thereto is being received and queries as to whether or not to acquire the command. When requested by the external device 24 to acquire the command, the reception device 23 transfers the Execute command to the external device 24.

[0135]

Upon receipt of the Execute command from the reception device 23, the external device 24 requests a data broadcast application, different from that which is currently executed by the reception device 23, from the server 22 via the Internet 3. The external device 24 acquires the data broadcast application transmitted from the server 22 as requested and executes the acquired data broadcast application. The external device 24 then notifies the reception device 23 that the operation of the different data broadcast application is started.

[0136]

That is, the reception device 23 and external device 24 execute their respectively different data broadcast applications.

[0137]

Later, the broadcast unit 21 may transmit the trigger information of the Terminate command to the reception device proper. In response, the reception device 23 terminates the currently executing data broadcast application. And when the broadcast unit 21 transmits the trigger information of the Terminate command addressed to the external device, the reception device 23 queries the external device 24 on whether or not to acquire the command. If requested to acquire the command, the

reception device 23 transfers the Terminate command to the external device 24.

[0138]

On receiving the Terminate command transferred from the reception device 23, the external device 24 terminates the currently executing data broadcast application. Also, the external device 24 notifies the reception device 23 that the operation of the data broadcast application is terminated.

[0139]

The preceding paragraph completes the explanation of the operation sequence of each device in effect when different devices acquire different data broadcast applications.

[0140]

Fig. 17 shows a typical operation sequence of each device in effect when the same data broadcast application is acquired by different devices.

[0141]

The operation sequence in Fig. 17 is the same as that in Fig. 16 up to the step where the reception device 23 and external device 24 are connected with each other and subjected to terminal authentication. Thus the steps of the sequence in Fig. 17 leading up to that step will not be discussed further.

[0142]

After the external device 24 is proved to be a valid terminal through terminal authentication, the broadcast unit 21 may transmit the trigger information of the Execute command addressed to the external device. In that case, the reception device 23 transfers the Execute command to the external device 24 provided the external device 24 requests acquisition of the command.

[0143]

Upon receipt of the Execute command from the reception device 23, the external device 24 requests the same data broadcast application as that which is currently executed by the reception device 23 from the server 22 via the Internet 3. The external device 24 acquires the data broadcast application transmitted from the server 22 as requested and executes the acquired data broadcast application. And the external device 24 notifies the reception device 23 that the operation of the same data broadcast application is started.

[0144]

Based on the notification from the external device 24, the reception device 23 terminates the currently executing data broadcast application.

[0145]

That is, the reception device 23 and external device 24

do not execute the same data broadcast application respectively. When the external device 24 starts executing the same data broadcast application, the reception device 23 terminates the same data broadcast application.

[0146]

Later, the broadcast unit 21 may transmit the trigger information of the Terminate command to all devices. Upon receipt of the transmitted trigger information, the reception device 23 ignores the command because the data broadcast application has already been terminated. Also, if requested by the external device 24 to acquire the command, the reception device 23 transfers the Terminate command to the external device 24.

[0147]

On receiving the Terminate command transferred from the reception device 23, the external device 24 terminates the currently executing data broadcast application. Also, the external device 24 notifies the reception device 23 that the operation of the data broadcast application is terminated.

[0148]

The preceding paragraph completes the explanation of the operation sequence in effect when different devices acquire the same data broadcast application.

[0149]

In the operation sequences of Figs. 16 and 17, the reception device 23 may forcibly transfer the command to the external device 24 without querying the latter on whether or not to acquire the command in question.

[0150]

[Trigger Handling Process of Reception Device]

A trigger handling process to be performed by the reception device 23 is explained below in reference to the flowchart of Fig. 18.

[0151]

The trigger handling process of Fig. 18 may be carried out by the reception device 23 when, for example, AV content from the broadcast unit 21 is received and its images are displayed on the display unit.

[0152]

In step S101, the external device processing part 83 controls the external interface 75 to determine whether the external device 24 has made a connection request.

[0153]

In step S101, if the external device 24 is coupled to the reception device 23 and the external device 24 has made a connection request, control is passed to step S102. In step S102, the external device processing part 83 communicates with the external device 24 via the external

interface 75 to carry out a connection process with the external device 24. For example, the connection process may involve performing terminal authentication of the coupled external device 24.

[0154]

In step S103, the external device processing part 83 acquires a device ID and a device type from the external device 24 proved to be valid through terminal authentication, for example, and records external device information in which these items of information are associated with each other to the memory 69. Incidentally, the device ID is an identifier identifying the device to be coupled, and the device type is information indicative of the type of the device in question.

[0155]

On the other hand, in step S101, if the external device 24 has not made a connection request, steps S102 and S103 are skipped, and control is passed to step S104.

[0156]

In step S104, the trigger extraction part 81 extracts the trigger information transmitted from the broadcast unit 21 along with AV content, and determines whether the trigger information is extracted.

[0157]

If it is determined in step S104 that no trigger

information has been extracted, control is passed to step S105. In step S105, the external device processing part 83 controls the external interface 75 to determine whether the connected external device 24 has notified that the operation of the data broadcast application is started.

[0158]

If it is determined in step S105 that the notification of the start of application operation has not been made, control is passed to step S109. In step S109, the external device processing part 83 controls the external interface 75 to determine whether the connected external device 24 has given notification that the operation of the data broadcast application is terminated.

[0159]

If it is determined in step S109 that the notification of the termination of application operation has not been made, control is returned to step S101 and the subsequent steps are repeated. If it is determined later in step S104 that the trigger information is extracted, control is passed to step S111.

[0160]

In step S111, the trigger analysis part 82 determines the type of the device targeted by the command included in the received trigger information, the device type being

the reception device proper, connected external device, or some other device.

[0161]

The device type is determined based on the item "Target_device_type" included in each of the commands discussed above. Whether or not the device type is the currently connected external device may be determined by, say, verifying whether the device type coincides with the device type of the currently connected external device 24 included in the external device information recorded in the memory 69 in the processing of step S103. In this context, some other device means a device other than the reception device 23 or external device 24.

[0162]

In step S111, if the device type is indicative of some other device, control is returned to step S101 and the subsequent steps are repeated. For example, if the received command is addressed to an external device yet to be connected or to some other device, the reception device 23 ignores the command in question.

[0163]

In step S111, if the device type indicates the reception device proper, control is passed to step S112. In step S112, the trigger analysis part 82 analyzes the command included in the received trigger information.

[0164]

In step S113, the trigger analysis part 82 determines whether the application ID ("App_id") of the analyzed command is set to be blocked (i.e., the blocked data broadcast application is not to be executed by the reception device 23). If it is determined in step S113 that the application ID is set to be blocked, the command is not executed, control is returned to step S101, and the subsequent steps are repeated.

[0165]

On the other hand, if it is determined in step S113 that the application ID is not set to be blocked, control is passed to step S114. In step S114, based on the result of the analysis in step S112, the trigger analysis part 82 determines whether the command included in the trigger information is the Execute command.

[0166]

If it is determined in step S114 that the command is the Execute command, control is passed to step S116. In step S116, the trigger analysis part 82 references the external device information recorded in the memory 69 to determine whether the trigger ID ("Trigger_id") of the Execute command coincides with the trigger ID of the trigger information addressed to the currently connected external device.

[0167]

If it is determined that the trigger ID of the Execute command is different from the trigger ID of the trigger information addressed to the external device, control is passed to step S118. For example, if the trigger information addressed to the currently connected external device has yet to be received, it is determined that the trigger IDs do not coincide with each other.

[0168]

In step S118, the application engine 73 under control of the device proper control block 68 starts operating the application. Specifically, the application engine 73 controls the communication interface 71 to acquire the data of the data broadcast application identified by the application ID ("App_id") of the trigger information from the server 22 via the Internet 3, and executes the data broadcast application thus acquired.

[0169]

In step S119, the device proper control block 68 records the trigger ID of the currently executing data broadcast application to the memory 69. Thereafter, control is returned to step S101 and the subsequent steps are repeated.

[0170]

If a command other than the Execute command is

transmitted from the broadcast unit 21 and addressed to the reception device proper, the command is determined in step S114 to be a command other than the Execute command, and control is passed to step S115. In step S115, the application engine 73 under control of the device proper control block 68 performs processing in accordance with the command in question. For example, if the trigger information of the Suspend command is received, the currently executing data broadcast application is suspended.

[0171]

In step S111, if the device type indicates the currently connected external device, control is passed to step S120. In step S120, the external device processing part 83 controls the external interface 75 to transfer to the external device 24 the command included in the received trigger information and addressed to the external device. This causes the external device 24 to acquire the data broadcast application corresponding to the command and to execute the acquired data broadcast application.

[0172]

Although not described above for purpose of simplification, the command may alternatively be transferred to the external device 24 after the external device 24 is queried as to whether or not to acquire the

command as described above.

[0173]

In step S121, the trigger analysis part 82 determines whether the command transferred to the external device 24 is the Execute command. If it is determined in step S121 that the command is the Execute command, control is passed to step S122.

[0174]

In step S122, the trigger analysis part 82 records to the memory 69 the trigger ID in the trigger information of the Execute command in association with the device ID of the currently connected external device 24. Since the external device information in which the device ID and the device type are associated with each other was already recorded to the memory 69 in step S103, the device ID included in the external device information is further associated with the trigger ID in this step.

[0175]

That is, with the device ID of the transfer destination recorded in association with the trigger ID in the trigger information of the Execute command upon transfer of the Execute command, when the Execute command addressed to the reception device proper is subsequently received, it is determined whether the trigger ID in the trigger information of the received Execute command

coincides with the trigger ID in the trigger information of the Execute command transferred to the external device 24 serving as the transfer destination. If it is determined that the trigger IDs coincide with each other ("Yes" in step S116), the application ID involved may be set to be blocked (step S117). This prevents the reception device 23 from executing the blocked data broadcast application that is currently executed by the external device 24.

[0176]

Upon completion of step S117 or S122, control is returned to step S101 and the subsequent steps are repeated.

[0177]

When starting to execute the data broadcast application, the external device 24 notifies the reception device 23 that the operation of the application is started. In step S105, it is determined that the notification of the start of application operation has been made. Control is then passed to step S106.

[0178]

In step S106, the trigger analysis part 82 determines whether the trigger ID of the data broadcast application currently executed by the external device 24 having made the notification of the start of application operation coincides with the trigger ID of the data broadcast

application currently executed by the reception device 23.

[0179]

If it is determined in step S106 that the trigger IDs coincide with each other, control is passed to step S107. In step S107, the application engine 73 under control of the device proper control block 68 terminates the currently executing data broadcast application.

[0180]

In step S108, the trigger analysis part 82 causes the application ID corresponding to the data broadcast application currently executed by the external device 24 (i.e., data broadcast application terminated by the reception device 23) to be blocked so that the data broadcast application currently executed by the external device 24 will not be executed by the reception device 23.

[0181]

That is, if the reception device 23 and external device 24 acquire the same data broadcast application, the data broadcast application currently executed by the reception device 23 is terminated; only the external device 24 is allowed to execute the data broadcast application in question.

[0182]

Upon completion of step S108, control is returned to step S101 and the subsequent steps are repeated.

[0183]

If it is determined in step S106 that the trigger IDs do not coincide with each other, steps S107 and S108 are skipped, and control is passed to step S109.

[0184]

That is, if the reception device 23 and external device 24 acquire different data broadcast applications, the reception device 23 and external device 24 execute their respective data broadcast applications that are different from each other.

[0185]

Later, when the external device 24 terminates the data broadcast application, the reception device 23 is notified of the termination of application operation. In step S109, it is determined that the notification of the termination of application operation has been made. Control is then passed to step S110.

[0186]

In step S110, the trigger analysis part 82 deblocks the application ID corresponding to the data broadcast application terminated by the external device 24 having made the notification of the termination of application operation, so that the reception device 23 may execute the data broadcast application that has been terminated by the external device 24.

[0187]

Upon completion of step S110, control is returned to step S101 and the subsequent steps are repeated.

[0188]

The preceding paragraph completes the explanation of the trigger information handling process carried out by the reception device 23.

[0189]

According to the above-described trigger information handling process performed by the reception device 23, the reception device proper can execute a data broadcast application, fire an event, or terminate the data broadcast application in linkage with AV content such as a TV program. Furthermore, the external device can execute a data broadcast application, fire an event, or terminate the data broadcast application in linkage with AV content such as a TV program.

[0190]

[Trigger Handling Process of External Device]

A trigger handling process to be performed by the external device 24 is explained below in reference to the flowchart of Fig. 19.

[0191]

In step S151, the control block 93 controls the external interface 91 to determine whether the external device 24

is coupled with the reception device 23. If it is determined in step S151 that the external device 24 is coupled with the reception device 23, control is passed to step S152.

[0192]

In step S152, the control block 93 controls the external interface 91 to notify the reception device 23 of a connection request to the reception device 23. In step S153, the control block 93 communicates with the reception device 23 via the external interface 91 to perform a connection process with the reception device 23. For example, the connection process may involve termination authentication of the external device 24 performed by the reception device 23.

[0193]

In step S154, the control block 93 controls the external interface 91 to determine whether the command transferred from the reception device 23 is received. If it is determined in step S154 that the command has yet to be received, the determination process of step S154 is repeated.

[0194]

If it is determined in step S154 that the command is received, control is passed to step S155. In step S155, the command analysis block 92 analyzes the command

received from the reception device 23.

[0195]

In step S156, based on the result of the analysis in step S156, the command analysis block 92 determines whether the received command is the Execute command. If it is determined in step S156 that the command is the Execute command, control is passed to step S157.

[0196]

In step S157, the application engine 96 under control of the control block 93 starts operating the application. Specifically, the application engine 96 controls the communication interface 97 to acquire the data of the data broadcast application identified by the application ID ("App_id") from the server 22 via the Internet 3, and executes the data broadcast application thus acquired.

[0197]

In step S158, the control block 93 controls the external interface 91 to notify the reception device 23 of the start of application operation. Upon completion of step S158, control is returned to step S154 and the subsequent steps are repeated.

[0198]

If it is determined in step S156 that the command in question is a command other than the Execute command, control is passed to step S159. In step S159, based on

the result of the analysis in step S155, the command analysis block 92 determines whether the received command is the Terminate command.

[0199]

If it is determined in step S159 that the command is not the Terminate command, i.e., that it is a command other than the Execute command or Terminate command, control is passed to step S160. In step S160, the application engine 96 under control of the control block 93 performs processing corresponding to the command. For example, if the trigger information of the Suspend command is received, the currently executing data broadcast application is suspended. Upon completion of step S160, control is returned to step S154 and the subsequent steps are repeated.

[0200]

If it is determined in step S159 that the command is the Terminate command, control is passed to step S161. In step S161, the application engine 96 under control of the control block 93 terminates the currently executing data broadcast application.

[0201]

In step S162, the control block 93 controls the external interface 91 to notify the reception device 23 of the termination of application operation. Upon completion of

step S162, control is returned to step S154 and the subsequent steps are repeated.

[0202]

The preceding paragraph completes the explanation of the trigger information handling process performed by the external device 24.

[0203]

According to the above-described trigger information handling process performed by the external device 24, the external device under control of the reception device proper can execute a data broadcast application, fire an event, or terminate the data broadcast application in linkage with AV content such as a TV program.

[0204]

Fig. 20 shows a typical coordination of data broadcast applications performed by the reception device 23 and external device 24.

[0205]

As shown in Fig. 20, the display unit of the reception device 23 displays an image of AV content currently received from the broadcast unit 21. In the bottom left corner of that image appears an image of the data broadcast application in superimposed fashion. When the reception device 23 coupled with the external device 24 receives a command that causes the data broadcast

application currently executed by the reception device 23 to be executed by the external device 24, that command is transferred to the external device 24.

[0206]

Based on the command transferred from the reception device 23, the external device 24 acquires the same data broadcast application as that which is currently executed by the reception device 23 from the server 22 via the Internet 3 and executes the data broadcast application thus acquired. As a result of this, a screen of the external device 24 displays the same image of the data broadcast application as that appearing in the bottom left corner of the display unit of the reception device 23.

[0207]

When the image of the data broadcast application is displayed on the screen of the external device 24, the reception device 23 causes the image of the data broadcast application superimposed on the AV content to disappear and leaves only the AV content displayed.

[0208]

The example explained above was a case in which the same data broadcast application is acquired. If the reception device 23 and external device 24 acquire different data broadcast applications as described above, the two

devices execute their respective data broadcast applications that are different from each other.

[0209]

In the manner explained above, the external device 24 connected to the reception device 23 can be operated in linkage with the progress of AV content.

[0210]

[Typical Structure of Computer]

Incidentally, the series of the steps and processes described above may be executed either by hardware or by software. Where the software-based series of processing is to be carried out, a program constituting the software is installed from a program recording medium into either a computer incorporated in a dedicated hardware or, for example, a general-purpose personal computer or like equipment capable of executing diverse functions by installing various programs.

[0211]

Fig. 21 is a block diagram showing a typical hardware structure of a computer that carries out the above-described steps and processes using a program.

[0212]

In a computer 200, a CPU (Central Processing Unit) 201, a ROM (Read Only Memory) 202, and a RAM (Random Access Memory) 203 are interconnected via a bus 204.

[0213]

An input/output interface 205 is further connected to the bus 204. The input/output interface 205 is connected with an input block 206 generally made up of a keyboard, a mouse, and a microphone; an output block 207 typically formed by a display unit and a speaker; a storage block 208 composed of a hard disk, a nonvolatile memory or the like; a communication block 209 constituted by a network interface or the like; and a drive 210 that drives removable media 211 such as a magnetic disk, an optical disk, a magneto-optical disk, or a semiconductor memory.

[0214]

In the computer structured as outlined above, the CPU 201 performs the above-described series of steps and processes by loading a relevant program from, say, the storage block 208 into the RAM 203 via the input/output interface 205 and bus 204 and by executing the program thus loaded.

[0215]

Also, the program to be executed by the computer may be processed in the depicted sequence of this specification (i.e., on a time series basis), in parallel, or in otherwise appropriately timed fashion such as when it is invoked as needed.

[0216]

Furthermore, the program may be processed by a single computer or by a plurality of computers on a distributed basis. The program may also be transferred to a remote computer or computers for execution.

[0217]

In this specification, the term "system" refers to an entire configuration made up of a plurality of component devices.

[0218]

Also, it should be understood that this technology when embodied is not limited to the above-described embodiment and that various modifications may be made of this technology so far as they are within the spirit and scope thereof.

[0219]

This technology may also be configured as follows.

[0220]

[1]

A reception device including:

a reception block configured to receive transmitted AV content;

a trigger extraction part configured to extract trigger information about the control of an application program to be executed either by the reception device proper or by an external device connected to the reception device

in linkage with the AV content, the trigger information being transmitted together with the AV content;
a device proper control block configured such that if the extracted trigger information indicates a command addressed to the reception device proper, then the device proper control block controls the operation of the application program in accordance with the command indicated by the trigger information; and
an external device processing part configured such that if the command indicated by the extracted trigger information is addressed to the external device, then the external device processing part transfers the command indicated by the trigger information to the external device.

[2]

The reception device as described in paragraph [1] above, in which, if the application program executed by the external device is the same as the application program currently executed by the reception device proper, the device proper control block terminates the application program currently executed by the reception device proper.

[3]

The reception device as described in paragraph [1] or [2] above, in which, if the application program executed by the external device is different from the application

program currently executed by the reception device proper, the device proper control block causes the reception device proper to execute continuously the application program.

[4]

The reception device as described in any one of paragraphs [1] through [3] above, in which the device proper control block prevents the reception device proper from executing the application program same as the application program currently executed by the external device.

[5]

The reception device as described in any one of paragraphs [1] through [4] above, in which the command indicated by the trigger information includes information for designating either a specific device or part or all of the devices targeted by the command.

[6]

The reception device as described in any one of paragraphs [1] through [5] above, in which the trigger information includes any one of commands to acquire, register, and execute a predetermined application program, a command to fire an event, a command to suspend the application program, and a command to terminate the application program.

[7]

The reception device as described in paragraph [6] above, in which, in response to each of the commands, the device proper control block controls acquisition, registration, or execution of the application program, firing of an event in the currently executing application program, suspension of the currently executing application program, or termination of the currently executing application program.

[8]

The reception device as described in paragraph [6] or [7] above, in which the external device processing part transfers to the external device any one of the commands to acquire, register, and execute the application program, the command to fire an event in the currently executing application program, the command to suspend the currently executing application program, and the command to terminate the currently executing application program.

[9]

A reception method including the steps of:

causing a reception device to receive transmitted AV content;

causing the reception device to extract trigger information about control of an application program to be executed either by the reception device proper or by an

external device connected to the reception device in linkage with the AV content, the trigger information being transmitted together with the AV content; if the extracted trigger information indicates a command addressed to the reception device proper, then causing the reception device to control the operation of the application program in accordance with the command indicated by the trigger information; and if the command indicated by the extracted trigger information is addressed to the external device, then causing the reception device to transfer the command indicated by the trigger information to the external device.

[10]

A program for causing a computer to function as:
a reception block configured to receive transmitted AV content;
a trigger extraction part configured to extract trigger information about control of an application program to be executed either by a reception device proper or by an external device connected to the reception device in linkage with the AV content, the trigger information being transmitted together with the AV content;
a device proper control block configured such that if the extracted trigger information indicates a command

addressed to the reception device proper, then the device proper control block controls the operation of the application program in accordance with the command indicated by the trigger information; and an external device processing part configured such that if the command indicated by the extracted trigger information is addressed to the external device, then the external device processing part transfers the command indicated by the trigger information to the external device.

[Reference Signs List]

[0221]

1 Broadcasting system, 21 Broadcast unit, 22 Server, 23 Reception device, 24 External device, 61 Tuner, 67 Trigger processing block, 68 Device proper control block, 71 Communication interface, 73 Application engine, 75 External interface, 81 Trigger extraction part, 82 Trigger analysis part, 83 External device processing part, 200 Computer, 201 CPU

What is claimed is:

1. A reception device comprising:

a reception block configured to receive transmitted AV content;

a trigger extraction part configured to extract trigger information about the control of an application program to be executed either by the reception device or by an external device connected to the reception device in linkage with the AV content, the trigger information being transmitted together with the AV content;

a device proper control block configured such that if the extracted trigger information indicates a command addressed to the reception device, then the device proper control block controls the operation of the application program in accordance with the command indicated by the trigger information; and

an external device processing part configured such that if the command indicated by the extracted trigger information is addressed to the external device, then the external device processing part transfers the command indicated by the trigger information to the external device.

2. The reception device according to claim 1, wherein,
if the application program executed by the external device

is the same as the application program currently executed by the reception device, the device proper control block terminates the application program currently executed by the reception device.

3. The reception device according to claim 1 or 2, wherein, if the application program executed by the external device is different from the application program currently executed by the reception device, the device proper control block causes the reception device to execute continuously the application program.

4. The reception device according to any one of claims 1 to 3, wherein the device proper control block prevents the reception device from executing the application program that is the same as the application program currently executed by the external device.

5. The reception device according to any one of claims 1 to 4, wherein the command indicated by the trigger information includes information for designating either a specific device or part or all of the devices targeted by the command.

6. The reception device according to any one of claims 1 to 5, wherein the trigger information includes any one of commands to acquire, register, and execute a predetermined application program, a command to fire an event, a command to suspend the application program, and a command to terminate the application program.

7. The reception device according to claim 6, wherein, in response to each of the commands, the device proper control block controls acquisition, registration, or execution of the application program, firing of an event in the currently executing application program, suspension of the currently executing application program, or termination of the currently executing application program.

8. The reception device according to claim 6 or 7, wherein the external device processing part transfers to the external device any one of the commands to acquire, register, and execute the application program, the command to fire an event in the currently executing application program, the command to suspend the currently executing application program, and the command to terminate the currently executing application program.

9. A reception method comprising the steps of:

- causing a reception device to receive transmitted AV content;

- causing the reception device to extract trigger information about control of an application program to be executed either by the reception device or by an external device connected to the reception device in linkage with the AV content, the trigger information being transmitted together with the AV content;

- if the extracted trigger information indicates a command addressed to the reception device, then

causing the reception device to control the operation of the application program in accordance with the command indicated by the trigger information; and

if the command indicated by the extracted trigger information is addressed to the external device, then causing the reception device to transfer the command indicated by the trigger information to the external device.

10. A non-transitory computer-readable medium having computer-executable instructions stored thereon, which when executed by a computer configure the computer to function as:

a reception block configured to receive transmitted AV content;

a trigger extraction part configured to extract trigger information about control of an application program to be executed either by a reception device or by an external device connected to the reception device in linkage with the AV content, the trigger information being transmitted together with the AV content;

a device proper control block configured such that if the extracted trigger information indicates a command addressed to the reception device, then the device proper control block controls the operation of the application program

in accordance with the command indicated by the trigger information; and

an external device processing part configured such that if the command indicated by the extracted trigger information is addressed to the external device, then the external device processing part transfers the command indicated by the trigger information to the external device.

11. A television receiver comprising the reception device of any one of claims 1 to 8.

12. A video recorder comprising the reception device of any one of claims 1 to 8.

13. A receiving apparatus comprising:

means for receiving audio-visual content being transmitted;

means for extracting trigger information for controlling a downloaded application program for execution either by said receiving apparatus or by an external device connected thereto in conjunction with said audio-visual content;

means for determining a destination of a command, which is indicated by the extracted trigger information, based on a destination attribute associated with the command;

means for controlling performance of said downloaded application program in accordance

with said command when the destination is determined to be said receiving apparatus; and means for transferring said command to said external device when the destination is determined to be said external device, wherein said external device controls performance of said downloaded application program in accordance with said command.

14. A receiving apparatus comprising:

circuitry to:

receive audio-visual content being transmitted,

extract trigger information for controlling a downloaded application program for execution either by said receiving apparatus or by an external device connected thereto in conjunction with said audio-visual content,

determine a destination of a command, which is indicated by the extracted trigger information, based on a destination attribute associated with the command,

when the destination is determined to be said receiving apparatus, control performance of said downloaded application program in accordance with said command, and

when the destination is determined to be said external device, transfer said command to

said external device, wherein said external device controls performance of said downloaded application program in accordance with said command.

15. The receiving apparatus according to claim 14, wherein the circuitry

determines whether the command indicated by the extracted trigger information is destined for said receiving apparatus or said external device based on the determined destination,

when the command indicated by the extracted trigger information is determined to be destined for said receiving apparatus, controls performance of said application program in accordance with said command, and

when the command indicated by the extracted trigger information is determined to be destined for said external device, transfers said command to said external device.

16. The receiving apparatus according to claim 14 or claim 15, wherein, when said application program executed by said external device is different from the application program currently executed by said receiving apparatus, said circuitry allows said receiving apparatus to continue executing the currently executing application program.

17. The receiving apparatus according to any one of claims 14 to 16, wherein, when said application program executed by said external device is the same as the application program currently executed by said receiving apparatus, said circuitry terminates said application program currently executed by said receiving apparatus.

18. The receiving apparatus according to any one of claims 14 to 17, wherein said circuitry exercises control so that said receiving apparatus does not execute the same program as said application program currently executed by said external device.

19. The receiving apparatus according to any one of claims 14 to 18, wherein said command indicated by said trigger information includes destination information for designating a specific device or part of or all of the devices that may be targeted by said command.

20. The receiving apparatus according to any one of claims 14 to 19, wherein said trigger information includes one of the commands to acquire, register, start, fire an event in, suspend, and terminate a predetermined application program.

21. The receiving apparatus according to claim 20, wherein, in accordance with each of the commands, said circuitry exercises control so as to acquire, register, or start said application program; or to

fire an event in, suspend, or terminate the currently executing application program.

22. The receiving apparatus according to claim 20, wherein said circuitry transfers to said external device the command to acquire, register, or start said application program; or to fire an event in, suspend, or terminate the currently executing application program.

23. The receiving apparatus according to any one of claims 14 to 22, wherein the circuitry receives a digital television broadcast signal including the audio-visual content.

24. The receiving apparatus according to any one of claims 14 to 23, wherein said application program is transmitted along with said audio-visual content.

25. The receiving apparatus according to any one of claims 14 to 24, wherein the circuitry receives the command and the destination attribute from an external source.

26. A receiving method for use with a receiving apparatus, said receiving method comprising:

causing circuitry of said receiving apparatus to receive audio-visual content being transmitted;

causing said circuitry of said receiving apparatus to extract trigger information for controlling a downloaded application program for

execution either by said receiving apparatus or by an external device connected thereto in conjunction with said audio-visual content;

causing said circuitry of said receiving apparatus to determine a destination of a command, which is indicated by the extracted trigger information, based on a destination attribute associated with the command;

when the destination is determined to be said receiving apparatus, causing said receiving apparatus to control performance of said downloaded application program in accordance with said command; and

when the destination is determined to be said external device, causing said receiving apparatus to transfer said command to said external device, wherein said external device controls performance of said downloaded application program in accordance with said command.

27. A non-transitory computer-readable storage medium storing a program which when executed by a computer causes the computer to perform the method according to claim 26.

28. A television set comprising the receiving apparatus according to any one of claims 13-25.

29. A reception apparatus comprising:

circuitry to:

receive a first trigger associated with a first application to be executed by the reception apparatus,

execute the first application associated with the first trigger based on a determination that a target of the first trigger is the reception apparatus,

receive a second trigger associated with a second application to be executed by an external device, which is configured to execute the second application, and

transfer the second trigger associated with the second application to the external device based on a determination that a target of the second trigger is the external device.

30. The reception apparatus according to claim 29, wherein

when the first application is different from the second application, the circuitry allows the reception apparatus to execute the first application while the second application is executed on the external device.

31. The reception apparatus according to claim 29 or claim 30, wherein the circuitry exercises control so that the reception apparatus does not execute the first application when the first application is the

same as the second application executed by the external device.

32. The reception apparatus according to any one of claims 29 to 31, wherein

the first trigger includes first destination information that designates the reception apparatus as the target for the first trigger, and

the second trigger includes second destination information that designates the external device as the target for the second trigger.

33. The reception apparatus according to any one of claims 29 to 32, wherein the first trigger includes a first command that identifies a command to acquire, register, start, fire an event in, suspend, or terminate the first application.

34. The reception apparatus according to any one of claims 29 to 33, wherein said circuitry transfers to the external device a second command included in the second trigger to acquire, register, or start the second application; or to fire an event in, suspend, or terminate the second application.

35. The reception apparatus according to any one of claims 29 to 34, wherein, when the second application executed by the external device is the same as the first application currently executed by the reception

apparatus, the circuitry terminates the first application currently executed by the circuitry.

36. The reception apparatus according to any one of claims 29 to 35, wherein the circuitry
receives a digital broadcast signal that includes audio/video content associated with the first and second applications, and
outputs the audio/video content for display to a user.

37. The reception apparatus according to any one of claims 29 to 36, wherein the circuitry is configured to download the first application in response to receiving the first trigger.

38. A method of a reception apparatus for processing triggers, the method comprising:
receiving a first trigger associated with a first application to be executed by the reception apparatus;
executing, by circuitry of the reception apparatus, the first application associated with the first trigger based on a determination that a target of the first trigger is the reception apparatus,
receiving a second trigger associated with a second application to be executed by an external device, which is configured to execute the second application, and

transferring the second trigger associated with the second application to the external device based on a determination that a target of the second trigger is the external device.

39. The method according to claim 38, further comprising:

when the first application is different from the second application, allowing by the circuitry the reception apparatus to execute the first application while the second application is executed on the external device.

40. The method according to claim 38 or claim 39, further comprising:

executing control, by the circuitry, so that the reception apparatus does not execute the first application when the first application is the same as the second application executed by the external device.

41. The method according to any one of claims 38 to 40, wherein

the first trigger includes first destination information that designates the reception apparatus as the target for the first trigger, and

the second trigger includes second destination information that designates the

external device as the target for the second trigger.

42. The method according to any one of claims 38 to 41, wherein the first trigger includes a first command that identifies a command to acquire, register, start, fire an event in, suspend, or terminate the first application.

43. The method according to any one of claims 38 to 42, wherein the step of transferring comprises:

transferring to said external device a second command included in the second trigger to acquire, register, or start the second application; or to fire an event in, suspend, or terminate the second application.

44. The method according to any one of claims 38 to 43, wherein, when the second application executed by the external device is the same as the first application currently executed by the circuitry, terminating by the circuitry the first application currently executed by the reception apparatus.

45. The method according to any one of claims 38 to 44, further comprising:

receiving, by the circuitry, a digital broadcast signal that includes audio/video content associated with the first and second applications; and

outputting, by the circuitry, the
audio/video content for display to a user.

46. A transmission apparatus, comprising:

circuitry to:

transmit audio/video content,

transmit, during the transmission of the
audio/video content, a first trigger associated
with a first application to be executed by a
reception apparatus,

transmit, during the transmission of the
audio/video content, a second trigger
associated with a second application to be
executed by an external device, which is
configured to execute the second application,
wherein

the reception apparatus executes the first
application associated with the first trigger
based on a determination that a target of the
first trigger is the reception apparatus, and
transfers the second trigger associated with the
second application to the external device based
on a determination that a target of the second
trigger is the external device.

47. A method of a transmission apparatus for

transmitting triggers, comprising:

transmitting audio/video content;

transmitting, by circuitry of the transmission apparatus and during the transmission of the audio/video content, a first trigger associated with a first application to be executed by a reception apparatus,

transmitting, during the transmission of the audio/video content, a second trigger associated with a second application to be executed by an external device, which is configured to execute the second application, wherein

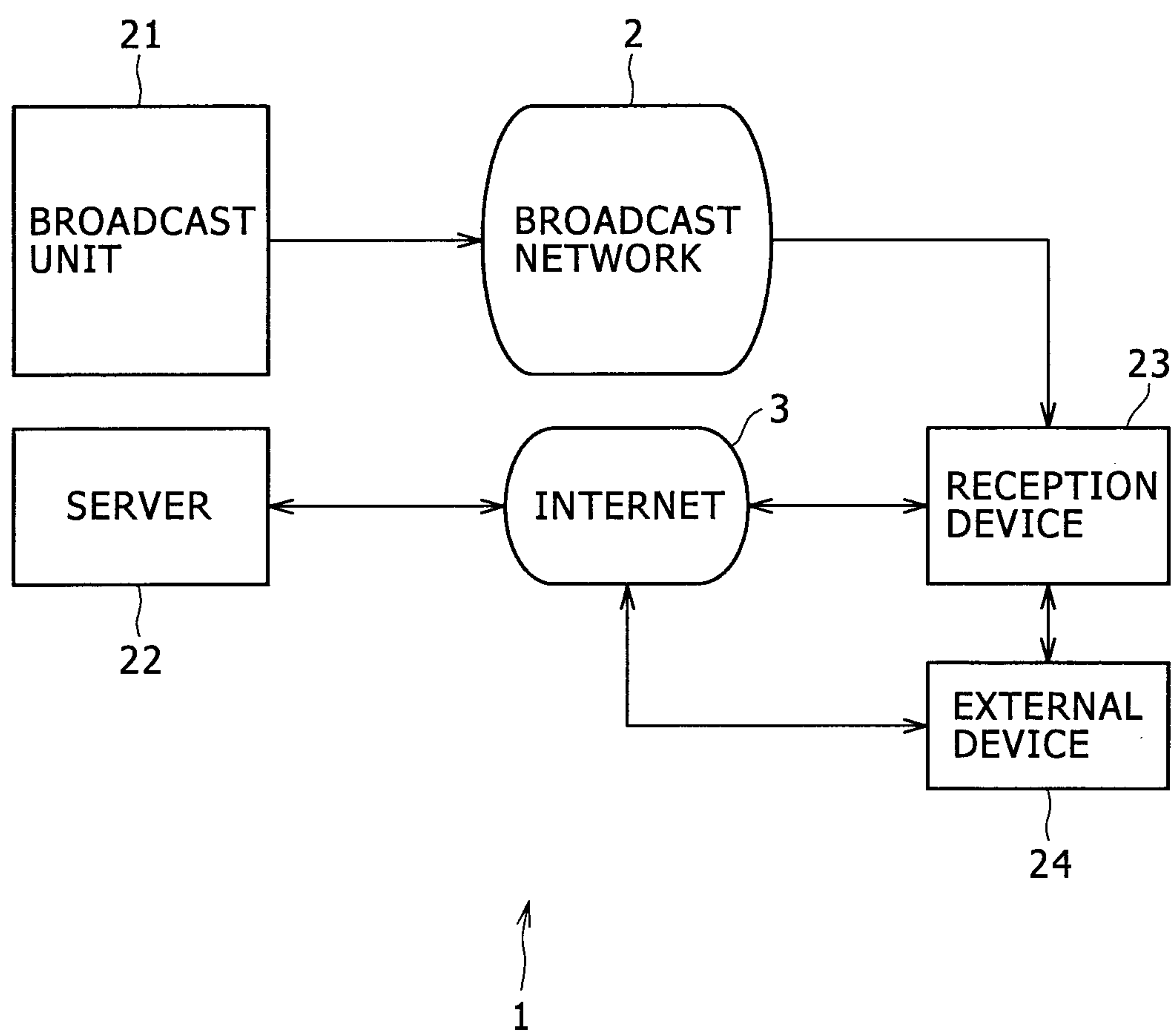
the reception apparatus executes the first application associated with the first trigger based on a determination that a target of the first trigger is the reception apparatus, and transfers the second trigger associated with the second application to the external device based on a determination that a target of the second trigger is the external device.

48. A television set comprising the reception apparatus according to any one of claims 29 to 37.

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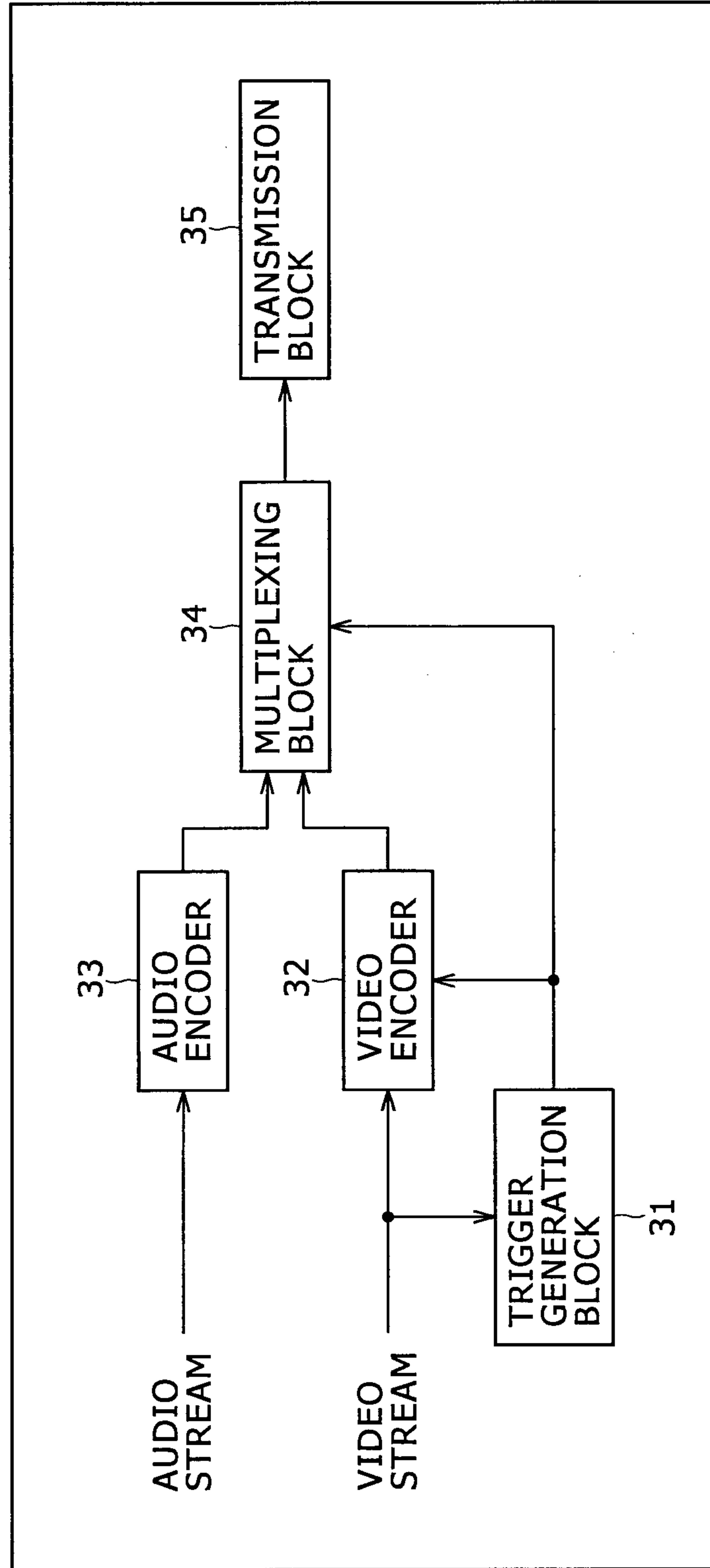
FIG. 1



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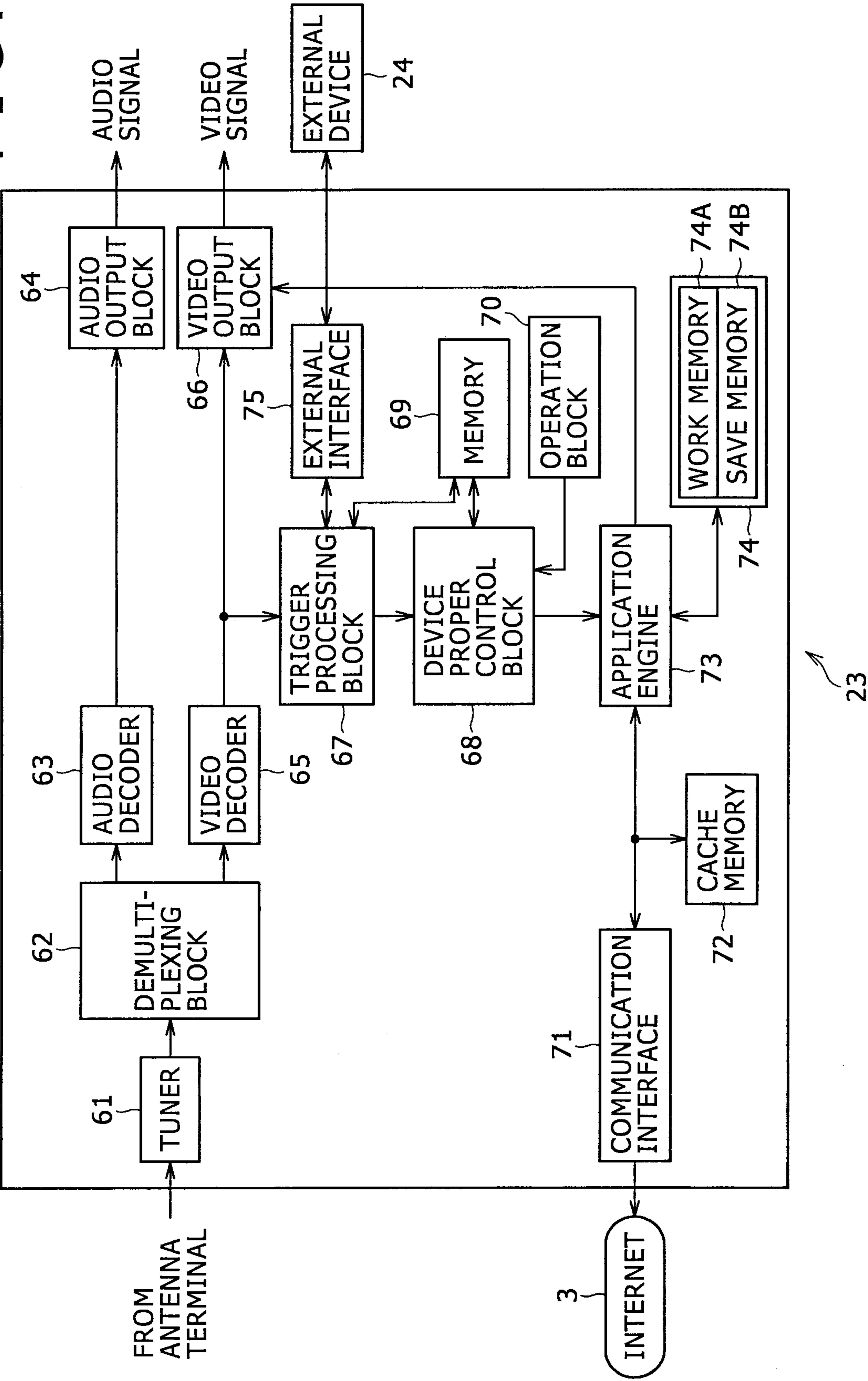
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FIG. 2



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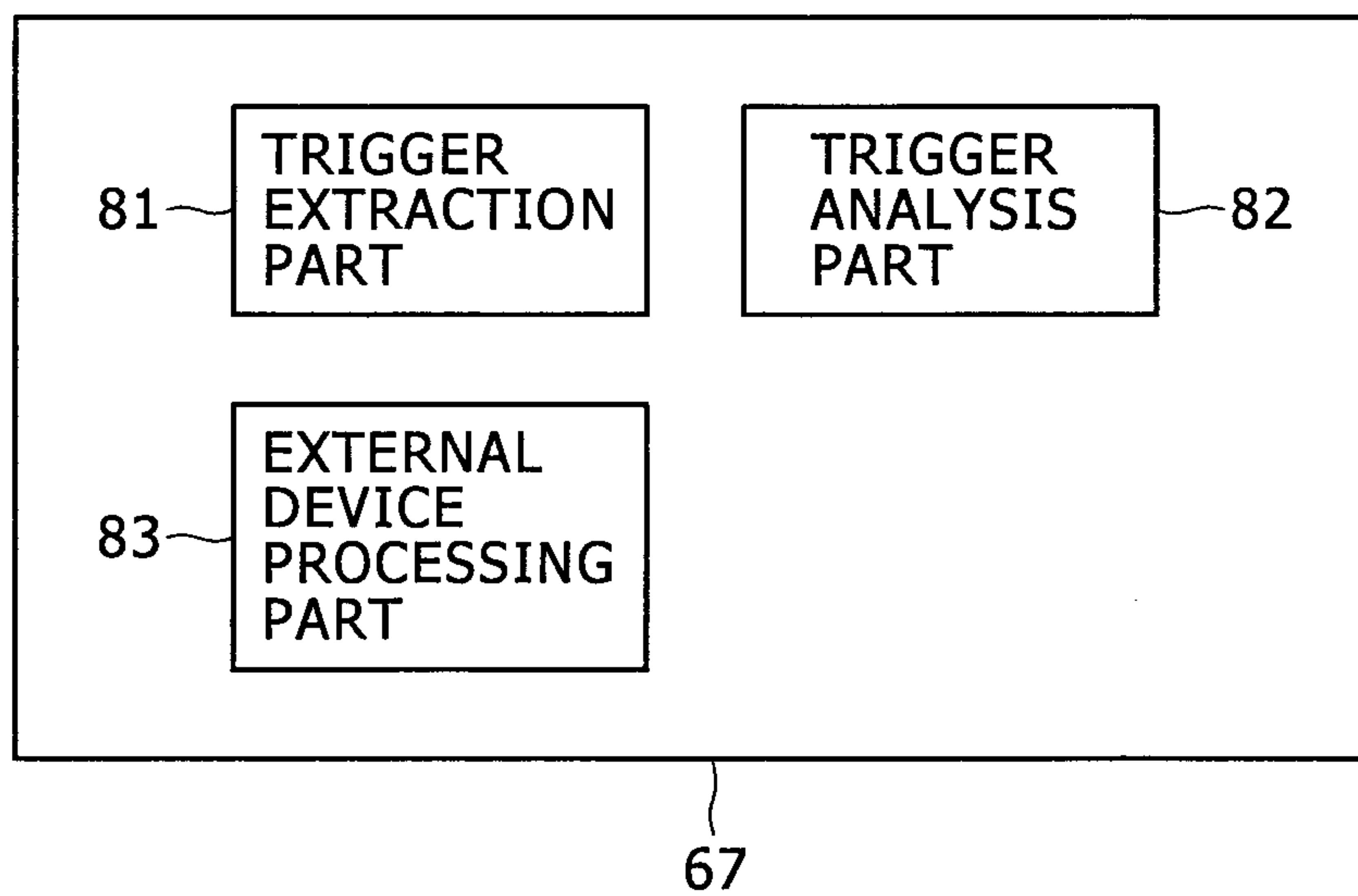
FIG. 3



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FIG. 4



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FIG. 5

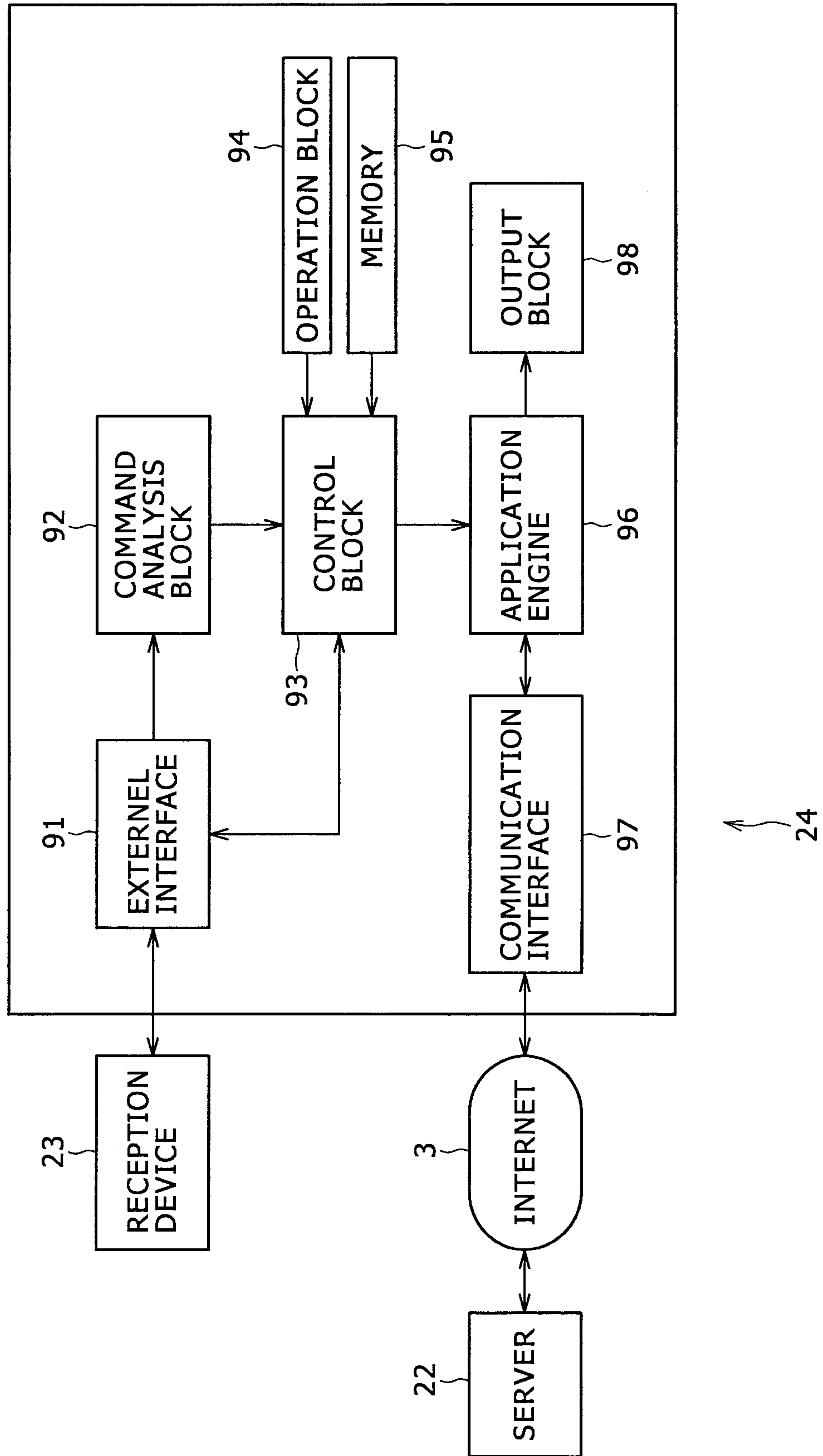


FIG. 6

TRIGGER WITH "Register" COMMAND

ITEM	NO OF BITS	EXPLANATION
Trigger_id	8	ID OF TRIGGER INFORMATION OF THE SAME SUBSTANCE
Target_device_type	8	DEVICE TYPE TARGETED BY THE COMMAND. IF "0xFF" IS DESIGNATED, IT INDICATES THAT THIS COMMAND IS COMMON TO ALL DEVICE TYPES.
Protocol_verion	8	FIXED TO "0" (PROTOCOL VERSION NO.)
Command_code	8	VALUE INDICATIVE OF THE Register COMMAND.
Trigger_validity	8	INFORMATION INDICATIVE OF THE PROBABILITY THAT TRIGGER INFORMATION WILL BE VALID
App_id	N	APPLICATION ID (URL OF THE APPLICATION PROPER IS ALSO INDICATED)
App_type	4	APPLICATION TYPE
App_life_span	1	SCOPE OF OPERATION OF APPLICATION
Persistent_priority	2	PRIORITY OF ACQUISITION AND HOLDING OF THE APPLICATION PROPER
Expire_date	32	EXPIRATION DATE

FIG. 7

TRIGGER WITH "Execute" COMMAND

ITEM	NO OF BITS	EXPLANATION
Trigger_id	8	ID OF TRIGGER INFORMATION OF THE SAME SUBSTANCE
Target_device_type	8	DEVICE TYPE TARGETED BY THE COMMAND. IF "0xFF" IS DESIGNATED, IT INDICATES THAT THIS COMMAND IS COMMON TO ALL DEVICE TYPES.
Protocol_verion	8	FIXED TO "0" (PROTOCOL VERSION NO.)
Command_code	8	VALUE INDICATIVE OF THE Execute COMMAND.
Trigger_validity	8	INFORMATION INDICATIVE OF THE PROBABILITY THAT TRIGGER INFORMATION WILL BE VALID
App_id	N	APPLICATION ID (URL OF THE APPLICATION PROPER IS ALSO INDICATED)
App_type	4	APPLICATION TYPE
TDO_life_scope	1	SCOPE OF OPERATION OF APPLICATION
Expire_date	32	EXPIRATION DATE

FIG. 8

TRIGGER WITH "Inject_event" COMMAND

ITEM	NO OF BITS	EXPLANATION
Trigger_id	8	ID OF TRIGGER INFORMATION OF THE SAME SUBSTANCE
Target_device_type	8	DEVICE TYPE TARGETED BY THE COMMAND. IF "0xFF" IS DESIGNATED, IT INDICATES THAT THIS COMMAND IS COMMON TO ALL DEVICE TYPES.
Protocol_verion	8	FIXED TO "0" (PROTOCOL VERSION NO.)
Command_code	8	VALUE INDICATIVE OF THE Inject event COMMAND.
Trigger_validity	8	INFORMATION INDICATIVE OF THE PROBABILITY THAT TRIGGER INFORMATION WILL BE VALID
App_id	N	APPLICATION ID (URL OF THE APPLICATION PROPER IS ALSO INDICATED)
Event_id	8	ID OF EVENT DESCRIBED IN THE TARGETED APPLICATION
Event Embedded Data	M	DATA TO BE TRANSFERRED TO APPLICATION UPON FIRING OF EVENT

FIG. 9

TRIGGER WITH "Suspend" COMMAND

ITEM	NO OF BITS	EXPLANATION
Trigger_id	8	ID OF TRIGGER INFORMATION OF THE SAME SUBSTANCE
Target_device_type	8	DEVICE TYPE TARGETED BY THE COMMAND. IF "0xFF" IS DESIGNATED, IT INDICATES THAT THIS COMMAND IS COMMON TO ALL DEVICE TYPES.
Protocol_verion	8	FIXED TO "0" (PROTOCOL VERSION NO.)
Command_code	8	VALUE INDICATIVE OF THE Suspend COMMAND.
Trigger_validity	8	INFORMATION INDICATIVE OF THE PROBABILITY THAT TRIGGER INFORMATION WILL BE VALID
App_id	N	APPLICATION ID (URL OF THE APPLICATION PROPER IS ALSO INDICATED)

FIG. 10

TRIGGER WITH "Terminate" COMMAND

ITEM	NO OF BITS	EXPLANATION
Trigger_id	8	ID OF TRIGGER INFORMATION OF THE SAME SUBSTANCE
Target_device_type	8	DEVICE TYPE TARGETED BY THE COMMAND. IF "0xFF" IS DESIGNATED, IT INDICATES THAT THIS COMMAND IS COMMON TO ALL DEVICE TYPES.
Protocol_verion	8	FIXED TO "0" (PROTOCOL VERSION NO.)
Command_code	8	VALUE INDICATIVE OF THE Terminate COMMAND..
Trigger_validity	8	INFORMATION INDICATIVE OF THE PROBABILITY THAT TRIGGER INFORMATION WILL BE VALID
App_id	N	APPLICATION ID (URL OF THE APPLICATION PROPER IS ALSO INDICATED)

FIG. 11

Syntax	No. Bits	Format
<pre>Trigger_info_data() { trigger_id target_device_type protocol_version command_code trigger_validity app_id_length for(i=0;i<N;i++) { app_id_byte } if(command_code==1 command_code==2) { app_type app_life_span persistent_priority reserved app_expire_date } if(command_code==3) { event_id event_embedded_data_length for(i=0;i<N;i++) { event_embedded_data_byte } } }</pre>	8 8 8 8 8 8 8 8 4 1 2 1 32 16 8 8×N	uimbsf uimbsf uimbsf" uimbsf uimbsf uimbsf bslbsf (register/execute) uimbsf uimbsf Uimbsf uimbsf (Inject event) uimbsf uimbsf bslbf

FIG. 12

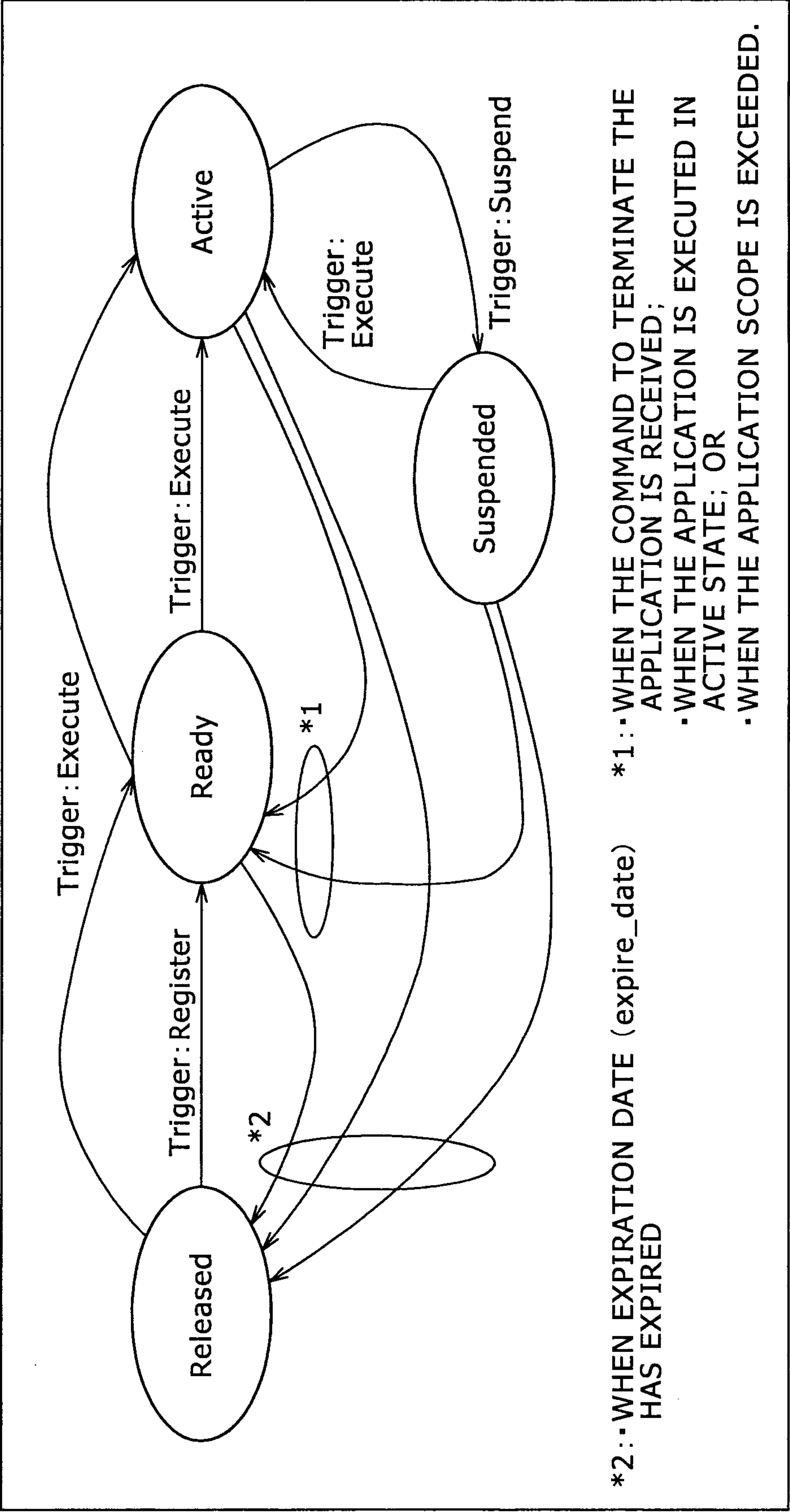


FIG. 13

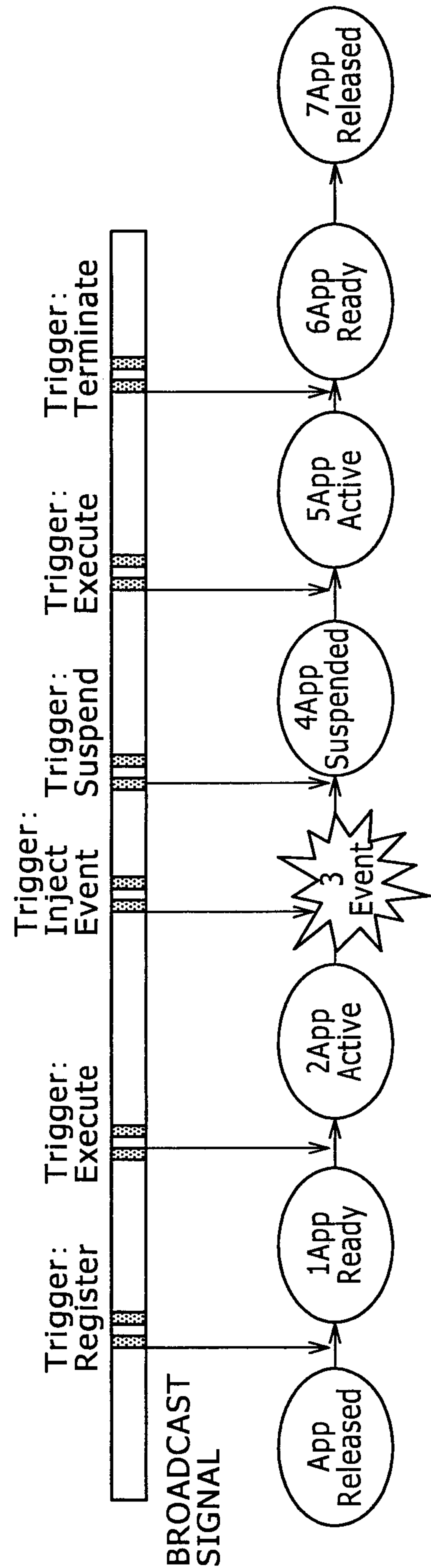


FIG. 14

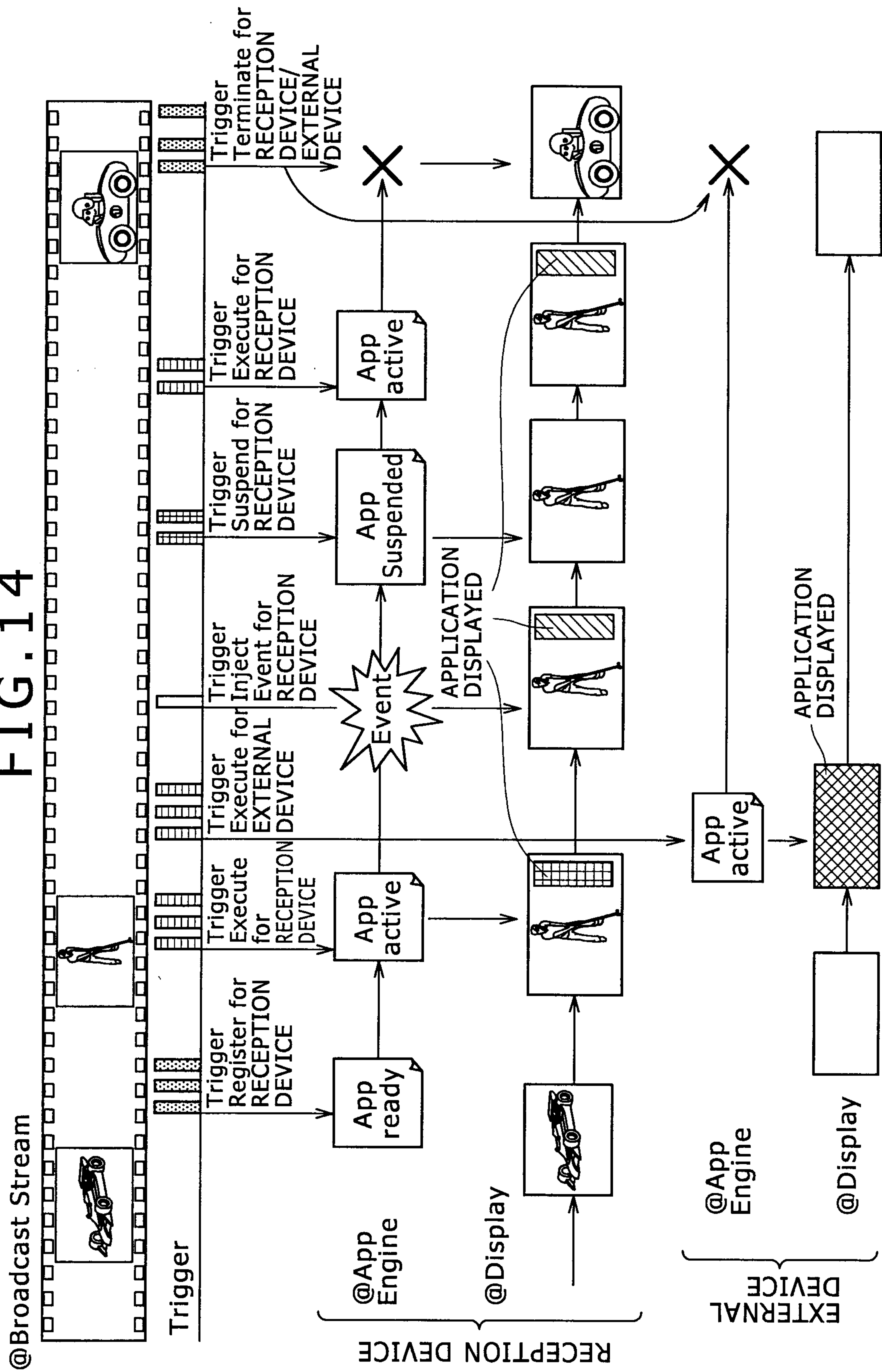
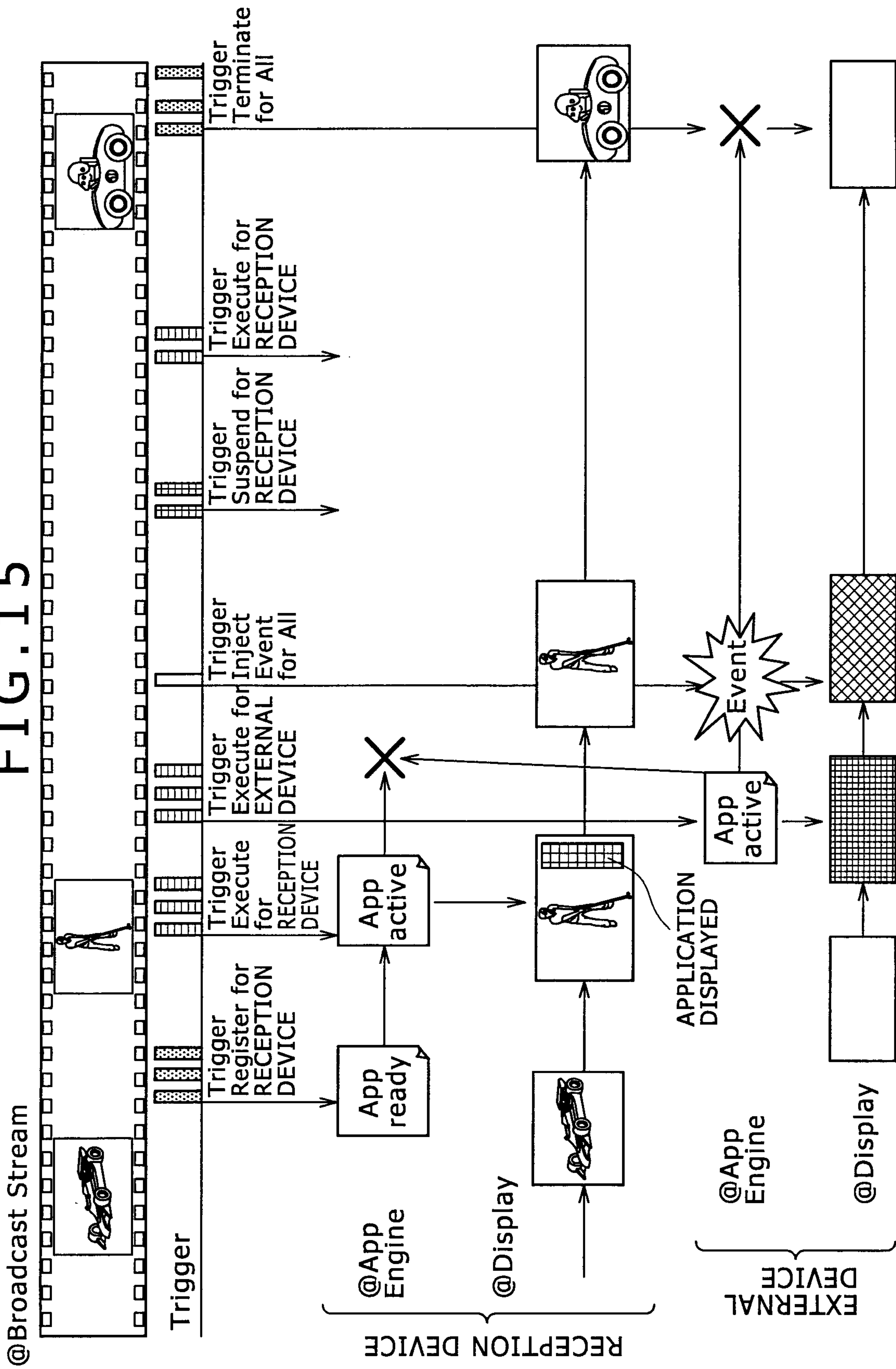


FIG.15



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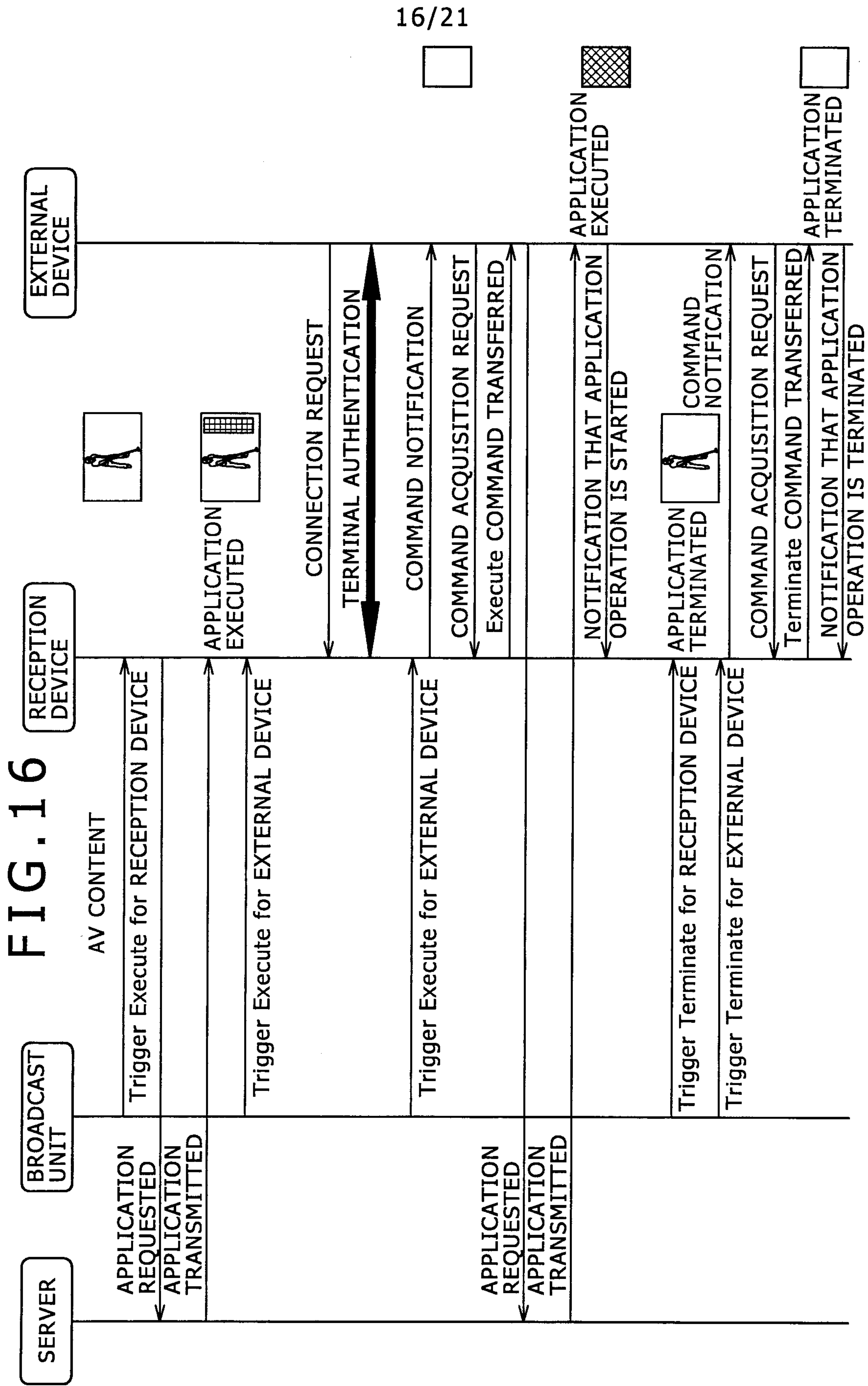
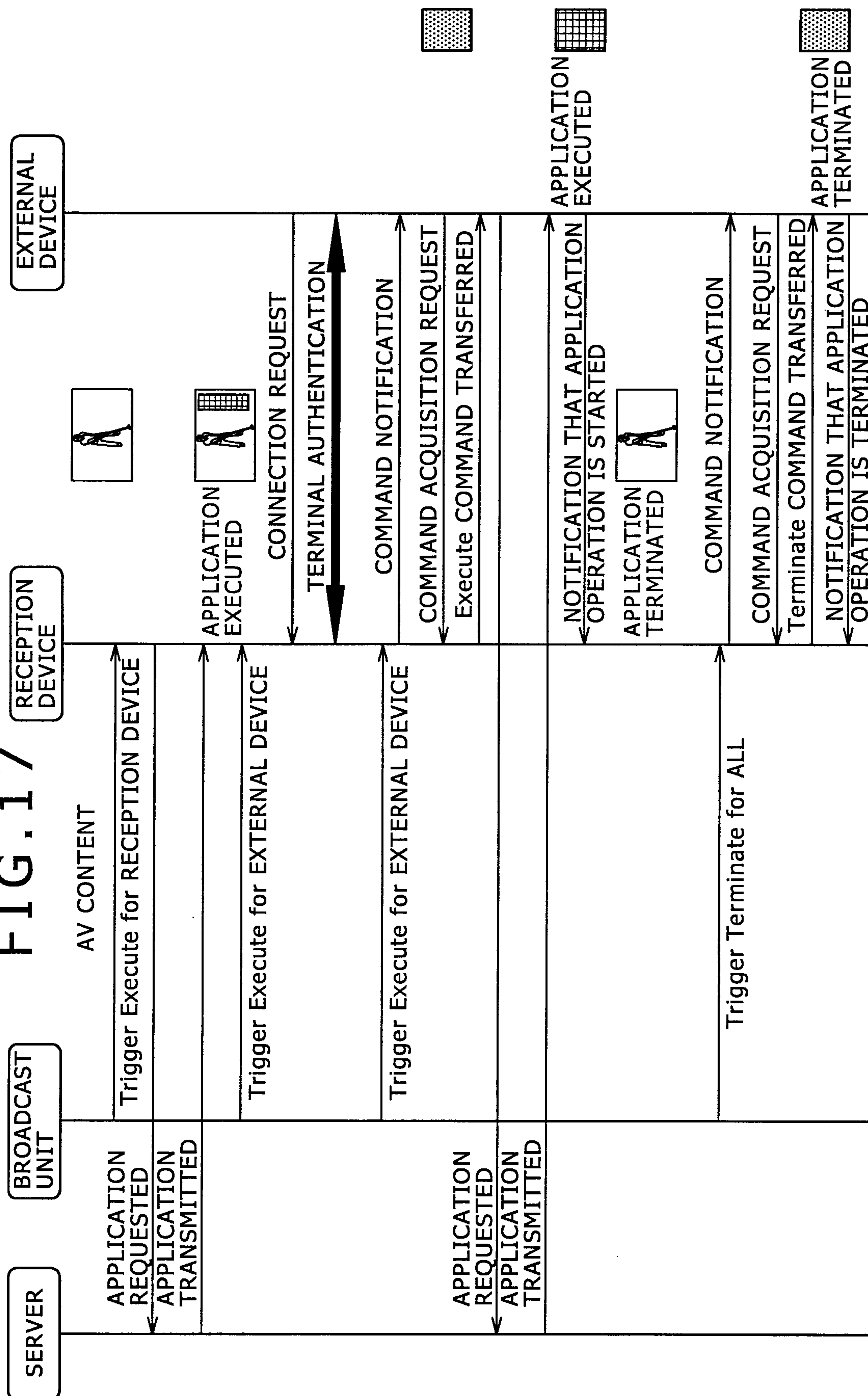


FIG. 17



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FIG. 18

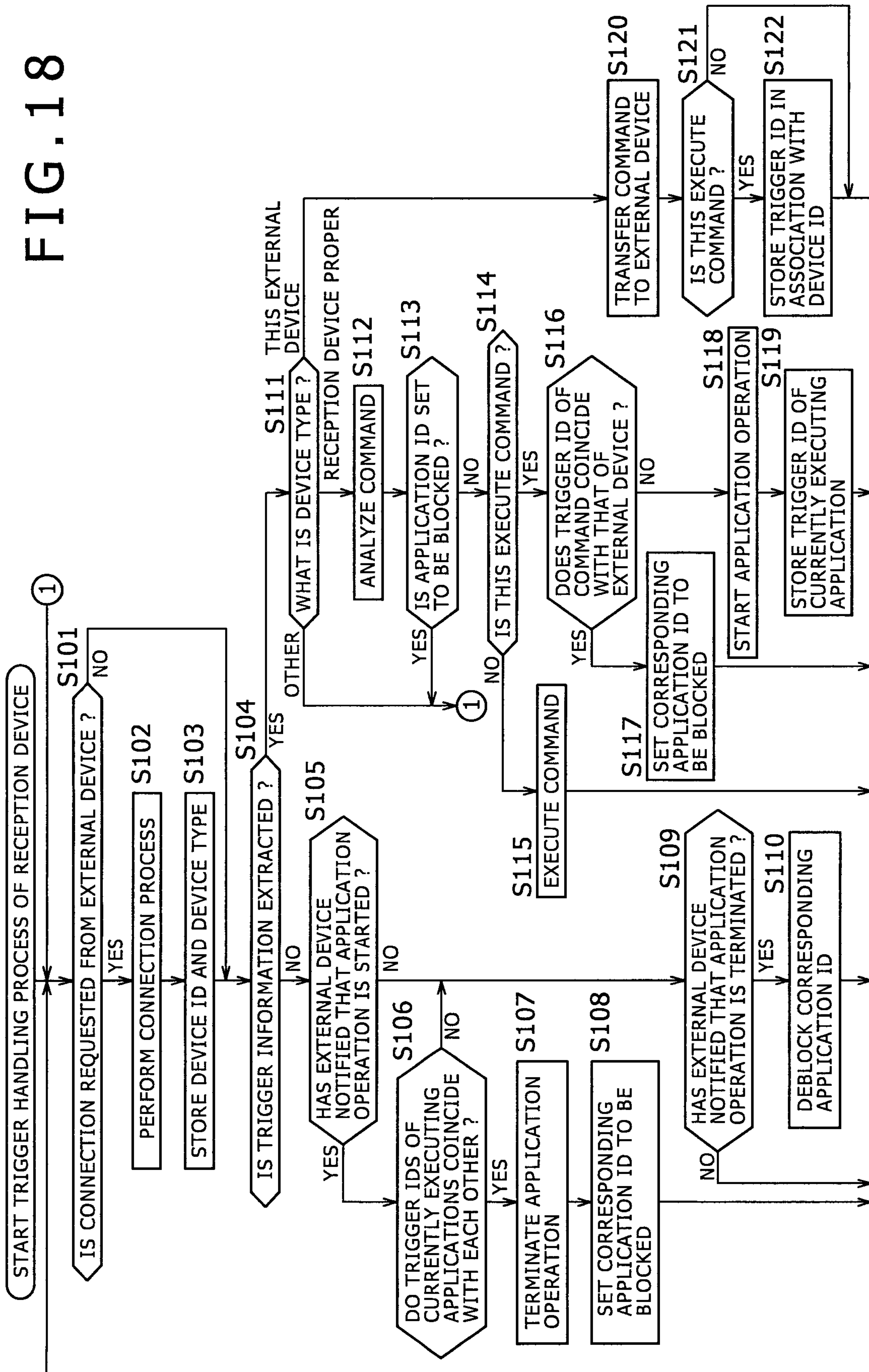
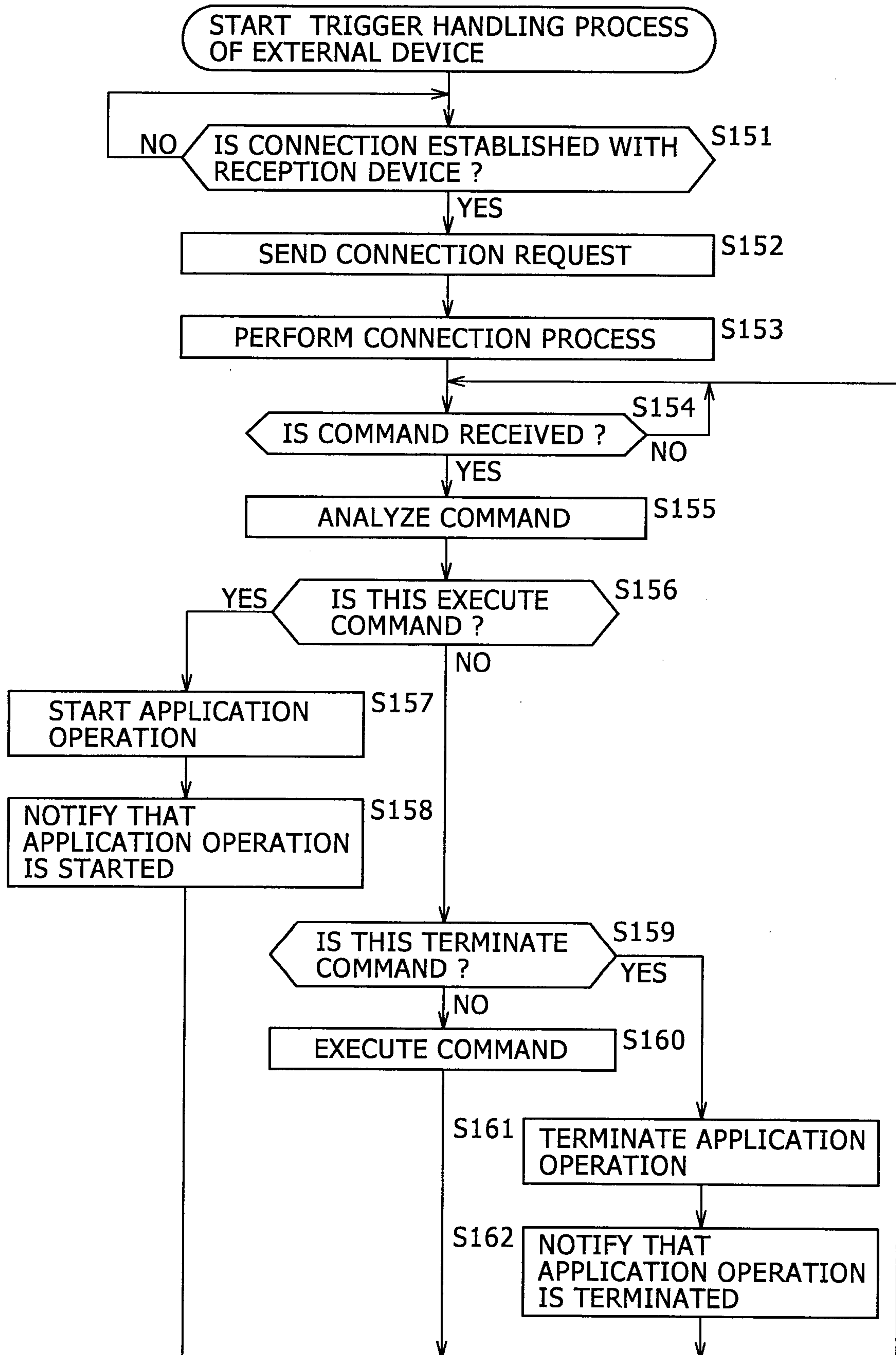


FIG. 19



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FIG. 20

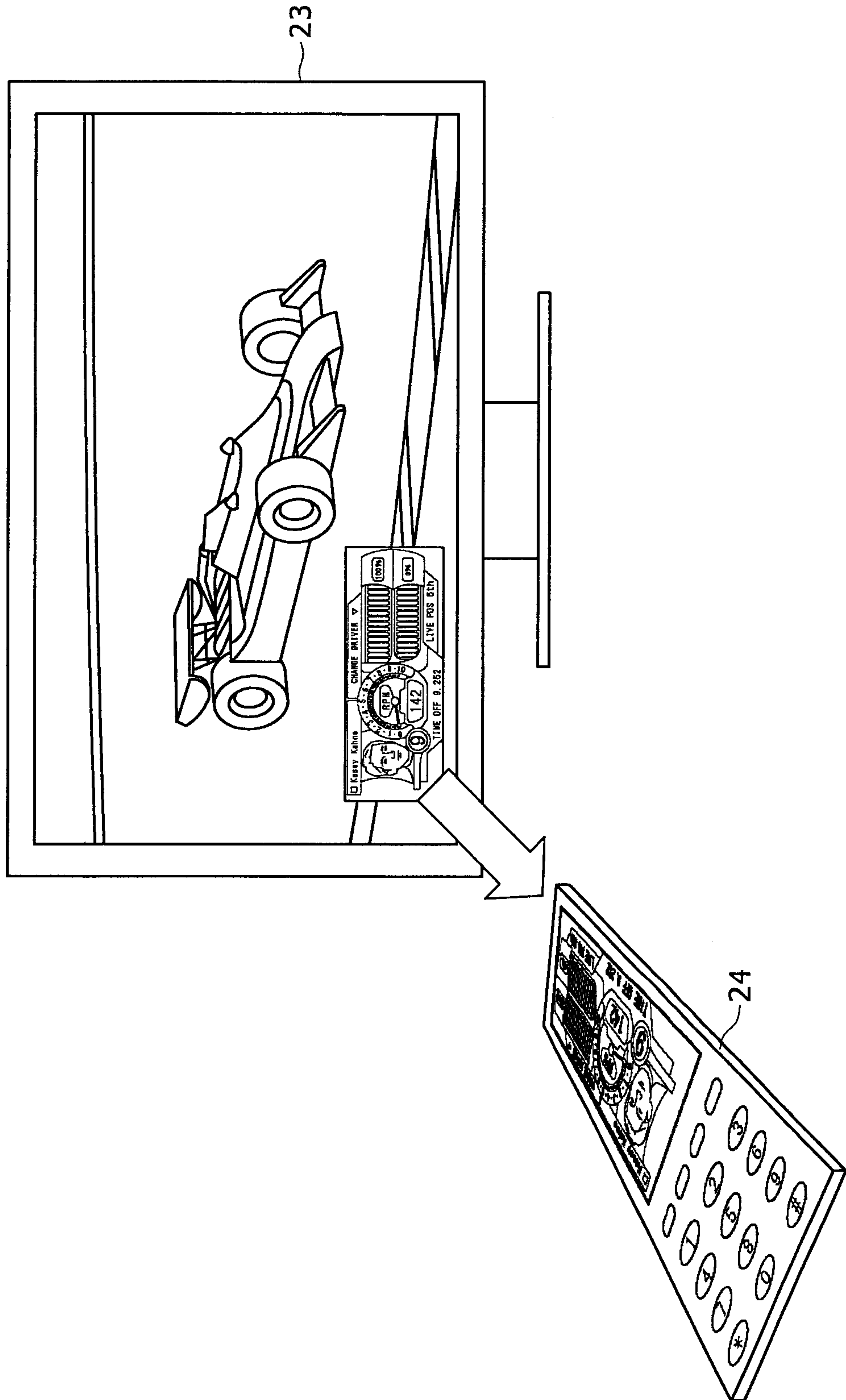
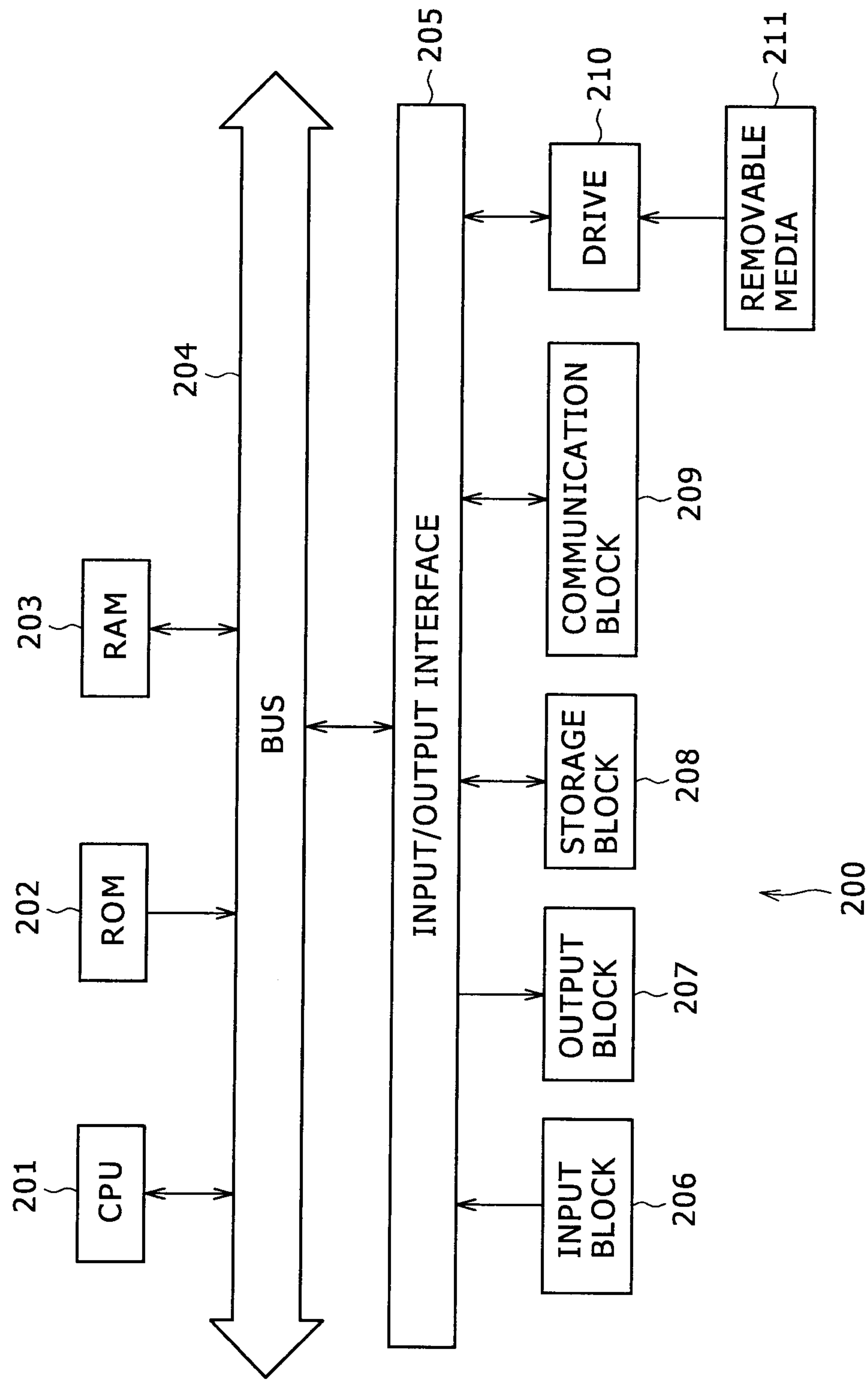


FIG. 21



81

TRIGGER
EXTRACTION
PART

TRIGGER
ANALYSIS
PART

82

83

EXTERNAL
DEVICE
PROCESSING
PART

67