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(54) **Title**: METHOD AND APPARATUS OF DISABLING A NOTIFICATION MODULE IN A PORTABLE PROJECTION DEVICE

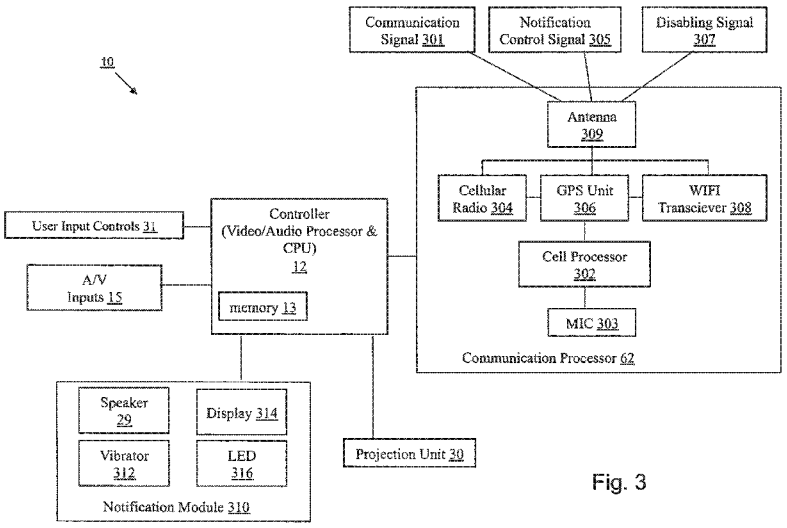

Fig. 3

(57) **Abstract**: An apparatus and method for projecting received images onto a display surface is provided. A projection unit (30) selectively projects at least one received image onto a display surface. A communication processor (62) selectively receives at least one of an incoming communication signal from a remote source and a notification configuration signal and a notification module (310) selectively notifies a user upon receipt of the incoming communication signal from the remote source. A controller (12) is coupled to each of the projection unit, the communication processor (62) and notification module. The controller (12) identifies a mode of operation and automatically disables the notification module upon determining that the projection unit (30) is configured to selectively project the at least one received image onto a display surface.

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Method and Apparatus of Disabling a Notification module In a Portable Projection Device

FIELD

[001] The present arrangement provides a system and method for controlling the operation of a portable projection device.

BACKGROUND

[002] Conventionally, projection devices were (and are) designed as non-mobile devices that are positioned in a room and project a series of audio-visual images on a screen that is viewable by individuals within the room and in the line of sight of the projected image. To ensure projection quality and an optimal viewing experience for the individuals, these projection devices are precisely configured to minimize errors in the audio-visual images being displayed. Examples of these systems include but are not limited to movie theaters, professional meeting rooms, lecture halls and the like.

[003] However, the rapid miniaturization of electronic devices has also extended to projection devices. Currently, there exists a portable electronic projection device that may be easily transported and able to turn virtually any room into a projection room. These portable electronic projection devices are termed pico projectors. A pico projector may be included in any handheld device that can selectively project at least one of an image or series of images on a surface. Moreover, it is important for the pico projector to be able to generate a clear image of sufficient quality on any type of surface. This may include, for example, a conventional display screen or a wall in a room. It is, therefore, necessary for the pico projector to compensate for any surface impurities when generating and projecting a display image.

[004] Moreover, a further drawback associated with pico projection relates to the nature of the device itself. Because the pico projector is naturally handheld and/or portable, the pico projector suffers from increased visual display errors as compared to a traditional projection device. The increased visual errors (e.g. noise, distortion, etc) in images projected by pico projectors result from the often sub-optimal positioning of the pico projector with respect to the surface on which the images are being displayed as well as the orientation of individuals viewing the image to the surface on which the image is displayed.

[005] Furthermore, as pico projectors are increasingly being embodied in multi-function devices, activities associated with functions other than the projection of images may interrupt, distort and/or otherwise affect the image being projected by the pico projector and/or the experience of the individuals viewing the projected images. An example of these drawbacks is present in a multi-function portable electronic device that, in addition to being a pico projector, is also a portable communication device (e.g. smartphone). Various call and message functionality associated with the portable communication device may interfere with the functionality of the pico projector embodied in the multifunction portable electronic device.

[006] It would, therefore, be desirable to correct any of the above identified drawbacks associated with pico projectors. A system and method according the present invention addresses these deficiencies.

SUMMARY

[007] In one embodiment, an apparatus for projecting received images onto a display surface is provided. A projection unit selectively projects at least one received image onto a display surface. A communication processor selectively receives at least one of an incoming communication signal from a remote source and a notification configuration signal, and a notification module selectively notifies a user upon receipt of the incoming communication signal from the remote source. A controller is coupled to each of the projection unit, the communication processor and notification module. The controller identifies a mode of operation and automatically disables the notification module upon determining that the projection unit is configured to selectively project the at least one received image onto a display surface.

[008] A method of projecting received images onto a display surface is provided in a further embodiment. The method includes projecting at least one received image onto a display surface; receiving at least one of an incoming communication signal from a remote source and a notification configuration signal at a communication processor identifying a mode of operation; and automatically disabling a notification module that notifies a user upon receipt of incoming communication signals upon determining that the projection unit is configured to selectively project the at least one received image onto a display surface.

[009] In another embodiment, an apparatus for projecting received images onto a display surface is provided. The apparatus includes means, such as a projection unit, for selectively projecting at least one received image onto a display surface and means, such as a communication processor, for receiving at least one of an incoming communication signal from a remote source and a notification configuration signal. The apparatus further includes means, such as a notification module, for notifying a user upon receipt of the incoming communication signal from the remote source and means, such as a controller, for controlling the apparatus, wherein the means for controlling identifies a mode of operation and automatically disables the notification module upon determining that the projection unit is configured to selectively project the at least one received image onto a display surface.

[0010] The above presents a simplified summary of the subject matter in order to provide a basic understanding of some aspects of subject matter embodiments. This summary is not an extensive overview of the subject matter. It is not intended to identify key/critical elements of the embodiments or to delineate the scope of the subject matter. Its sole purpose is to present some concepts of the subject matter in a simplified form as a prelude to the more detailed description that is presented later.

[0011] To the accomplishment of the foregoing and related ends, certain illustrative aspects of embodiments are described herein in connection with the following description and the annexed drawings. These aspects are indicative, however, of but a few of the various ways in which the principles of the subject matter can be employed, and the subject matter is intended to include all such aspects and their equivalents. Other advantages and novel features of the subject matter can become apparent from the following detailed description when considered in conjunction with the drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

[0012] FIG. 1 is a block diagram of the portable projection device according to aspects of the present invention;

[0013] FIGS. 2A – 2B are exemplary light engines for use in the portable projection device according to aspects of the present invention;

[0014] FIG. 3 is a block diagram of the notification disabling mechanism according to aspects of the present invention;

[0015] FIGS. 4 - 8 are illustrative views of an exemplary operation of the notification disabling mechanism according to aspects of the present invention; and

[0016] FIG. 9 is a flow diagram of the notification disabling mechanism according to aspects of the present invention.

DETAILED DESCRIPTION

[0017] It should be understood that the elements shown in the FIGS. may be implemented in various forms of hardware, software or combinations thereof. Preferably, these elements are implemented in a combination of hardware and software on one or more appropriately programmed general-purpose devices, which may include a processor, memory and input/output interfaces.

[0018] The present description illustrates the principles of the present disclosure. It will thus be appreciated that those skilled in the art will be able to devise various arrangements that, although not explicitly described or shown herein, embody the principles of the disclosure and are included within its spirit and scope.

[0019] All examples and conditional language recited herein are intended for pedagogical purposes to aid the reader in understanding the principles of the disclosure and the concepts contributed by the inventor to furthering the art, and are to be construed as being without limitation to such specifically recited examples and conditions.

[0020] Moreover, all statements herein reciting principles, aspects, and embodiments of the disclosure, as well as specific examples thereof, are intended to encompass both structural and functional equivalents thereof. Additionally, it is intended that such equivalents include both currently known equivalents as well as equivalents developed in the future, i.e., any elements developed that perform the same function, regardless of structure.

[0021] Thus, for example, it will be appreciated by those skilled in the art that the block diagrams presented herein represent conceptual views of illustrative circuitry embodying the principles of the disclosure. Similarly, it will be appreciated that any flow charts, flow diagrams, state transition diagrams, pseudocode, and the like represent various processes which may be substantially represented in computer readable media and so executed by a computer or processor, whether or not such computer or processor is explicitly shown.

[0022] The functions of the various elements shown in the figures may be provided through the use of dedicated hardware as well as hardware capable of executing software in association with appropriate software. When provided by a processor, the functions may be provided by a single dedicated processor, by a single shared processor, or by a plurality of individual processors, some of which may be shared. Moreover, explicit use of the term "processor" or "controller" should not be construed to refer exclusively to hardware capable of executing software, and may implicitly include, without limitation, digital signal processor ("DSP") hardware, read only memory ("ROM") for storing software, random access memory ("RAM"), and nonvolatile storage.

[0023] If used herein, the term “component” is intended to refer to hardware, or a combination of hardware and software in execution. For example, a component can be, but is not limited to being, a process running on a processor, a processor, an object, an executable, *and/or* a microchip and the like. By way of illustration, both an application running on a processor and the processor can be a component. One or more components can reside within a process and a component can be localized on one system *and/or* distributed between two or more systems. Functions of the various components shown in the figures can be provided through the use of dedicated hardware as well as hardware capable of executing software in association with appropriate software.

[0024] Other hardware, conventional and/or custom, may also be included. Similarly, any switches shown in the figures are conceptual only. Their function may be carried out through the operation of program logic, through dedicated logic, through the interaction of program control and dedicated logic, or even manually, the particular technique being selectable by the implementer as more specifically understood from the context.

[0025] In the claims hereof, any element expressed as a means for performing a specified function is intended to encompass any way of performing that function including, for example, a) a combination of circuit elements that performs that function or b) software in any form, including, therefore, firmware, microcode or the like, combined with appropriate circuitry for executing that software to perform the function. The disclosure as defined by such claims resides in the fact that the functionalities provided by the various recited means are combined and brought together in the manner which the claims call for. It is thus regarded that any means

that can provide those functionalities are equivalent to those shown herein. The subject matter is now described with reference to the drawings, wherein like reference numerals are used to refer to like elements throughout. In the following description, for purposes of explanation, numerous specific details are set forth in order to provide a thorough understanding of the subject matter. It can be evident, however, that subject matter embodiments can be practiced without these specific details. In other instances, well-known structures and devices are shown in block diagram form in order to facilitate describing the embodiments.

[0026] The present invention is directed towards a multifunction portable electronic device (hereinafter, the "device") that includes audiovisual image projection capabilities (e.g. a pico projector) and method of operating the same. An exemplary block diagram of the device 10 is provided in Figure 1. The device 10 includes a controller 12. The controller 12 is a component that executes various operational algorithms that control the various functions of the device 10. In one embodiment, the controller 12 executes algorithms that enable audio and video processing of a source input signal. The controller 12 may also include a memory in which various machine executable instructions controlling various device functionality may be stored and accessed as needed in response to various control signals generated by one of (a) a user and (b) other components of the device 10 as will be discussed below. The memory of the controller 12 may also store data associated with any input signal received by the controller 12. The memory of controller 12 may also store user-specific information that is associated with a user of the device 10. In one embodiment, user specific information may include user preferences for configuring the device for a particular type of operation. The user specific information may include global preference information that configures aspects of device operation that are common between the various functions as well as function specific preference information that configures the device to operate in a particular manner when executing a particular function. While the controller 12 is described as including a memory, one skilled in the art should understand that the memory (or other storage medium) within the device may be a separately embodied component that is read/write accessible by the controller 12 as needed.

[0027] The device 10 also includes a power converter 14 and battery 16 connected to the power converter 14. The power converter 14 is selectively connectable to an input power source (either AC or DC) for receiving power therefrom. Power received by

the power converter 14 is provided to the battery 16 and selectively charges the battery 16 as needed. It should be understood that the operation of charging is meant to include an initial charging of the battery 16 as well as recharging the battery 16 when the power level has been depleted. Power is also simultaneously provided by the power converter 14 to the controller 12 for powering operation thereof. The controller 12 may selectively detect when input power is being provided to the power converter 14 causing the device 10 to operate in a first power mode when a connection to an input power source is detected and a second mode when no connection to an input power source is detected. In one embodiment of the first power mode, the controller 12 may execute a battery monitoring algorithm that enables the controller 12 to selectively detect a power level in the battery 16 and control the power converter 14 to direct power thereto. The controller 12 can also control charging of the battery 16 when the detected power level in the battery 16 is below a predetermined threshold. In another embodiment of the first power mode, the controller 12 may automatically direct power from the power converter 14 to be provided to the battery 16 in response to connection of the power converter with the input power source. In the second mode of operation, the controller 12 is powered by the battery 16 until such time that the battery power is depleted below a predetermined operational threshold representing a minimum amount of power needed to operate the device.

[0028] The controller 12 may receive an input audiovisual signal from one of a plurality of device inputs collectively referred to using reference numeral 15. The controller 12 can control selective projection of the audiovisual input signal using projection unit/microdisplay 30. The input audiovisual signal may include one of (a) a still image; (b) a series of images; (c) a video signal; and (d) and audio signal. The input audiovisual signal may also include an audio component that is intended to be audibly reproduced by speaker 29 in conjunction with the projection, by the projection unit 30, of the one still image or series of images as will be discussed below.

[0029] The plurality of inputs may include any combination of but is not limited to (a) a card reader 18; (b) a USB port 20; (c) a digital video input port (HDMI) 22; (d) a VGA/Component video input port 24; and (e) a composite/S-Video input port 26. The depiction of the plurality of input ports 15 is for purposes of example only and

the device 10 may include any combination of the described input ports or other known input ports.

[0030] The card reader selectively receives a storage card that may include data representative of the input audiovisual signal that is accessed by the controller 12 and provided to the projection unit 30 and/or speaker 29 for output thereof. In one embodiment, the card reader 18 may be a MicroSD card reader. This is described for purposes of example only and any card reading device able to read any standardized storage card may be included in device 10. The USB port 20 enables the device 10 to be selectively connected to one of (a) a portable storage device (e.g. flash drive); or (b) a secondary device, that stores data representative of the audiovisual input signal. Any of the digital video input 22, VGA/component input 24 and/or composite video input 26 may enable connection with a secondary device that includes the source audiovisual input signal and are coupled to the controller 12 via an input selector 28. The input selector 28 selectively couples a respective one of the digital video input 22, VGA/component input 24 and/or composite video input 26 with the controller 12 such that the controller 12 may provide the audiovisual input signal to the projection unit 30 and speaker 29 for output thereof.

[0031] The device 10 further includes a plurality of user controls, collectively referred to using reference numeral 31, enabling the user to selectively control various device functions. An input/output (IO) interface 32 may include at least one user selectable button associated with at least one device function such that selection thereof initiates a control signal received by the controller 12 that is used to control the particular device function. In one embodiment, the IO interface 32 may be a touch screen and the at least one button may be a user selectable image element displayed on the touch screen enabling selection thereof by a user. In this embodiment, the number and types of user selectable image elements may be generated by the controller 12 depending on the particular operational mode of the device. For example, during projection mode, the user selectable image elements may enable activation of image projection functionality and, if the device 10 is operating in a communication mode, the user selectable image elements displayed on the I/O interface 32 may relate to communication functionality. In another embodiment, the IO interface 32 may include at least one dedicated button on a housing of the device 10 that may be manually activated by a user.

[0032] Another user control 31 included with the device 10 includes a keyboard 34. The keyboard 34 enables a user to enter alphanumeric text-based input commands for controlling the operation of the device. In one embodiment, the keyboard is positioned on the housing of the device. In another embodiment, there is no dedicated keyboard and the keyboard may be generated by the controller 12 and provided for display by the IO interface 32.

[0033] A further user control 31 that may be provided is a remote infrared (IR) sensor 36. Remote IR sensor 36 selectively receives an IR input signal that is generated by a remote control. The IR input signal received by the remote IR sensor 36 is communicated to the controller 12 which interprets the received IR input signal and initiates operation of a particular function of the device corresponding to user input.

[0034] Any of the user controls 32, 34 and/or 36 may be used to generate control signals for selecting an input audiovisual signal from a respective input source of the plurality of input sources 15. The control signals input via the user are received by the controller 12 which processes the user input signal and selects the source of the input audiovisual signal. Input received from any of the user controls 31 may also condition the controller 12 to selectively output the audiovisual signal using projection unit 30 and speaker 29.

[0035] Operation of the projection unit 30 will now be discussed. The projection unit 30 may include a microdisplay/pico projection unit 30. The projection unit 30 includes a panel driver 38, a light engine 39 and a projection lens 48. The panel driver 38 receives the audiovisual input signal from the controller 12 and controls the light engine to emit light representative of the audiovisual input signal that may be projected via a projection lens 48 coupled thereto. The light engine 39 may include a light source and light processing circuitry that is selectively controlled by the panel driver 38 to generate light and project an image representing the audiovisual signal onto a surface. Exemplary types of light engines 39 will be discussed in greater detail with respect to Figures 2A – 2D. However, persons skilled in the art will understand that any light engine used in any type of projection device (portable or otherwise) may be incorporated in the projection unit 30 of the device 10. In operation, the light generated by the light engine 39 is provided to the projection lens 48 which projects the full color image onto a display surface (e.g. screen, wall, etc). The projection lens 48 may be focused in response to user input received by the controller 12 as needed. Additionally, the operation and position of the various components of the projection

unit 30 may be controlled via a control signal that is generated by either the user or another component of device 10.

[0036] The projection unit 30 of the device may also include an infrared light emitting diode (IR LED) 50 that is coupled to the panel driver 38. In certain exemplary operations, the controller 12 may generate an IR audiovisual input signal based on the audiovisual input signal received from one of the plurality of inputs 31 or user controls. The IR audiovisual signal may be provided to the panel driver 38 which conditions the IR LED 50 to project an IR version of the audiovisual input signal. The IR signal is imperceptible to the human eye but may be used by other components as an input control signal in the manner discussed below.

[0037] The device 10 may also include a camera module 52. The camera module 52 may include a lens 54 coupled to an image sensor 56. Image data received via the lens 54 and sensed by image sensor 56 may be processed by image processor 58. The camera module 52 may operate as a convention digital camera able to capture one of still images and video images. The camera module 52 may also operate as a sensor that senses at least one type of image being displayed and uses the sensed image as a control signal for controlling at least one function of the device 10 as will be discussed below. The lens 54 of the camera module 52, shown in conjunction with the projection lens 48 of the projection unit, is described for purposes of example only and the device may include a single lens that is shared between the projection unit 30 and camera module 52.

[0038] A motion sensor 60 is also provided. The motion sensor 60 is coupled to the controller 12 and selectively senses data representing movement of the device 10. The motion sensor 60 may sense the position of the device and generate an input control signal used by the controller 12 for controlling device operation. The motion sensor 60 may include any type of motion sensor including but not limited to a gyroscope and/or an accelerometer. For example, in an embodiment, where the motion sensor 60 includes an accelerometer, the device 10 may include at least three accelerometers positioned on the X, Y and Z axis such that accelerometers may sense the position of the device 10 with respect to gravity. The motion sensor 60 may refer to a plurality of different sensors that are able to sense various types of data which may be provided to the controller 12 for analysis and processing thereof.

[0039] The device 10 also includes a communications processor 62 that enables bidirectional communication between the device 10 and a remote device. The

communication processor 62 is described generally and is intended to include all electronic circuitry and algorithms that enable bidirectional communication between devices. In one embodiment, the communication processor 62 enables the device to operate as a cellular phone. In another embodiment, the communication processor 62 includes all components and instructions for connecting the device 10 to the internet. In a further embodiment, the communication processor 62 includes all components associated with a smartphone to enable a plurality of different types of bidirectional communication (e.g. telephone, email, messaging, internet, etc) between the device an a communications network.

[0040] Figures 2A – 2D are block diagrams representing different types of light engines 39 that may be employed within the projection unit 30 described in Figure 1. It should be understood that the portable projection device 10 as discussed herein may utilize any of the different light engines 39a – 39d described in Figures 2A – 2D. It should also be appreciated that the description of the light engines 39a – 39d is not limited to those described herein and any type of light engine able to generate and process light into a full color image for display on a surface may be used by the device 10.

[0041] Figure 2A represents a three-color LED light engine 39a. The light engine 39a is controlled via the panel driver 38 (Fig. 1). The panel driver 38 receives the audiovisual input signal from the controller 12 and controls the operation of light emitting diodes (LED) 40a, 40b, and 40c. The LEDs 40a – c represent three color LEDs including a blue LED 40a, a green LED 40b and a red LED 40c. The audiovisual input signal provided to the panel driver 38 has been separated into its component colors by the controller 12 and the panel driver 38 selectively controls the LEDs 40a-c to emit the necessary light to generate the desired audiovisual image for output. Light generated by the LEDs 40a-c is focused into a full color image by a focusing element 42. In one embodiment, the focusing element 42 may be an x-cube. In another embodiment, the focusing element 42 may be a dichroic mirror. These focusing elements are described for purposes of example only and any focusing element 42 able to combine light from a plurality of LEDs into a single full color image may be used in the projection unit 30.

[0042] The focused image is projected on a liquid crystal on silicon (LCOS) chip 44 for receiving light emitted from each of the LEDs 40a – c and optically combines the received light via a polarizing beam splitter 46. The combined light is provided to the

projection lens 48 which projects the combined full color image onto a display surface (e.g. screen, wall, etc). The projection lens 48 may be focused in response to user input received by the controller 12 as needed. Additionally, the operation and position of the various components of the projection unit 30 may be controlled via a control signal that is generated by either the user or another component of device 10.

[0043] Figure 2B depicts a white-light LED light engine 39b that may be used in the projection unit of the device 10. Light engine 39b may include a while light LED 41. The panel driver 38 (in Fig. 1) receives the audiovisual input signal from the controller 12 and controls the operation of the white light LED 41. The LED 41 is controlled to emit a pattern of light to generate the desired audiovisual image for output. Light generated by the LED 41 is provided to a LCOS chip 44b. The LCOS chip 44b has a predetermined pattern of primary color dots thereon. The panel driver 38 controls the LCOS chip 44b to have certain of the dots illuminated by the light emitted by LED 41 to provide colored light to the polarizing beam splitter 46b which optically combines the colored light reflected off of the LOCS chip 44b. The combined light is provided to the projection lens 48 which projects the combined full color image onto a display surface (e.g. screen, wall, etc).

[0044] Figure 2C depicts a digital light processing (DLP) engine 39c. The DLP engine 39c includes three colored light sources 40a, 40b, and 40c. In one embodiment, the light sources 40a – c represent three color LEDs including a blue LED 40a, a green LED 40b and a red LED 40c. While these are described as LED light sources, this is done for purposes of example only and the light sources may be any type of light sources including, but not limited to lasers as are known to be implemented in a DLP light engine. In operation, the light sources 40a-c are not on simultaneously. Rather, the panel driver 38 controls the individual light sources in sequence and the emitted light is provided to the focusing element for producing the full color image. In another embodiment of a DLP engine, a color wheel may be positioned between a light source and the focusing element 42. The panel driver 38 selectively controls the color wheel to rotate to one of the three primary colors based on the data in the audiovisual input signal to illuminate a respective light color at a given time.

[0045] The audiovisual input signal provided to the panel driver 38 has been separated into its component colors by the controller 12 and the panel driver 38 selectively controls the LEDs 40a-c to emit the necessary light to generate the desired

audiovisual image for output. Light generated by the LEDs 40a-c are projected and focused into a full color image by a focusing element 42. The focusing element 42 may include a mirror unit 45 formed from at least one mirror which reflects the emitted light through prisms 47. The focused image is provided to the projection lens 48 which projects the combined full color image onto a display surface (e.g. screen, wall, etc).

[0046] Figure 2D depicts a laser-based light engine 39d. The laser light engine 39d includes light sources 43a – c that each emit a respective color light based on an audiovisual input signal. The light sources 43a – c are lasers that emit light in three distinct wavelengths. For example, light source 43a may be a laser that emits light at a wavelength associated with the color red whereas light source 43b may emit light at a wavelength associated with the color green and light source 43c may emit light at a wavelength associated with the color blue. The panel driver 38 controls the light sources 43a-c to emit respective colored light based on the audiovisual input signal received from the controller 12. The emitted light (either, concurrently or sequentially – depending on the panel driver being used) is provided to a focusing element 42. The focusing element 42 includes a set of combiner optics 49 that receives and combines the emitted laser light and provides the light to the mirror unit 45 including a plurality of individual mirrors. The mirror unit 45 is controlled by the panel driver 38 to rotate the plurality of mirrors based on the audiovisual input signal and reflects light to the projection lens 48 for projection onto a display surface (e.g. screen, wall, etc).

[0047] Because the above described portable projection device 10 includes communication functionality along with projection functionality, it would be desirable to ensure that various operational aspects of each do not conflict with one another. Thus, the device 10 advantageously senses when it is intended to operate in a projection mode and automatically disable a notification module (310 in Figure 3) of the device 10 in response to a control signal included in the communication received thereby. The control signal includes data that is indicative of an alert to be provided to a user by the notification module 310. The notification module 310 may include at least one of (a) the speaker 29; (b) a vibrator 312; (c) an LED light 316 and (d) a display screen 314 on the device.

[0048] In one embodiment, the device 10 includes cellular phone circuitry embodied as the communication processor 62 in Figure 1. The communication processor 62

provides the device with smart phone capabilities such as receiving a plurality of different types of communication. The types of communication able to be received by the communication processor 62 includes but is not limited to (a) a phone call; (b) an email; (c) an SMS message; (d) a MMS message; (e) streaming audio data; and (f) streaming video data. Typically, upon receipt of any type of communication, the communication processor 62 would control the notification module 310 to activate one of the plurality of different types of notification options to notify the user that a communication has been received. However, when the device 10 is in projection mode and actively configured to project at least one image onto a display surface, certain features of the notification module may disrupt the projection of the at least one image. More specifically, as the position of the device 10 is required for proper configuration of the projection unit to project visually optimized images, any change in the position, no matter how minute, negatively impact the configuration of the projection unit and thus the image projected thereby. For example, if the vibrator 312 of the device 10 is conditioned to notify the user of incoming communications, vibration of the device 10 would negatively impact the quality of the at least one image being projected by projection unit 30. The negative impact to projection quality results from the rapid vibration of the device 10 causing the position of the device 10 to rapidly change thereby invalidating the set of configuration parameters of the projection unit 30 and distorting any images being projected. This same principle holds true even when the notification signal is conditioned to engage the speaker 29 to provide an audible notification of incoming communications. Depending on the type of audible notification emitted from the speaker, the reverberation in the speaker unit may also cause the position of the device to change and the current configuration to be invalid.

[0049] An exemplary block diagram of the device 10 for disabling the notification module thereof is shown in Figure 3. Figure 3 includes a subset of the components shown and described in Figure 1 that are used to disable the notification module. Thus, any components having a similar reference numeral as those contained in Figure 1 are intended to be equivalent and operate in the manner discussed above.

[0050] The controller 12 controls all operations of each component of the device 10. The controller 12 includes a memory module 13 on which data associated with device operation may be stored. The controller 12 is responsive to at least one type of user input control 31 which allows a user to provide an input signal containing instructions

for controlling at least one component of the device 10. In one embodiment, the user input controls enable a user to provide an input signal that places the device into projection mode indicating that the device is to be configured to optimally project the at least one image onto the display surface. In this embodiment, the controller 12 receives the input signal including the instructions to place the device in projection mode, configure optimal projection parameters, and selectively acquire at least one image audiovisual input signal from a respective one of the A/V inputs 15. The controller 12 provides the selected A/V input signal from the input 15 to the projection unit 30 for projection onto a display surface. The controller 12 may also selectively configure the projection unit 30 including setting at least one projection parameter associated with optimally projecting the at least one image in the AV input signal onto the display surface. In one embodiment, the controller 12 may selectively configure the projection unit based on the position of the device with respect to the surface on which the device 10 is positioned (e.g. the projection surface) and the surface on which the at least one image is being projected (e.g. the display surface). Once the controller 12 has determined and set the at least one projection parameter for the projection unit 30, the device 10 is configured to operate in projection mode and a mode indicator characterizing the type of mode (e.g. projection mode) is stored in the memory module 13.

[0051] The device 10, being a multifunction portable communication and projection device, also includes the communication processor 62. The communication processor 62 enables the device to engage in bidirectional communication with at least one other device or remote system. Bidirectional communication is facilitated using one of a microphone 303 for selectively capturing audible input from a user for communication to other devices and/or systems. Alternatively, bidirectional communication may be facilitated via one of the user input controls 31 such as a keyboard and/or touch screen display.

[0052] Thus, the communication processor 62 enables the device 10 to operate as a smart phone. In this embodiment, the communication processor 62 includes a cell processor 302 that controls all logic operations associated with cellular and data operations that enable the communication between the device 10 and another device or remote system. Connected to the cell processor 302 are a cellular radio 304, a GPS unit 306 and a WIFI transceiver 308. Each of the cellular radio 304, the GPS unit 306 and WIFI transceiver 308 are coupled to an antenna 309 that selectively receives at

least one type of communication signal 301. While a single antenna 309 is described herein, this is for purposes of example only and the device 10 may include any number of antennas 309 to be associated with any of the components for receiving a communication signal 301. Moreover, the description of a single antenna 309 should not limit the communication function of the communication processor 62 to receiving only one type of communication signal 301 at any given time. Rather, it is understood that the communication processor 62 can selectively receive and transmit a plurality of different types communication signals 301 any given time.

[0053] One type of communication signal 301 may be a notification configuration signal 305 that selectively controls the operation of the notification module 310. The notification control signal 305 may be a typical incoming communication signal that includes information indicating that the notification module 310 should be disabled for a particular period of time. Alternatively, the notification configuration signal 305 may only include information for configuring the notification module 310 of the device 10. The notification configuration signal 305 includes information characterizing an alert condition to be suppressed when the device 10 is configured to be in projection mode. The information characterizing the alert may include information describing the source from which the notification control signal 305 originated and may be used by the controller 12 to selectively modify an operation of the notification module 310 in response to receipt thereof.

[0054] In one embodiment, the notification control signal 305 may be communicated by a cellular network and is received by the antenna 309. The notification control signal 305 may include information associated with a party who initiated the cellular communication received by device 10. Thus, the notification control signal 305 may indicate that the notification module 310 should be disabled for a predetermined period of time thereby preventing the device 10 from notifying a user of any other type of incoming communication signals. The cellular communication received by the device may be at least one of a (a) a telephone signal; (b) an audio-visual communication signal; and (c) a data signal the enables communication over a packetized network such as the internet. In another embodiment, the notification control signal 305 may be a GPS signal received by the antenna 309 and provided to the GPS unit 306 for processing thereof. In this embodiment, the notification configuration signal 305 may include particular geophysical coordinates that may be used by the device 10 to determine its relative location which is used by the controller

12 to automatically disable the notification module 310 for a predetermined period of time. In a further embodiment, the notification configuration signal 301 may be a WIFI signal received by the antenna 309 and provided to the WIFI transceiver 308. The notification configuration signal 305 contained in the WIFI signal 301 may indicate a particular access point from which the communication signal 301 has been received. The controller 12 may use the information identifying the access point to disable the notification module 310 of the device 10.

[0055] Upon receipt of the communication signal by a respective one of the cellular radio 304, GPS unit 306 or WIFI transceiver 308, the cell processor 302 parses the notification configuration signal 305 for information characterizing the alert to be suppressed. The information characterizing the alert to be suppressed is provided to the controller 12. The controller 12 uses the notification configuration signal 305 in conjunction with data representing the operational mode stored in memory 13 to selectively modify the operation of the notification module 310.

[0056] Prior to direct modification of the notification module 310, the controller 12 identifies which components of the notification module 310 have been configured to notify the user in response to the communication processor 62 receiving an incoming communication signal 301. The components of the notification module 310 may include at least one of the (a) speaker 29; (b) vibrator 312; (c) display 314; and (d) an LED indicator. At any given time, a user may use a respective user input control 31 to selectively toggle which of the components of the notification module 310 will be used to notify the user of an incoming communication and stores notification information in the memory 13. To determine which components of the notification module 310 need to be modified, the controller 12 uses the notification information stored in memory 13. The controller 12 also uses the notification configuration signal 305 received by the communication processor 62 and data representing the operational mode stored in memory 13 to automatically disable the components of the notification module that were previously configured to notify the user of an incoming communication signal 301.

[0057] In an embodiment where the speaker 29 is configured to provide the user with a notification of an incoming communication signal 301, the controller 12 at least one of (a) disables the speaker such that no sound is output thereby; and (b) loads data representing a silenced ringtone stored in memory 13. The silenced ringtone allows for the notification to be provided without causing any reverberation in the speaker

and thereby preventing a change in position of the device on the display surface due to the vibration of the speaker in generating an audible output. In an alternate embodiment, where the incoming communication signal 301 includes the notification configuration signal 305 and is intended to disable the notification module 310, the notification control signal 305 may also include data representing a silenced ringtone for storage in memory 13. In this embodiment, as the notification configuration signal 305 includes data intending to cause the notification module to be disabled, the notification configuration signal 305 may also configure the controller to selectively provide the silenced notification in response to receiving any further incoming communication signals 301 from any other source.

[0058] In an embodiment, where the vibrator 312 is configured to cause the device to vibrate in response to an incoming communication signal 301, the controller 12 may selectively disable the vibration functionality thereby preventing any undesired change in position while the device 10 is in projection mode. In a further embodiment where the display screen 314 is configured to be illuminated with a message indicative of a received incoming communication signal 301, the controller 12 will instead prevent the display screen 314 from being illuminated. The same operation may occur when the LED indicator 316 is configured to illuminate in a particular colored indicator upon receipt of an incoming communication signal 301 resulting in the controller 12 disabling LED operation.

[0059] In any of the above embodiments, in response to the notification configuration signal 305 and/or the operational mode indicating that any of the components of the notification module 310 should be disabled, the controller 12 automatically records and stores information associated with any received incoming communication signals 301 received during the time period in which the notification module 310 has been disabled in the memory 13. This information may be provided to the user once the controller 12 determines that notification module 310 should be re-enabled. The controller 12 may determine that the notification module should re-enabled by continually monitoring the portion of the memory 13 that stores data representing the operational mode to identify when the device is no longer in projection mode. Thereafter, the controller 12 reinitiates the notification settings previously stored in memory 13 allowing the device 10 to receive communication signals and notify users of the receipt thereof in the manner configured by the user.

[0060] In another embodiment, the controller 12 may re-enable the notification module to revert to its originally configured state based on receipt by the communication processor 62 of a further notification control signal 305 including information indicating that a disabled notification module 310 should be re-enabled. For example, in the embodiment where the notification control signal 305 is a GPS signal, receipt of updated geophysical coordinates indicating that the position of the device has changed may trigger the controller 12 to re-enable the notification module. For example, the original notification control signal 305 may have included GPS coordinates indicating that the device 10 was at a location known at which the device would be configured to project images onto a display surface. Continual monitoring of signals received by the communication processor 62 would allow the controller 12 to determine that the device 10 has moved a predetermined distance from the location indicating that the device will no longer be projecting images using updated GPS coordinates. Thus, the updated GPS coordinates cause the controller 12 to re-enable the notification module 310.

[0061] In another embodiment, upon determination that the notification module 310 of the device 10 should be disabled, the controller 12 may condition the communication processor 62 to output a disabling signal 307 via at least one of the cellular radio 304 and the WIFI transceiver 308. The disabling signal 307 may serve as a notification control signal 305 for other devices within a predetermined range of device 10. The disabling signal emitted by the communication processor 62 may be emitted for a predetermined geographical range as determined by the GPS unit for receipt by other communication devices (e.g. cell phones, smart phones, tablets, laptops) to selectively disable the notification modules the other devices. This further minimizes the disruption to audience members viewing the at least one image being projected by the projection unit. In this embodiment, the disabling signal 307 may include information including duration information and device information. The duration information identifies an amount of time for which the notification module of the other devices should be disabled and the device information includes information on what type of notification devices are to be disabled for the length of time contained in the duration information. Thus, this enables the device 10, acting as the presenter, to selectively control which components may be used by other devices located within a predetermined range of device 10.

[0062] Figure 4 is a block diagram illustrating the connectivity between device 10 and various other communication components of a communication network. The specific operation will reference the components described above in Figure 3. As shown herein, the communication network includes at least one of (a) a network of cellular towers 402; (b) cellular boosters positioned at locations that are outside of a range of a respective cellular tower 404; (c) the internet 406; (d) at least one data server 408; (e) at least one WIFI access point 407; (f) a local communication network (LAN) 410; and (g) a content provider 412. The communication between the device 10 and all components of the communication network are bidirectional in nature and those received by the device may include the control signal 305 including information characterizing the source of the incoming communication.

[0063] The cellular radio 304 of the device may selectively communicate with a remote device via the network of cellular towers 402. The cellular radio 304 enables the device to send and receive telephone calls. The cellular radio 304 also enables bidirectional communication of data which provided by the cellular towers 402 to at least one data server 408. Data received from and transmitted to the at least one data server 408 may be further communicated via the internet 406 in a known manner. Also coupled to the internet 406 may be a gateway for accessing a LAN 410 at a particular location and a content provider 412.

[0064] The device 10 may also communicate with the communication network via the at least one access point 407 using its WIFI transceiver 308. The WIFI access point 407 may be selectively coupled to one of the internet 406 and the LAN 410 and allows bidirectional communication between the device 10 and other devices via the internet 406.

[0065] All communications described herein are performed in a known manner using known communication protocols. The important aspect of the communication is that any and all communication received by the device uses notification configuration signal as a control signal that, when compared with the operational mode of the device 10, may be used to selectively modify the operation of the notification module of the device 10.

[0066] Figures 5 – 8 illustrate particular types of communication and the sources from which they are received to further describe how these communications are used to selectively modify the operation of the notification module 310 of device 10. While these operations may describe a particular source or a particular type of

communication signal, it should be noted that these are described for purposes of example only and the underlying principles may be applied to any number and type of communication sources and signals.

[0067] Turning to Figure 5, the device 10 may selectively use the source of an incoming cellular communication signal to selectively disable the notification module 310. The device may be configured to project data representing the A/V input signal derived from a content provider 412. In this embodiment, the A/V input signal may be streamed from the content provider 412 via the internet for receipt by the device 10. Alternatively, the A/V input signal may be downloaded via the internet 406, in full, and stored at the device 10. In either instance the AV input signal may be viewed as the notification configuration signal characterizing the source thereof identifying the A/V input signal for projection by the projection unit 30 and prevent any further incoming communication signals 301 from any other sources. The content provider transmits the notification configuration signal 305a representing a time associated with a duration of the A/V input signal via the data server 408 and network of cellular towers 402 for receipt by the device 10. The controller 12 selectively uses the information identifying the A/V input signal as a projection signal and the data representing a time associated with the duration of the AV input signal in combination with the configured mode of the device 10 to selectively modify the notification module as discussed above.

[0068] In another embodiment, the content provider 412 may be a ticketing source that provides a notification configuration signal 305 indicating a duration of time associated with a particular event. The notification configuration signal indicating the duration of the event may be communicated via the data server 408 and cellular network 402 to the device 10. The device 10 may use the notification control signal 305 characterizing the duration of the event received by the cellular radio 304 of the device, in conjunction with the configured mode of the device 10 to selectively modify the notification module 310 of the device.

[0069] A further embodiment shown in Figure 5 includes the same principles described above with respect to transmission via the data server 408 and cellular network 402 and changes the mode of communication. Instead, the notification configuration signal 305 transmitted from the content provider 412 may be provided via the internet 406 and communicated to the device via a respective access point 407. The WIFI transceiver of the device 10 selectively receives the notification

configuration signal 305 and determines whether or not the notification module 310 needs to be modified based on the information included in the notification configuration signal 305.

[0070] In any of the above embodiments, once the device receives the communication signal via the cellular network 402 or the internet 406 via an access point 407, the controller 12 compares the data characterizing the source of the communication to a predetermined set of source data stored in the memory 13. If the controller 12 determines the source matches a predetermined source and the mode of the device is configured to be in projection mode, the controller 12 automatically disables the notification module 310 to prevent the position of the device 10 from being disturbed.

[0071] The device 10 may selectively modify the notification module 310 thereof using an incoming GPS signal received by the GPS unit 306 of the communication processor 62 as shown in Figure 6. The notification configuration signal 305 is the incoming GPS signal including geophysical coordinates of the device 10. The controller 12 may compare the received geophysical coordinates to a predetermined set of geophysical coordinates and, if the device is within a predetermined range of any of the geophysical coordinate in the predetermined set, the controller 12 automatically disables the notification module 310 of the device 10 and prevents notification of any further incoming communication signals 301 while the device is within a predetermined range of the received GPS coordinates. The predetermined set of geophysical coordinates may be one of (a) input by the user; (b) derived from a location of an event scheduled in a user schedule; (c) provided by content provider 412 in a prior incoming communication. Thus, by using the GPS signal, the device 10 is automatically made aware that the device 10 is at a location where it is likely to be projecting the set of images on a display surface at that location. Moreover, once the device 10 has been configured to be in projection mode, the controller 12 uses the GPS data to disable the notification module 310 allowing a position of the device 10 to remain undisturbed during the projection of the images onto the display surface.

[0072] The notification module 310 of the device 10 may be disabled via a notification configuration signal received via a LAN 410 as shown in Figure 7. The LAN 410 may include at least one access point 407 at the particular location to selectively govern access by the device 10 to the internet 406. When device 10 seeks to connect to the LAN 410 via the access point 407, the acknowledgement message received by the device 10 in response to successful connection with the LAN 310 may

represent the communication signal 310. Data identifying the particular LAN as governing the access to the internet 406 may be provided as the notification configuration signal 305 within the acknowledgement message. This source data may be compared to a predetermined set of source data which, if matched, indicates that the device 10 may be projecting images onto a display surface at a location proximate to the LAN 410. The controller 12 determines if the device is in projection mode, and if so and the source information received from the LAN matches the predetermined source data, the controller 12 automatically disables the notification module of the device.

[0073] Figure 8 represents a scenario when a cellular booster 404 at a particular location 410 provides the notification configuration signal 305 for disabling the notification module 310 of the device 10. A cellular booster is similar to a repeater and is an intermediary connection device to facilitate connection between the device 10 and a closest respective cellular tower. There are instances when certain buildings and/or structures are within range of a particular cellular tower but various locations within the building or structure are unable to receive a strong enough signal from the cell tower to establish a connection therebetween. The cellular booster 404 is positioned at a location able to establish a connection between itself and the closest cellular tower 402 and establish a connection between itself and various devices 10 within the building or structure that is out of range of the cellular tower 402. Thus, cellular communication between the device 10 and tower 402 is facilitated by the booster 404. In this embodiment, the booster 404, may append source information to the notification control signal 305 received from the cellular tower intended for device 10. The device, upon receiving the notification control signal 305 identifying that all communication at a current location is being routed via a particular booster 404 can disable the notification module 310. The notification configuration signal 305 being issued via the booster 404 may be indicative of a location where the device 10 may be configured to project images onto a display surface. The controller 12 uses the source information as originating from a booster 404 in conjunction with the configured mode of the device to disable the notification module 310.

[0074] Figure 9 is a flow diagram illustrating an exemplary operation of the device 10. In step 902, a set of desired notification types are provided by a user. This may include which of the speaker 29, vibrator 312, display screen 314 and LED indicators 316 are configured to notify a user of an incoming communication signal. In step 904,

the communication processor 62 receives a notification configuration signal indicating that the notification module 310 should be disabled and that any further notifications of incoming communications should be prevented. The notification configuration signal received in step 904 includes information characterizing the type of alert and a source that instructs the notification module to be disabled. The notification configuration signal 305 may include data identifying (a) a location of the device 10; (b) a type of communication signal (e.g. wifi, cellular, etc); (c) duration information representing a time period associated with the images being projected by the projection unit; and (d) location of the source from which the signal is being communicated (e.g. access point, booster, etc).

[0075] In step 906, the controller 12 uses the information in the notification configuration signal to determine if the notification module 310 should be disabled by identifying an operational mode of the device 10 and comparing the information in the control signal with a predetermined set of disabling notification stored in memory 13. The controller 12, in step 908, automatically disables the configured notification components to be disabled when the device 10 is configured for projection mode and the information in the control signal 305 matches the predetermined set of disabling notification. In step 906, the controller 12 may disable the notification module by at least one of (a) causing a silenced ringtone to be emitted; (b) disabling the speaker 29, (c) reducing a volume of a speaker below a threshold level; (d) disables the vibrator 312; (e) prevents the display screen 314 from being illuminated; and (f) preventing the LED indicator from being illuminated.

[0076] In step 910, the controller 12 continually monitors at least one of the operational mode of the device and further incoming communication signals to determine if an updated notification configuration signal indicating received by the communication processor 62 to determine if information in further notification configuration signals 305 no longer match the predetermined notification configuration information. The controller 12 also continually monitors the operational mode of the device 10 to determine if the mode has been changed from projection mode to any other operational mode. If the source information in further communication signals does not match the predetermined source information and/or the operation mode has been changed, the original notification settings of the device 10 are restored in step 912.

[0077] The implementations described herein may be implemented in, for example, a method or process, an apparatus, or a combination of hardware and software. Even if only discussed in the context of a single form of implementation (for example, discussed only as a method), the implementation of features discussed may also be implemented in other forms (for example, a hardware apparatus, hardware and software apparatus, or a computer-readable media). An apparatus may be implemented in, for example, appropriate hardware, software, and firmware. The methods may be implemented in, for example, an apparatus such as, for example, a processor, which refers to any processing device, including, for example, a computer, a microprocessor, an integrated circuit, or a programmable logic device. Processing devices also include communication devices, such as, for example, computers, cell phones, tablets, portable/personal digital assistants ("PDAs"), and other devices that facilitate communication of information between end-users.

[0078] Additionally, the methods may be implemented by instructions being performed by a processor, and such instructions may be stored on a processor or computer-readable media such as, for example, an integrated circuit, a software carrier or other storage device such as, for example, a hard disk, a compact diskette, a random access memory ("RAM"), a read-only memory ("ROM") or any other magnetic, optical, or solid state media. The instructions may form an application program tangibly embodied on a computer-readable medium such as any of the media listed above. As should be clear, a processor may include, as part of the processor unit, a computer-readable media having, for example, instructions for carrying out a process. The instructions, corresponding to the method of the present invention, when executed, can transform a general purpose computer into a specific machine that performs the methods of the present invention.

[0079] What has been described above includes examples of the embodiments. It is, of course, not possible to describe every conceivable combination of components or methodologies for purposes of describing the embodiments, but one of ordinary skill in the art can recognize that many further combinations and permutations of the embodiments are possible. Accordingly, the subject matter is intended to embrace all such alterations, modifications and variations that fall within the spirit and scope of the appended claims. Furthermore, to the extent that the term "includes" is used in either the detailed description or the claims, such term is intended to be inclusive in a

manner similar to the term “comprising” as “comprising” is interpreted when employed as a transitional word in a claim.

CLAIMS

1. An apparatus for projecting received images onto a display surface comprising

a projection unit (30) that selectively projects at least one received image onto a display surface; and

a communication processor (62) that selectively receives at least one of an incoming communication signal from a remote source and a notification configuration signal;

a notification module (310) that selectively notifies a user upon receipt of the incoming communication signal from the remote source; and

a controller (12) coupled to each of the projection unit, the communication processor and notification module, the controller identifies a mode of operation and automatically disables the notification module upon determining that the projection unit is configured to selectively project the at least one received image onto a display surface.

2. The apparatus according to claim 1, wherein

the controller uses the notification configuration signal to disable the notification module upon receipt thereof.

3. The apparatus according to claim 1, wherein

the communication processor 62 includes at least one of (a) a cellular radio (304) that receives cellular communication signals from a cellular network; (b) a GPS unit (306) that receives data representing geophysical coordinates describing a position of the device; and (c) a WIFI transceiver (308) for selectively receiving a WIFI signal from at least one WIFI access point.

4. The apparatus according to claim 1, wherein

the notification configuration signal includes information instructing the apparatus to disable the notification module based on at least one of (a) a predetermined location of the device; (b) an identifier identifying the source of the communication signal; (c) an identifier identifying a type of device that is transmitting the communication signal; (d) a duration of time associated with the projecting of the

at least one image by the projection unit; and (e) event data describing one of a date and time that the projection unit is to project the at least one received image.

5. The apparatus according to claim 1, wherein

the notification module includes at least one of (a) a speaker (29) for providing an audible notification; (b) a vibrator (312) for selectively causing the apparatus to vibrate; (c) a display screen (314) that is illuminated to selectively display a message indicative of a received communication signal; and (d) an LED indicator (316).

6. The apparatus according to claim 1, wherein

the notification configuration signal is received prior to a time at which the at least one image is to be projected onto the display surface.

7. The apparatus according to claim 1, wherein

the controller conditions the notification module to issue a silenced notification in response to receipt of the communication signal.

8. The apparatus according to claim 1, wherein

the notification module is disabled and prevented from notifying a user of any further incoming communication signals received by the communication processor while the apparatus is projecting the at least one received image onto the display surface.

9. The apparatus according to claim 1, wherein

the controller generates a disabling signal in response to disabling the notification module and controls the communication processor to selectively transmit the disabling signal for receipt by communication devices within a predetermined range of the apparatus.

10. The apparatus according to claim 1, wherein

the notification module is automatically re-enabled in response to one of (a) a change in operational mode of the apparatus and (b) receipt of an updated communication signal indicating that the notification module should be re-enabled.

11. A method of for projecting received images onto a display surface, comprising

projecting (30) at least one received image onto a display surface;

receiving (62) at least one of an incoming communication signal from a remote source and a notification configuration signal at a communication processor

identifying a mode of operation; and

automatically disabling a notification module that notifies a user upon receipt of incoming communication signals upon determining that the projection unit is configured to selectively project the at least one received image onto a display surface.

12. The method according to claim 11, further comprising

using the notification configuration signal to disable the notification module upon receipt thereof.

13. The method according to claim 11, wherein the activity of receiving includes

at least one of (a) receiving cellular communication signals from a cellular network via a cellular radio (304); (b) receiving data representing geophysical coordinates describing a position of the device via a GPS unit (306); and (c) receiving a WIFI signal from at least one WIFI access point via a WIFI transceiver (308).

14. The apparatus method to claim 11, wherein

the notification configuration signal includes information instructing the apparatus to disable the notification module based on at least one of (a) a predetermined location of the device; (b) an identifier identifying the source of the communication signal; (c) an identifier identifying a type of device that is transmitting the communication signal; (d) a duration of time associated with the projecting of the at least one image by the projection unit; and (e) event data describing one of a date and time that the projection unit is to project the at least one received image.

15. The method according to claim 11, wherein

the notification module includes at least one of (a) a speaker (29) for providing an audible notification; (b) a vibrator (312) for selectively causing the apparatus to vibrate; (c) a display screen (314) that is illuminated to selectively display a message indicative of a received communication signal; and (d) an LED indicator (316).

16. The method according to claim 11, further comprising

Receiving the notification configuration signal prior to a time at which the at least one image is to be projected onto the display surface.

17. The method according to claim 11, further comprising

conditioning the notification module to issue a silenced notification in response to receipt of the communication signal.

18. The method according to claim 11, further comprising

disabling the notification module and preventing a user from being notified of any further incoming communication signals received by the communication processor while the apparatus is projecting the at least one received image onto the display surface.

19. The method according to claim 11, wherein

generating a disabling signal in response to disabling the notification module; and

transmitting the disabling signal for receipt by communication devices within a predetermined range of the apparatus for disabling notification modules of the communication devices within the predetermined range.

20. The method according to claim 11, further comprising

re-enabling the notification module in response to one of (a) a change in operational mode of the apparatus and (b) receipt of an updated communication signal indicating that the notification module should be re-enabled.

21. An apparatus for projecting received images onto a display surface comprising

means (30) for selectively projecting at least one received image onto a display surface;

means (62) for receives at least one of an incoming communication signal from a remote source and a notification configuration signal;

means (310) for notifying a user upon receipt of the incoming communication signal from the remote source; and

means (12) for controlling the apparatus, wherein said means for controlling identifies a mode of operation and automatically disables the notification module upon determining that the projection unit is configured to selectively project the at least one received image onto a display surface.

22. The apparatus according to claim 21, wherein

said means for controlling uses the notification configuration signal to disable the notification module upon receipt thereof.

23. The apparatus according to claim 21, wherein

said means for receiving includes at least one of (a) a cellular radio (304) that receives cellular communication signals from a cellular network; (b) a GPS unit (306) that receives data representing geophysical coordinates describing a position of the device; and (c) a WIFI transceiver (308) for selectively receiving a WIFI signal from at least one WIFI access point.

24. The apparatus according to claim 21, wherein

the notification configuration signal includes information instructing the apparatus to disable the notification module based on at least one of (a) a predetermined location of the device; (b) an identifier identifying the source of the communication signal; (c) an identifier identifying a type of device that is transmitting the communication signal; (d) a duration of time associated with the projecting of the at least one image by the projection unit; and (e) event data describing one of a date and time that the projection unit is to project the at least one received image.

25. The apparatus according to claim 21, wherein

said means for notifying includes at least one of (a) a speaker (29) for providing an audible notification; (b) a vibrator (312) for selectively causing the apparatus to vibrate; (c) a display screen (314) that is illuminated to selectively display a message indicative of a received communication signal; and (d) an LED indicator (316).

26. The apparatus according to claim 21, wherein

Said means for receiving receives the notification configuration signal prior to a time at which the at least one image is to be projected onto the display surface.

27. The apparatus according to claim 21, wherein

said means for controller conditions the notification module to issue a silenced notification in response to receipt of the communication signal.

28. The apparatus according to claim 21, wherein

said means for notifying is disabled and prevented from notifying a user of any further incoming communication signals received by the communication processor while the apparatus is projecting the at least one received image onto the display surface.

29. The apparatus according to claim 21, wherein

said means for controller generates a disabling signal in response to disabling the notification module and controls the communication processor to selectively transmit the disabling signal for receipt by communication devices within a predetermined range of the apparatus.

30. The apparatus according to claim 21, wherein

said means for controller automatically re-enables said means for notifying in response to one of (a) a change in operational mode of the apparatus and (b) receipt of an updated communication signal indicating that the notification module should be re-enabled.

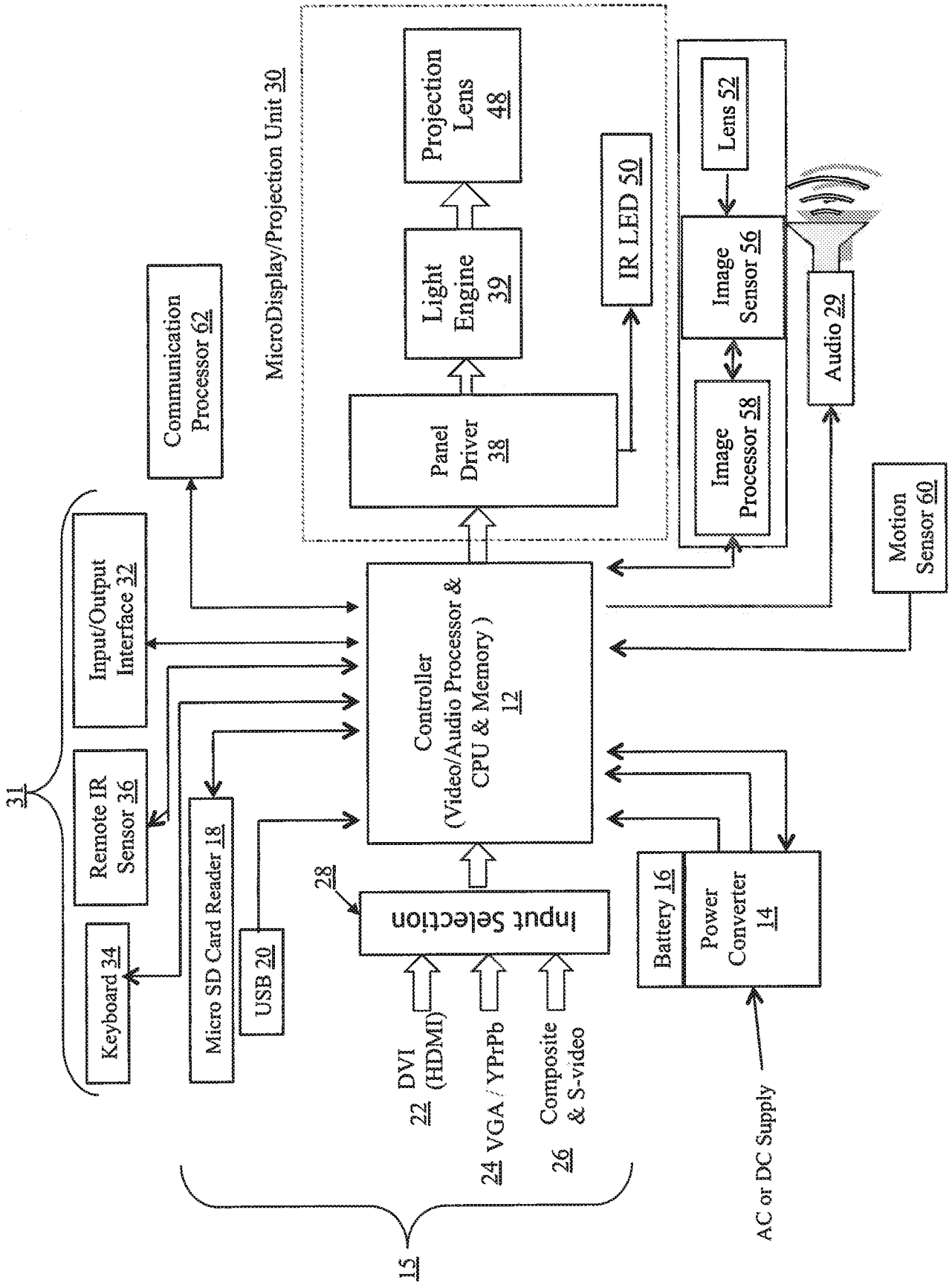
MicroDisplay/Projection Unit 30
Projection Lens 48
Light Engine 39
IR LED 50
Lens 52
Image Sensor 56
Audio 29
Communication Processor 62
Panel Driver 38
Image Processor 58
Motion Sensor 60
Input/Output Interface 32
Controller (Video/Audio Processor & CPU & Memory) 12
Remote IR Sensor 36
Micro SD Card Reader 18
USB 20
Keyboard 34
31
28
Input Selection
Battery 16
Power Converter 14
22 DVI (HDMI)
24 VGA / YPrPb
26 Composite & S-video
15
AC or DC Supply

Fig. 1

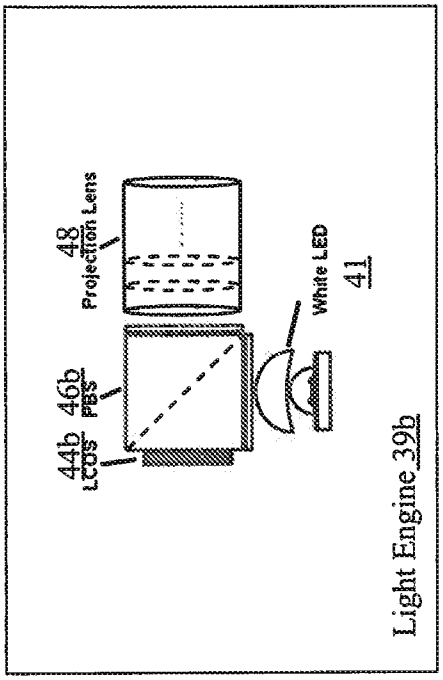

Fig. 2B

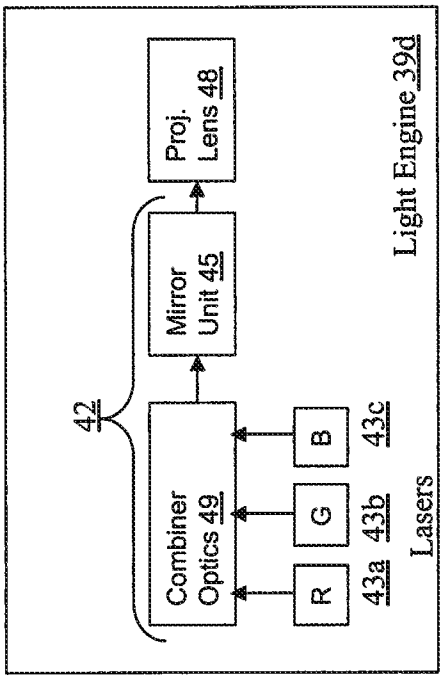

Fig. 2D

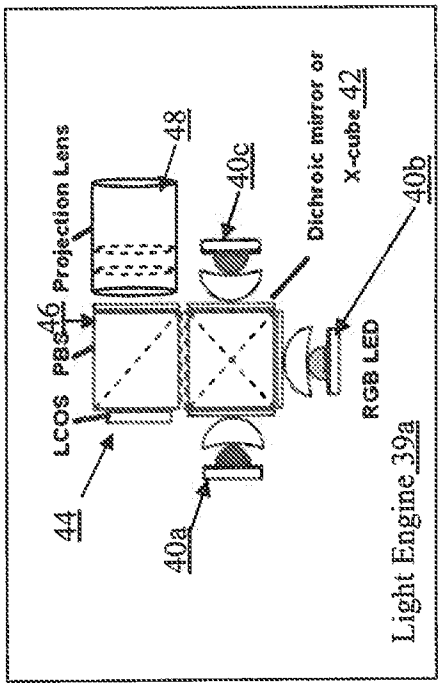

Fig. 2A

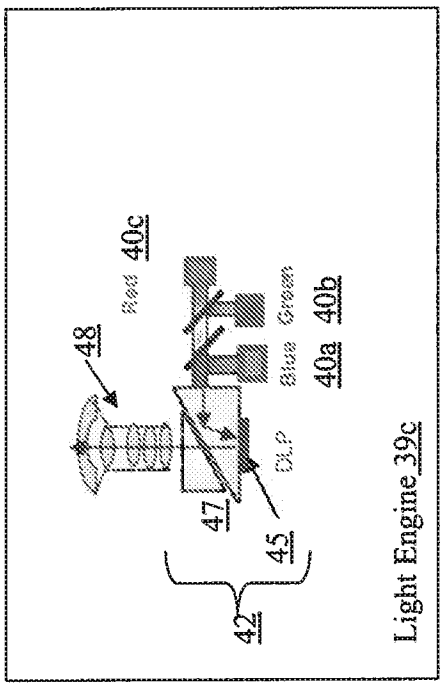

Fig. 2C

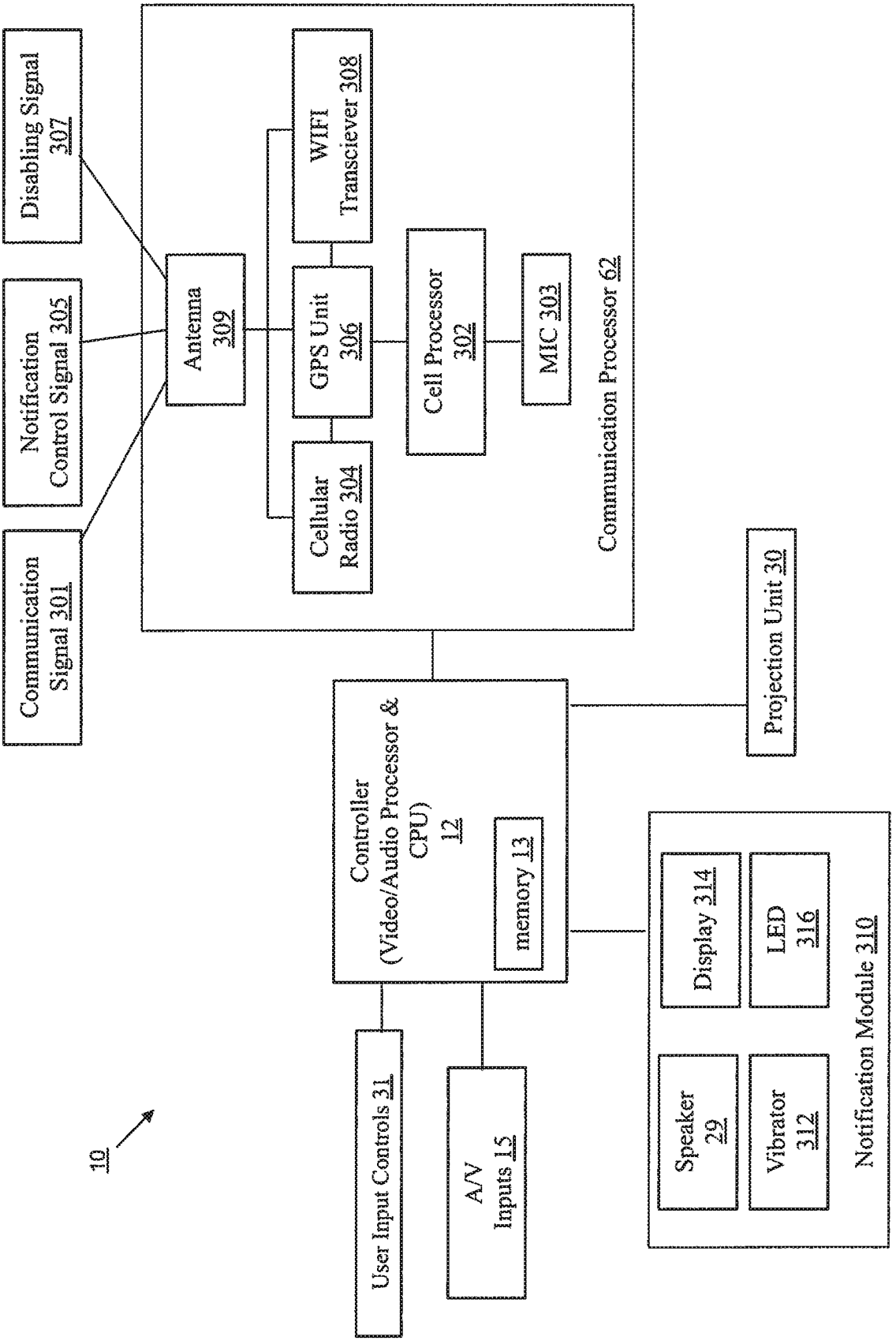
Disabling Signal 307
Notification Control Signal 305
Communication Signal 301
Antenna 309
WIFI Transciever 308
GPS Unit 306
Cellular Radio 304
Cell Processor 302
MIC 303
Communication Processor 62
Controller (Video/Audio Processor & CPU) 12
memory 13
Projection Unit 30
User Input Controls 31
A/V Inputs 15
Speaker 29
Display 314
LED 316
Vibrator 312
Notification Module 310
10

Fig. 3

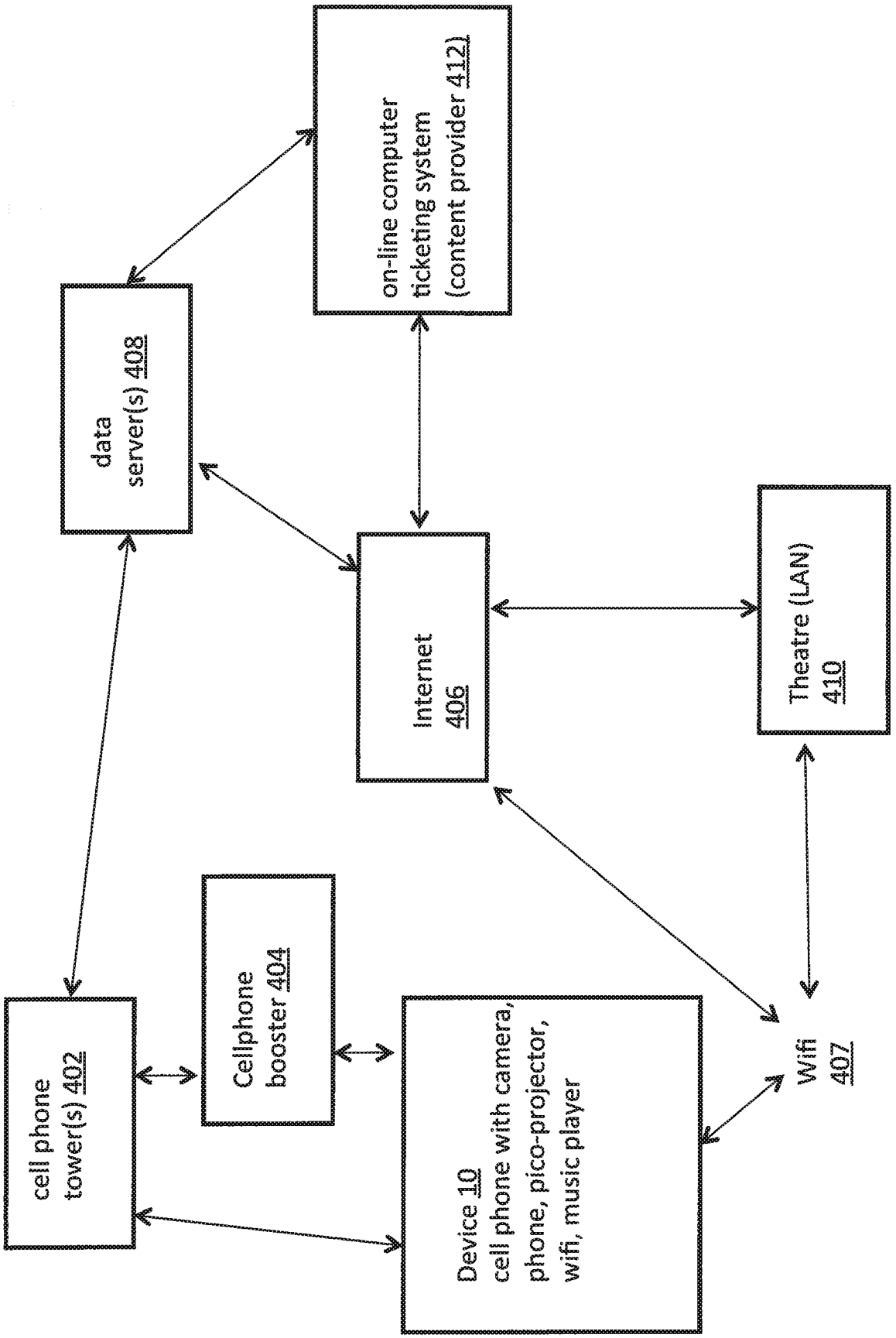
on-line computer ticketing system (content provider 412)
data server(s) 408
Internet 406
Theatre (LAN) 410
cell phone tower(s) 402
Cellphone booster 404
Device 10
cell phone with camera, phone, pico-projector, wifi, music player
Wifi 407

Fig. 4

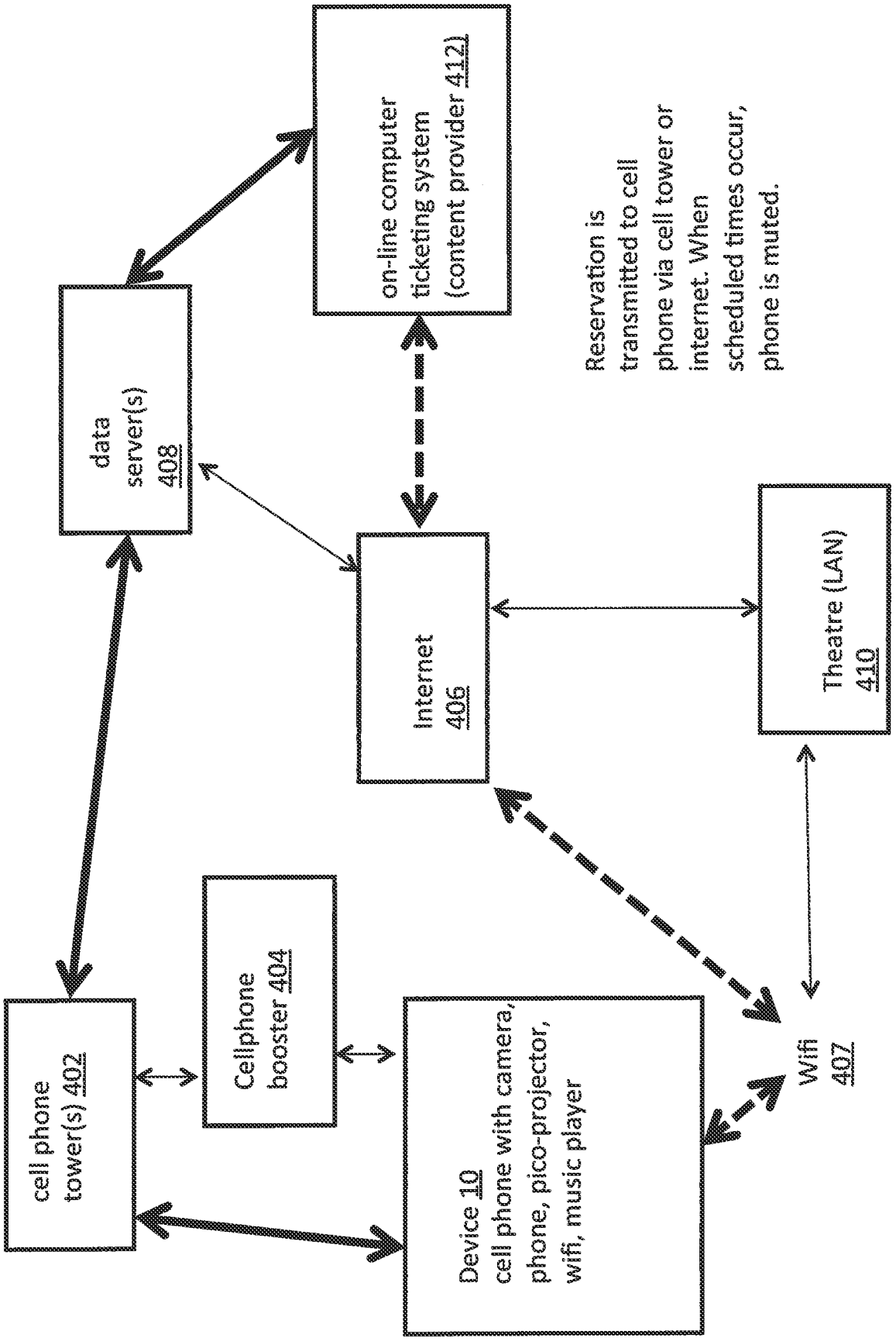
on-line computer ticketing system (content provider 412)
data server(s) 408
Reservation is transmitted to cell phone via cell tower or internet. When scheduled times occur, phone is muted.
Internet 406
Theatre (LAN) 410
cell phone tower(s) 402
Cellphone booster 404
Device 10
cell phone with camera, phone, pico-projector, wifi, music player
Wifi 407

Fig. 5

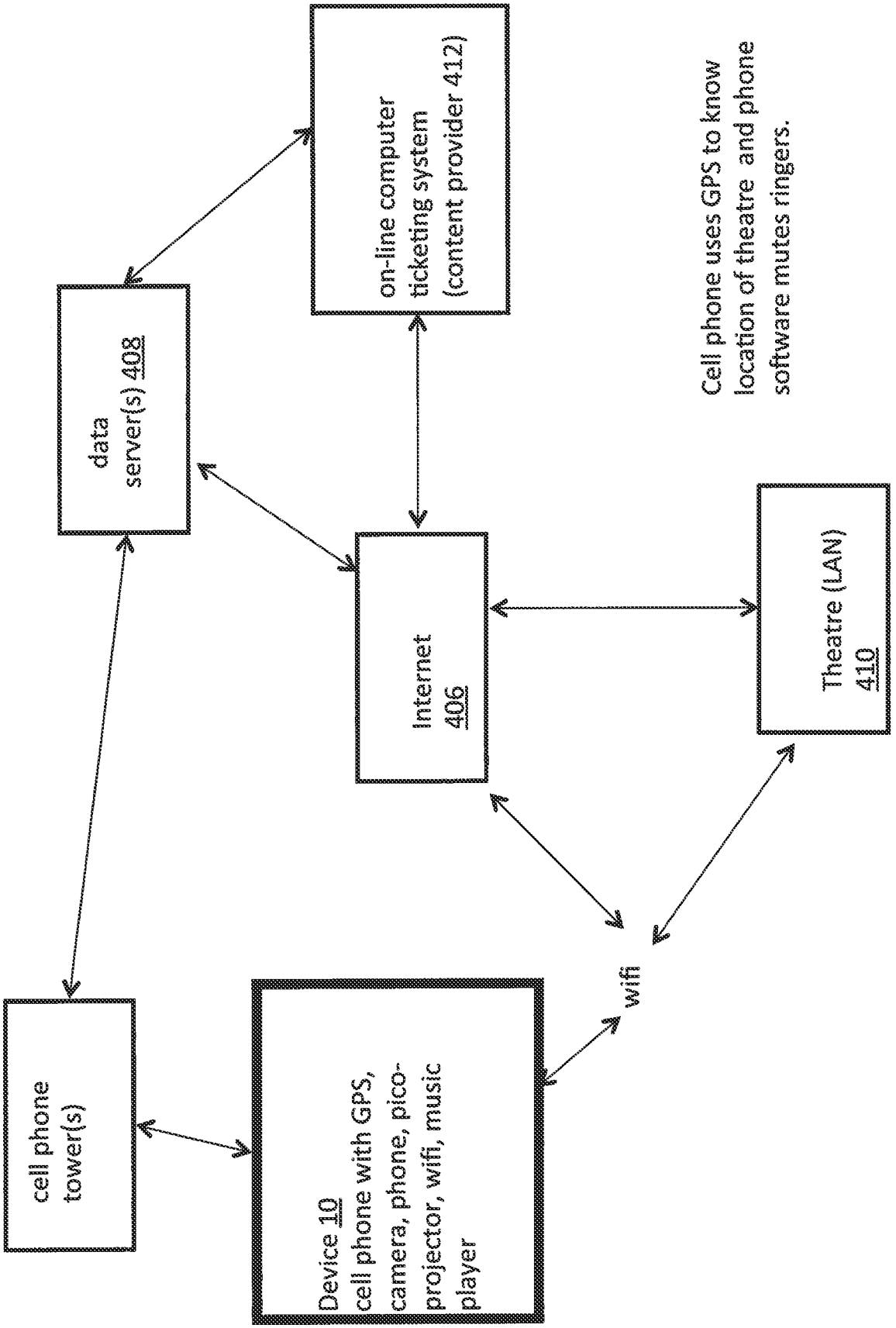
on-line computer ticketing system (content provider 412)
data server(s) 408
Cell phone uses GPS to know location of theatre and phone software mutes ringers.
Internet 406
Theatre (LAN) 410
wifi
cell phone tower(s)
Device 10
cell phone with GPS, camera, phone, pico-projector, wifi, music player

Fig. 6

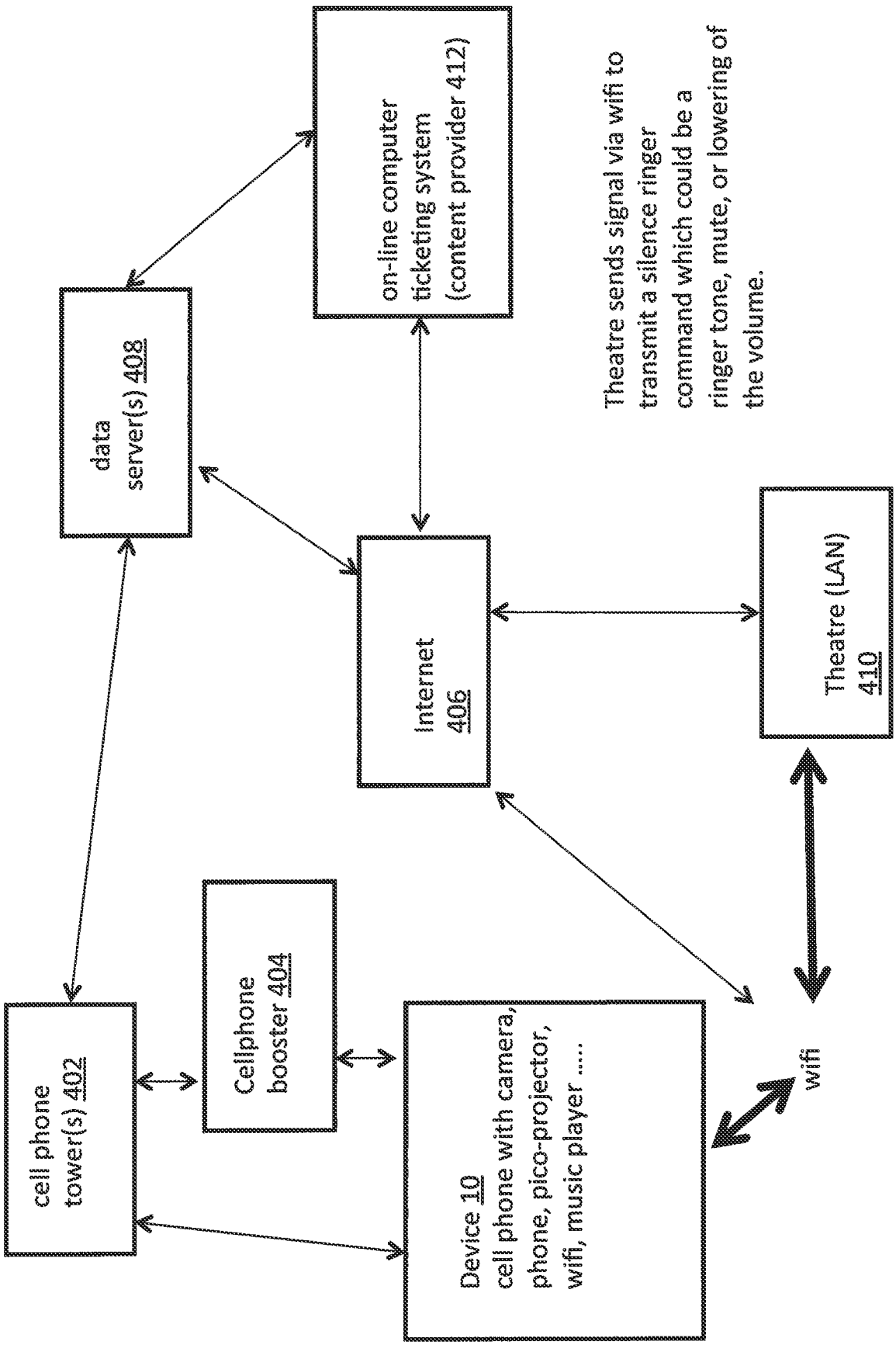
on-line computer ticketing system (content provider 412)
data server(s) 408
Theatre sends signal via wifi to transmit a silence ringer command which could be a ringer tone, mute, or lowering of the volume.
Internet 406
Theatre (LAN) 410
cell phone tower(s) 402
Cellphone booster 404
Device 10
cell phone with camera, phone, pico-projector, wifi, music player .....
wifi

Fig. 7

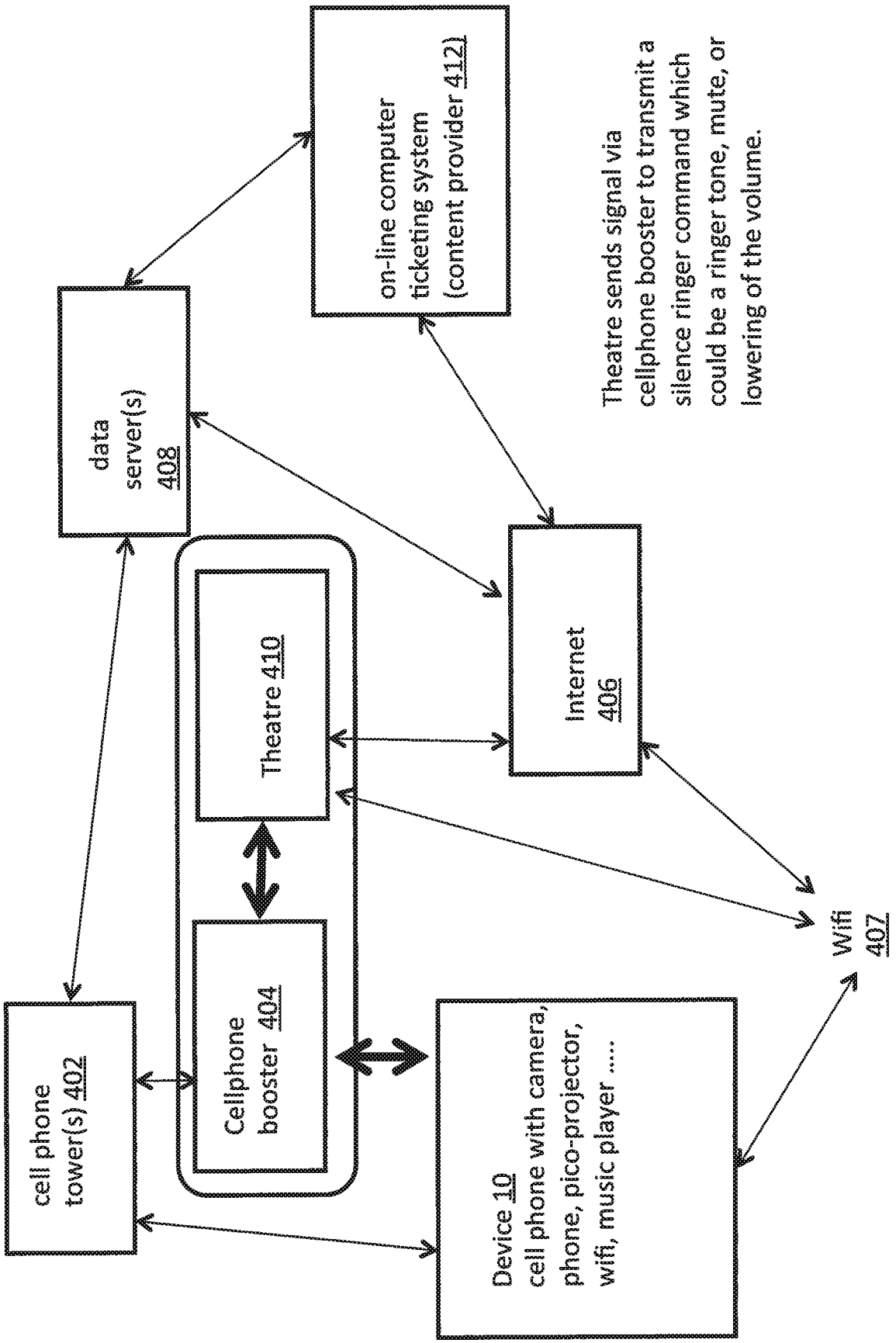
on-line computer ticketing system (content provider 412)
data server(s) 408
Theatre sends signal via cellphone booster to transmit a silence ringer command which could be a ringer tone, mute, or lowering of the volume.
Theatre 410
Internet 406
Cellphone booster 404
Wifi 407
cell phone tower(s) 402
Device 10
cell phone with camera, phone, pico-projector, wifi, music player .....

Fig. 8

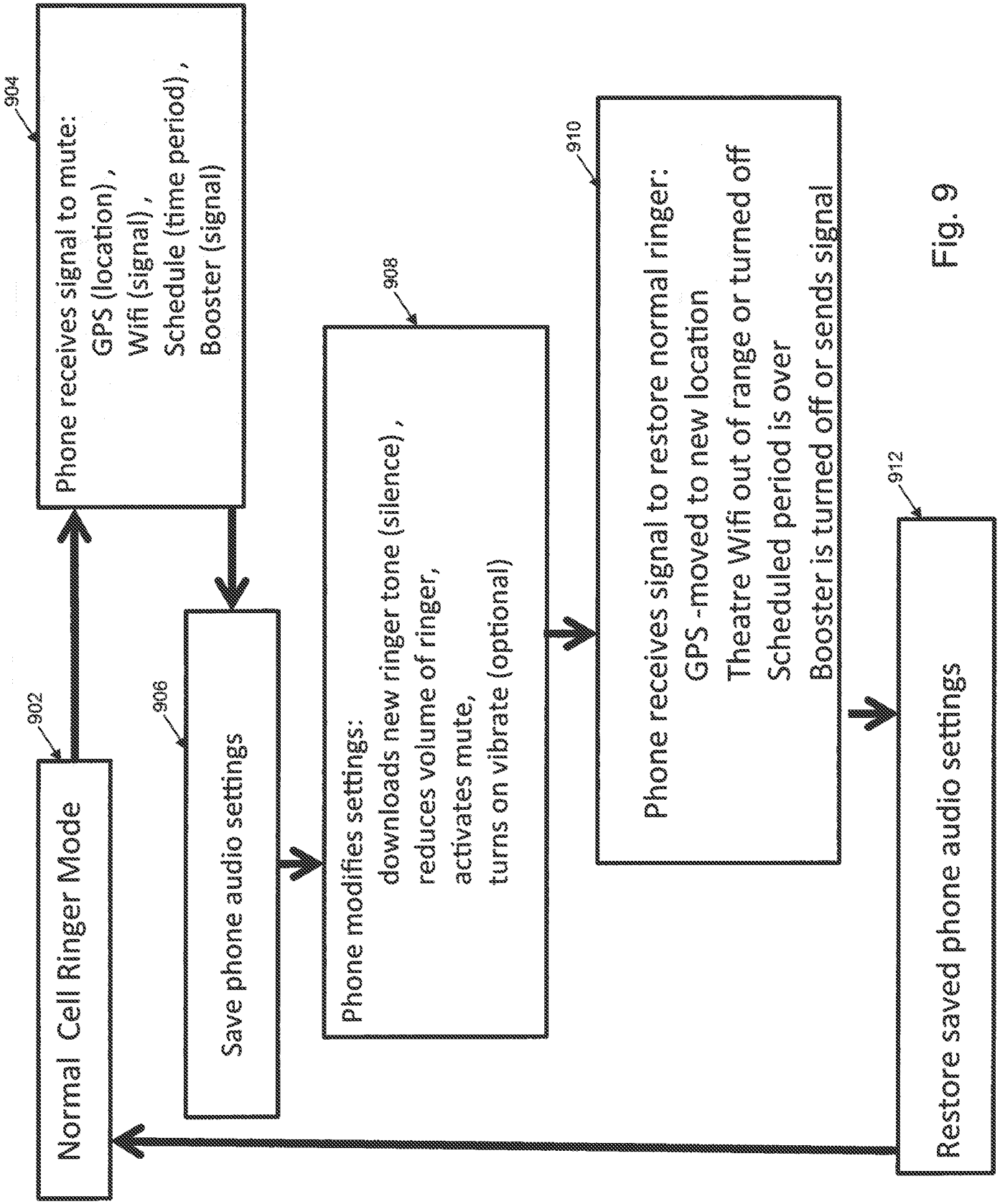
902
Normal Cell Ringer Mode
904
Phone receives signal to mute:
GPS (location),
Wifi (signal),
Schedule (time period),
Booster (signal)
906
Save phone audio settings
908
Phone modifies settings:
downloads new ringer tone (silence),
reduces volume of ringer,
activates mute,
turns on vibrate (optional)
910
Phone receives signal to restore normal ringer:
GPS -moved to new location
Theatre Wifi out of range or turned off
Scheduled period is over
Booster is turned off or sends signal
912
Restore saved phone audio settings

Fig. 9

INTERNATIONAL SEARCH REPORT

International application No
PCT/US2013/048528

A. CLASSIFICATION OF SUBJECT MATTER
INV. H04N5/74 H04M1/247
ADD.

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

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
H04N H04M

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

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

EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2010/304722 A1 (TANAKA RYUICHIRO [JP]) 2 December 2010 (2010-12-02)	1-8, 10-18, 20-28,30
Y	paragraph [0047] paragraph [0030] paragraph [0031] paragraph [0036] paragraph [0035] paragraph [0042] paragraph [0043] paragraph [0048] paragraph [0049] paragraph [0050] paragraph [0052] paragraph [0051] ----- -/--	9,19,29

[X] Further documents are listed in the continuation of Box C.

[X] See patent family annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
18 September 2013	25/09/2013

Name and mailing address of the ISA/	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Thieme, Markus

INTERNATIONAL SEARCH REPORT

International application No
PCT/US2013/048528

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	WO 2008/112405 A1 (MOTOROLA INC [US]; MOCK VON [US]) 18 September 2008 (2008-09-18) paragraph [0022]; figure 1 paragraph [0023] paragraph [0024] paragraph [0003]	9,19,29
A	EP 1 613 100 A2 (TOSHIBA KK [JP]) 4 January 2006 (2006-01-04) paragraph [0001] abstract; figure 1	1-30

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/US2013/048528

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
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WO 2008112405 A1	18-09-2008	CN 101636768 A	27-01-2010
		EP 2126867 A1	02-12-2009
		KR 20090129997 A	17-12-2009
		US 2008224883 A1	18-09-2008
		WO 2008112405 A1	18-09-2008
EP 1613100 A2	04-01-2006	CN 1717028 A	04-01-2006
		EP 1613100 A2	04-01-2006
		JP 2006017809 A	19-01-2006
		US 2006001840 A1	05-01-2006