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(54) **WAGERING GAME MACHINE WIRELESS KEY**

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(57) **ABSTRACT**

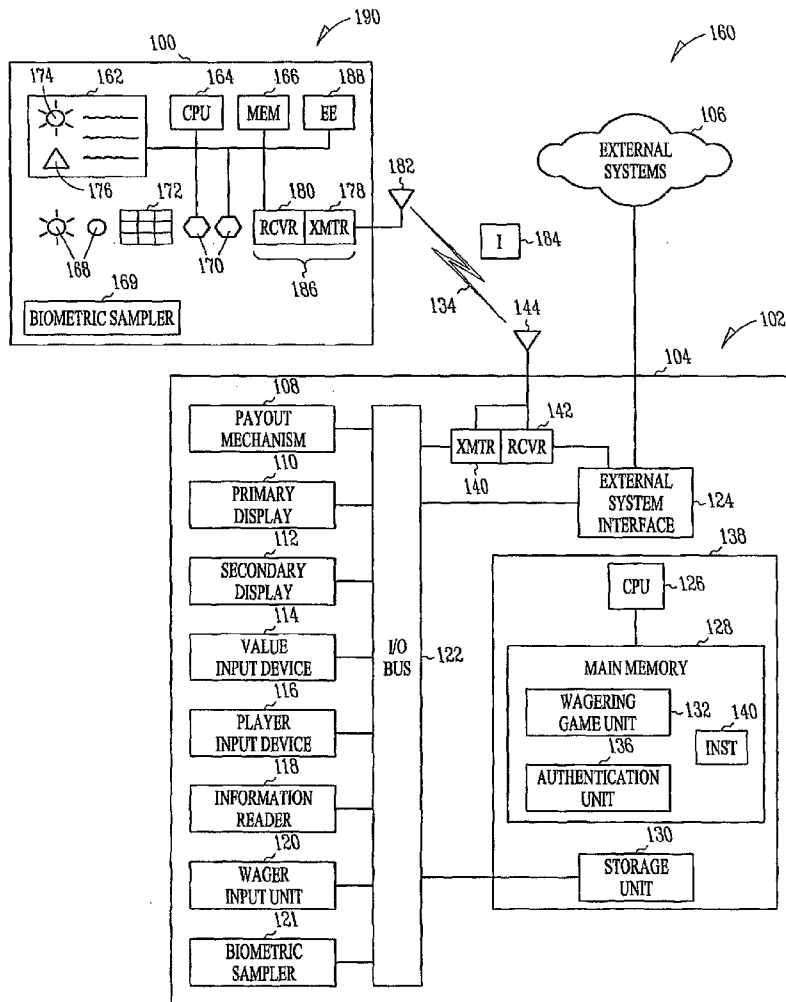
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Apparatus, systems, and methods may operate to receive authorization information from a wireless key at a wagering game machine, the machine including a wagering game unit operable to receive a wager in association with a wagering game. Further activities may include granting access to a gaming machine control system included in the wagering game machine in response to receiving the authorization information.

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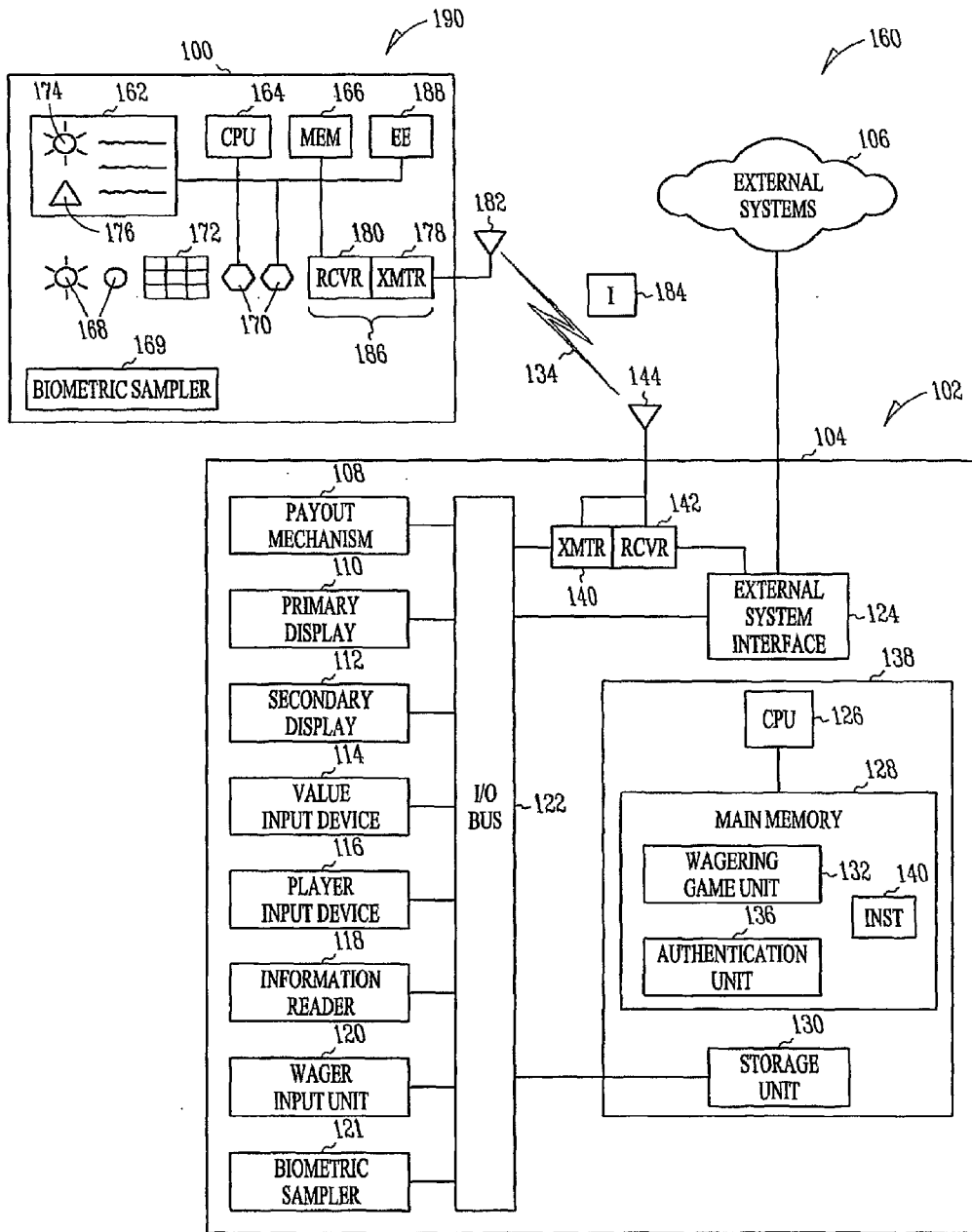


FIG. 1

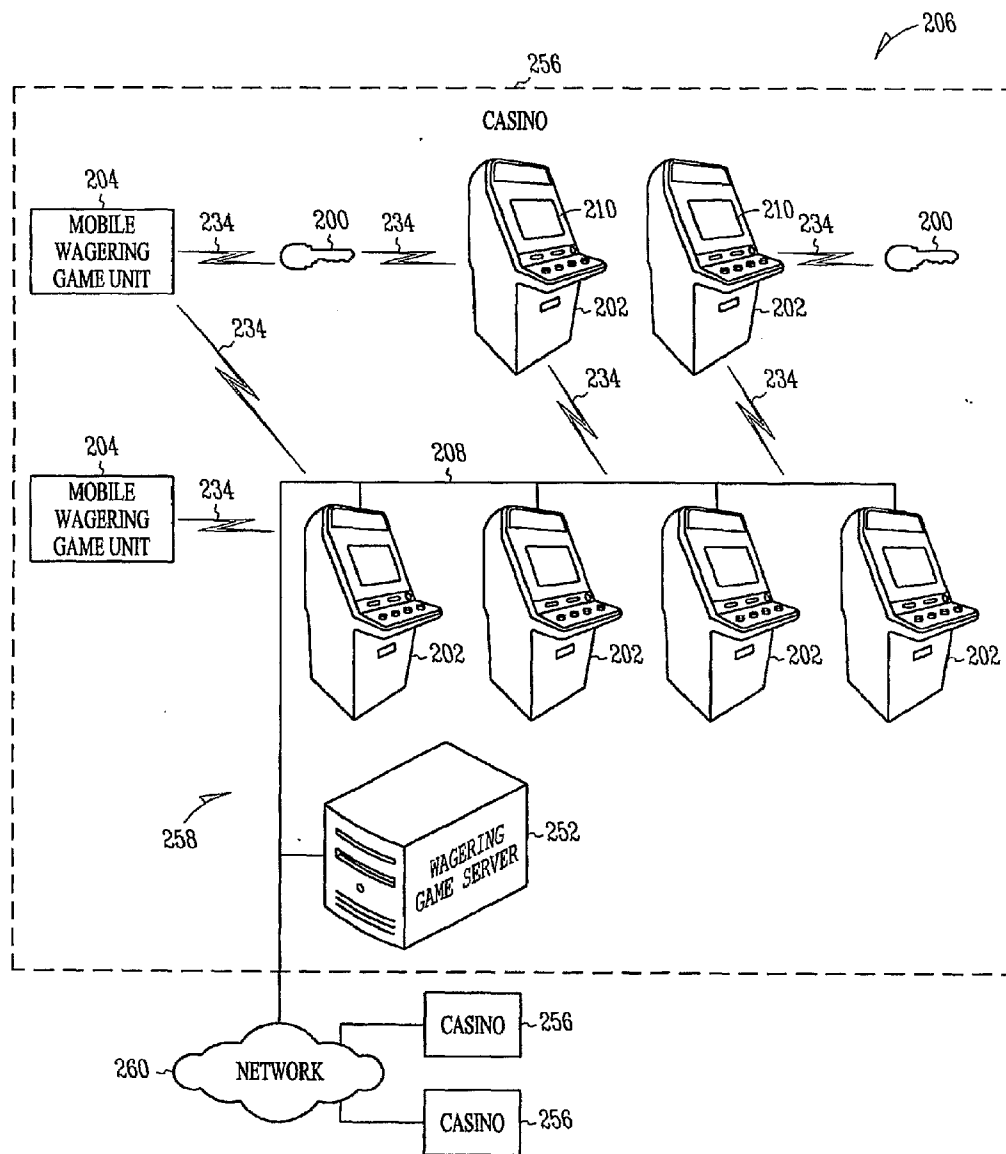


FIG. 2

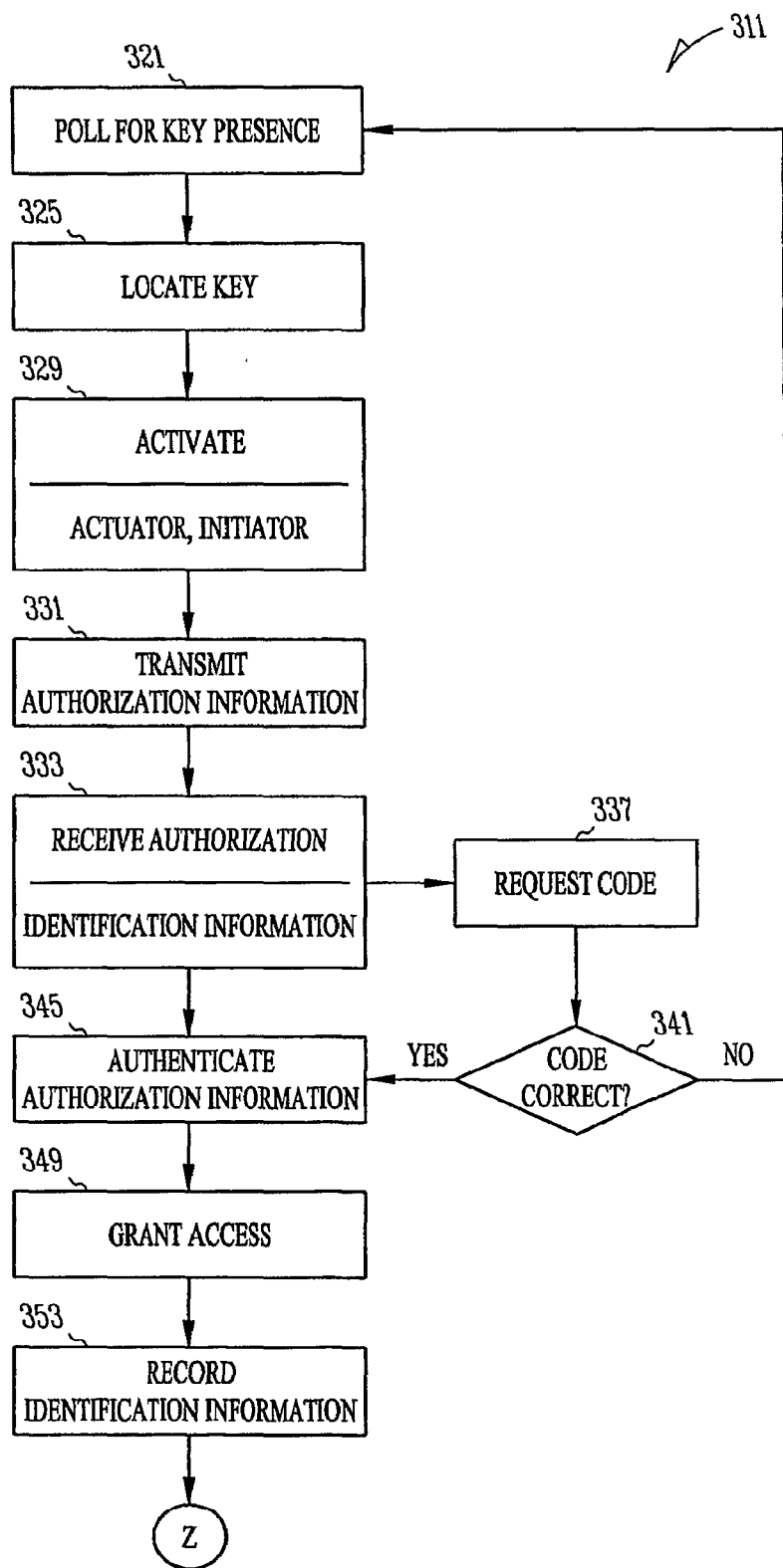


FIG. 3A

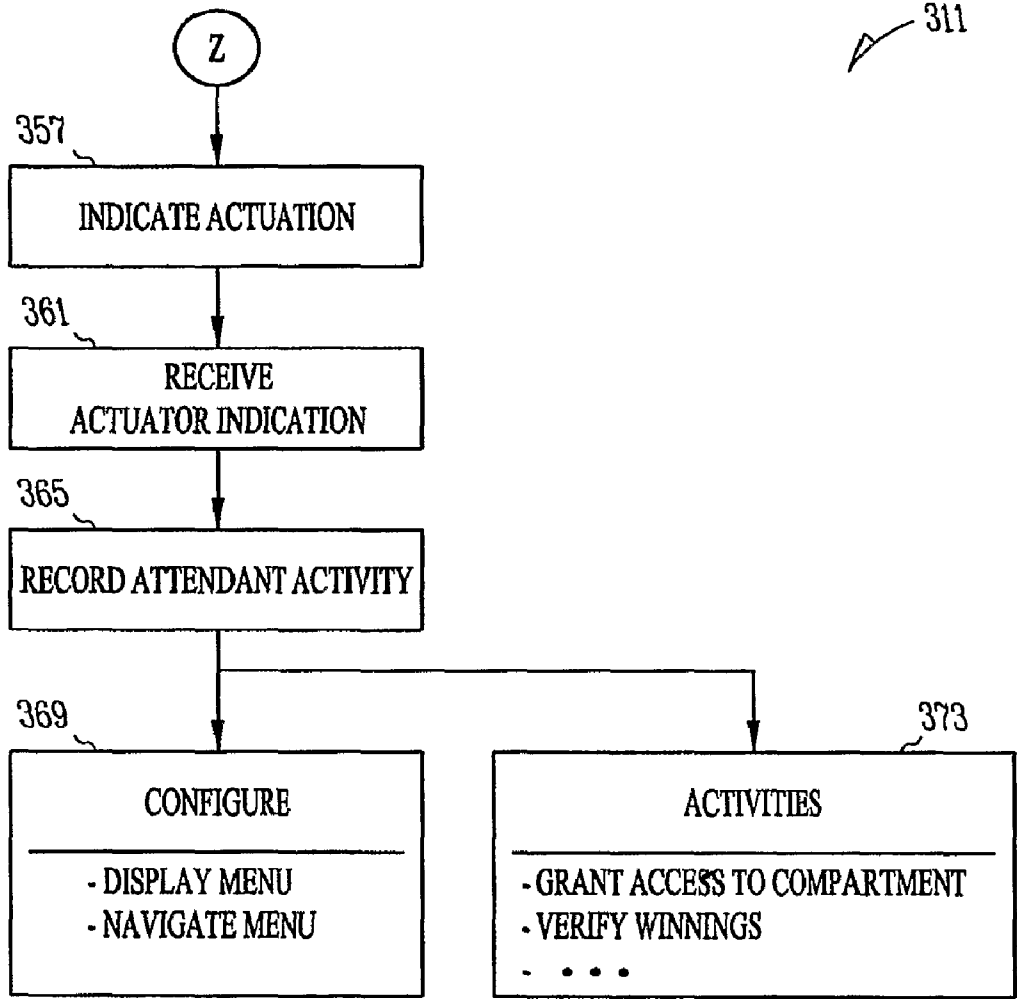


FIG. 3B

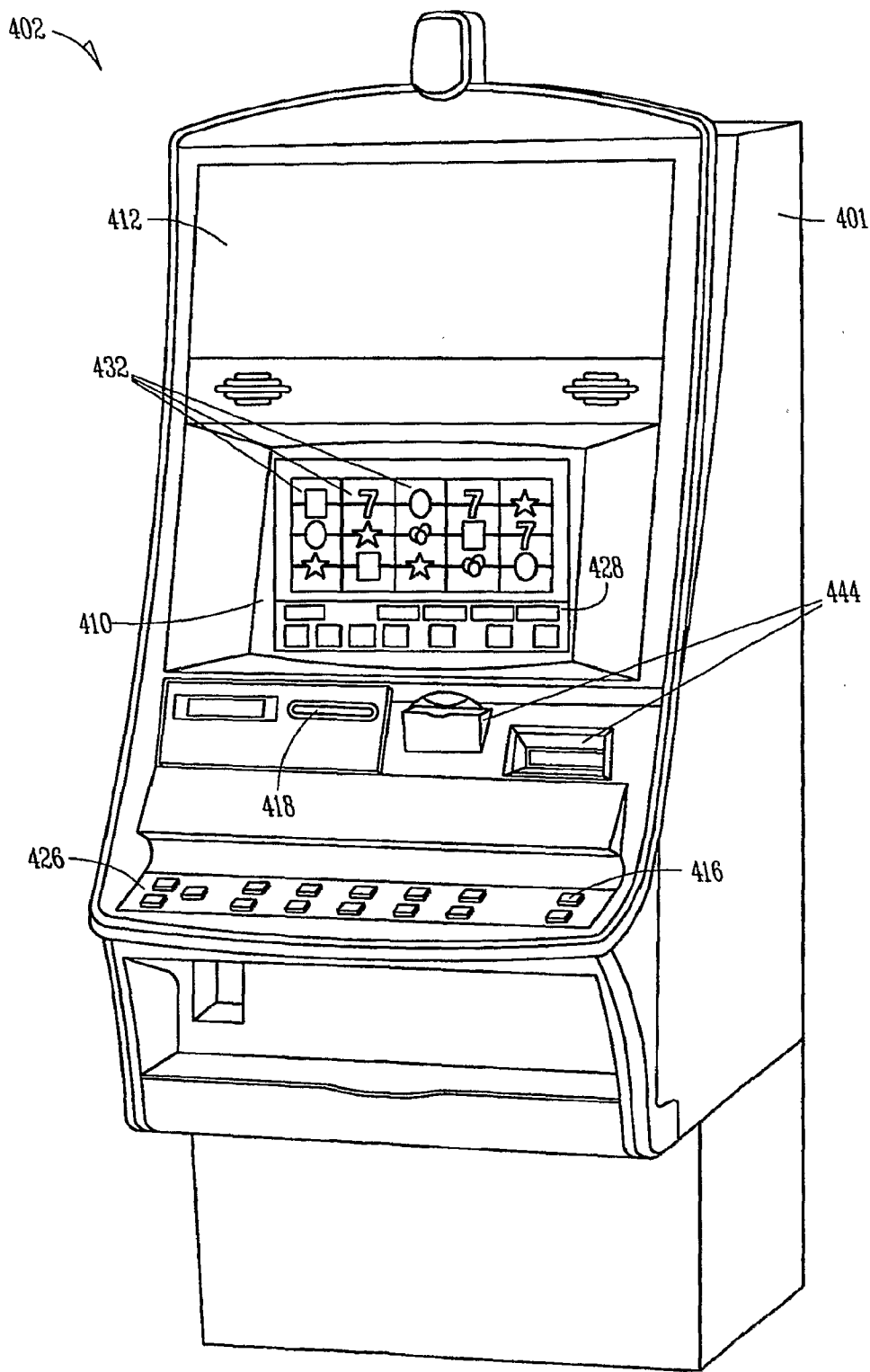


FIG. 4

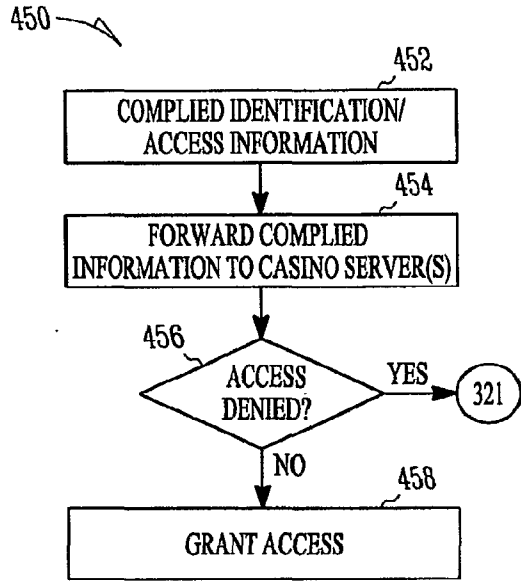


FIG. 5

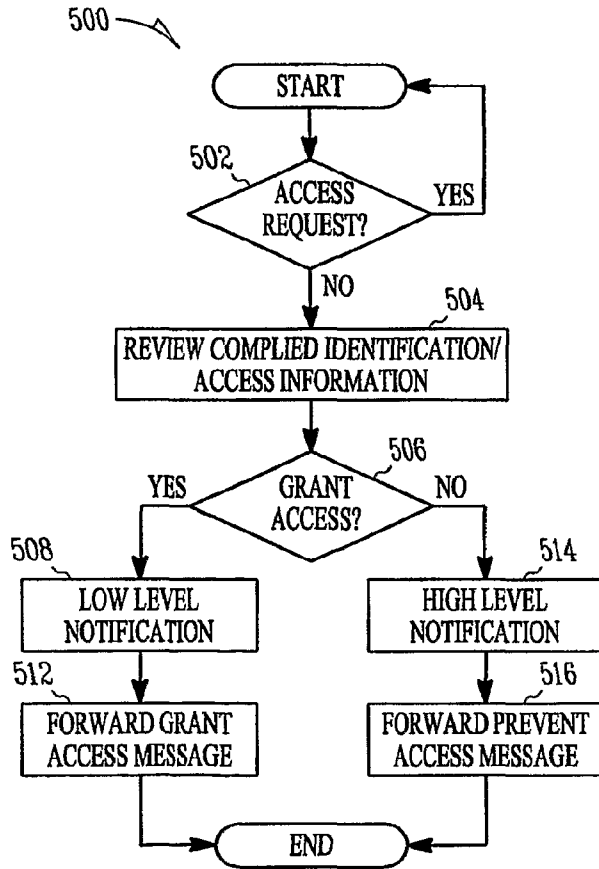


FIG. 6

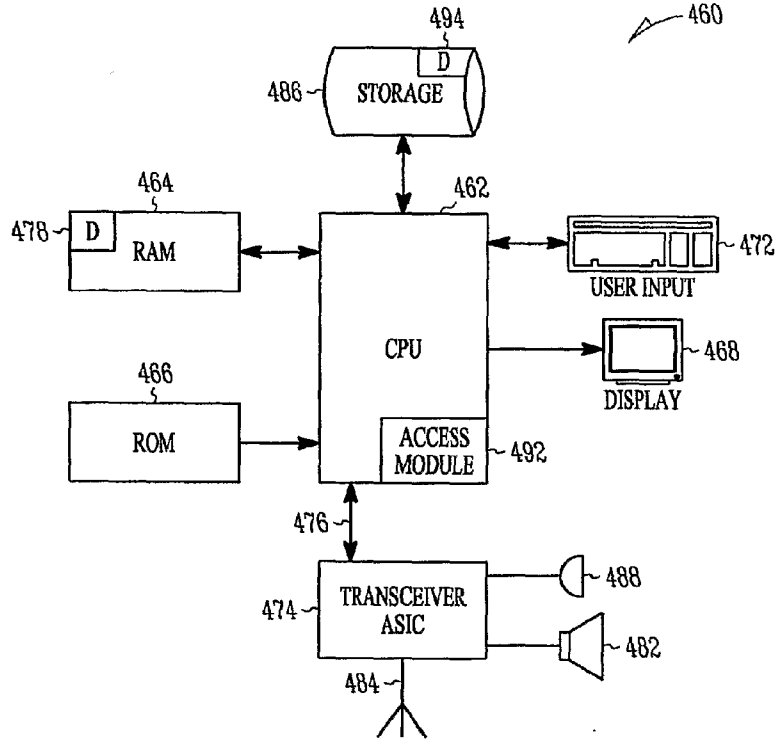


FIG. 7

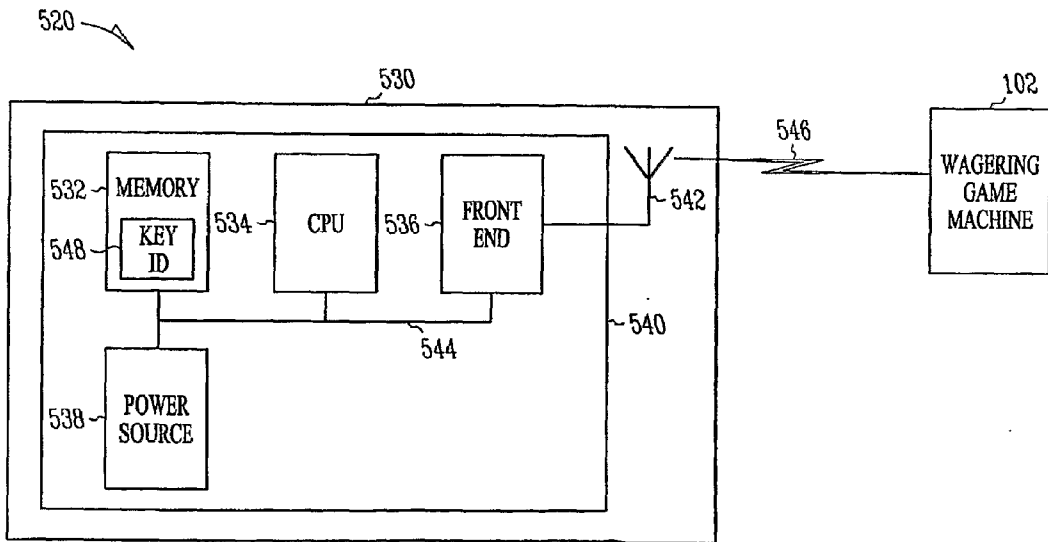


FIG. 8

WAGERING GAME MACHINE WIRELESS KEY

RELATED APPLICATIONS

[0001] This patent application claims the priority benefit of U.S. Provisional Patent Application Ser. No. 60/743,323 filed Feb. 20, 2006 and entitled “WAGERING GAME MACHINE WIRELESS KEY”, and of U.S. Provisional Patent Application Ser. No. 60/845,338 filed Sep. 18, 2006 and entitled “WAGERING GAME MACHINE WIRELESS KEY”, which applications are incorporated herein by reference.

FIELD

[0002] Embodiments of the inventive subject matter relate generally to wagering game machines, including access and configuration mechanisms associated with wagering game machines.

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BACKGROUND

[0004] Wagering game makers strive to improve the user experience associated with the games they provide. One way of increasing the entertainment value associated with wagering game operations includes offering excellent customer service to the user. For example, if play has stopped because the game needs a tilt condition cleared, the person playing the game appreciates prompt attention by an attendant.

[0005] Typically a mechanical key, carried by the attendant, is used to provide access to various features of the wagering game machine, such as reset operations and clearing tilts. Because a single attendant may carry a large number of keys, accessing a particular game may require some time before the proper key is located. The use of mechanical keys also can affect the physical placement of the machines, due to the location of access doors and key cylinders. Finally, such keys may sometimes be readily duplicated, lost, and/or stolen, which can present additional customer service and security issues. Thus, there is a need for improved apparatus, systems, and methods providing access to wagering game machines.

BRIEF DESCRIPTION OF THE DRAWINGS

[0006] FIG. 1 is a block diagram illustrating apparatus and systems according to various embodiments of the invention.

[0007] FIG. 2 is a block diagram illustrating a wagering game machine network according to various embodiments of the invention.

[0008] FIGS. 3A-3B comprise a flow diagram illustrating several methods according to various embodiments of the invention.

[0009] FIG. 4 is a perspective view of a wagering game machine according to various embodiments of the invention.

[0010] FIG. 5 comprises a flow diagram illustrating several methods according to various embodiments of the invention.

[0011] FIG. 6 comprises a flow diagram illustrating several methods according to various embodiments of the invention.

[0012] FIG. 7 is a block diagram illustrating an apparatus according to various embodiments of the invention.

[0013] FIG. 8 is a block diagram illustrating apparatus and systems according to various embodiments of the invention.

DETAILED DESCRIPTION

Example Operating Environment

[0014] FIG. 1 is a block diagram illustrating apparatus 190 and systems 160 according to various embodiments of the invention. As shown in FIG. 1, a wagering game machine 102 may include a central processing unit (CPU) 126 coupled to a main memory 128, which may include a wagering game unit 132 and an authentication unit 136. In many embodiments, the wagering game unit 132 can receive wagers and conduct wagering games, such as video poker, video black jack, video slots, video lottery, etc. In some embodiments, the wagering game machine 102 may comprise a mobile wagering game machine 104.

[0015] The CPU 126 may be coupled to an input/output (I/O) bus 122, which facilitates communication between the wagering game machine's components. For example, the I/O bus 122 may be connected to a payout mechanism 108, a primary display 110, a secondary display 112, other displays (not shown), a value input device 114, a player input device 116, an information reader 118, a wager input unit 120, and a storage unit 130. In some embodiments, the wager input unit 120 can electronically receive wagering value (e.g., monetary value) from a player's casino account or other suitable “cashless gaming” value source.

[0016] The I/O bus 122 may also be connected to an external system interface 124, such as a network interface, which can in turn be connected to external systems 106 (e.g., wagering game networks). In some embodiments, the I/O bus 122 and/or the external system interface 124 may be connected to a transmitter 140 and/or receiver 142, that are in turn connected to an antenna 144.

[0017] In some embodiments, the wagering game machine 102 includes additional peripheral devices and/or more than one of each component shown in FIG. 1. For example, in one embodiment, the wagering game machine 102 may include multiple external system interfaces 124 and multiple CPUs 126. In some embodiments, any of the components can be integrated or subdivided. Additionally, in some embodiments, the components of the wagering game machine 102 can be interconnected according to any suitable interconnection architecture (e.g., directly connected, bus (as shown), network, hypercube, etc.).

[0018] In some embodiments, a key 100 to authorize access to a gaming machine control system 138 included in the wagering game machine 102 may be used by an attendant to gain access to a multitude of features and elements of the wagering game machine 102. The key 100 typically communicates with the wagering game machine 102 using a wireless connection 134. In some embodiments the key 100 communicates with the wagering game machine 102 via radio frequencies (RF) or infrared frequencies. The key 100 may also communicate with a wagering game server 252 (FIG. 2) directly or indirectly via the LAN 258.

[0019] Embodiments of the key 100 may include a variety of elements, such as a display 162, including a touch screen display, a processor 164, one or more memories 166 (e.g.,

volatile and/or non-volatile memories), indicators **168** (e.g., lights, light-emitting diodes, fiber optics), actuators **170** (e.g., manual push-buttons, electronic capacitive switches, resistive switches), biometric sampler **169**, and keypads/keyboards **172**. In some embodiments, the function of physical indicators **168** may be supplemented, or supplanted, by virtual indicators **174** shown on the display **162**. If the display **162** comprises a touch screen display, the function of the actuators **170** may also be supplemented or supplanted by locations **176** on the display **162** that are responsive to touch. Most embodiments include a transmitter **178** and/or receiver **180**, coupled to an antenna **182**, so as to communicate authorization information **184** via the wireless connection **134** to one or more wagering game machines **102**.

[0020] Thus, many embodiments may be realized. For example, an apparatus **190** may comprise a key **100** to authorize access to a gaming machine control system **138** included in a wagering game machine **102** having a wagering game machine **102** operable to receive a wager in association with a wagering game. The key **100** may further include a wireless mechanism **186**, such as a wireless transmitter **178** and/or wireless receiver **180**, to send authorization information **184** to the wagering game machine **102**. The wireless mechanism **186** may comprise many elements, such as a passive radio-frequency identification device (RFID), an active RFID device, and/or a transceiver, among others.

[0021] The wireless receiver **180** might be used to receive information from the wagering game machine **102**, such as an initiation or polling communication that elicits the provision of authorization information **184** by the key **100**. The wireless receiver **180** might also be used to receive an acknowledgement indication that some particular signal (e.g., the authorization information) was received by the wagering game machine **102**.

[0022] In some embodiments, the memory **166** may comprise a volatile memory, or a non-volatile memory, or both. The memory **166** may be one-time programmable, or re-programmable. The memory **166** may be used to store identification information unique to the key **100**, and/or the attendant entrusted with the use of the key **100**. The memory **166** may be used to record a variety of activities in which the attendant may engage, as explained in detail below.

[0023] In some embodiments, the key **100** may include an encryption engine **188**. The encryption engine **188**, perhaps comprising a separate processor, may be used to encrypt authorization information **184** that is later decrypted and verified by the wagering game machine **102**, perhaps as part of the functions executed by the authentication unit **136**. In an embodiment any communication **134** between the key **100** and a wagering game machine **102** may be encrypted using one or more known wireless encryption protocols or techniques.

[0024] The actuators **170** included in the key may include any of several types. For example, the actuators **170** may include an authorization actuator to initiate transmission of the authorization information **184**. As noted above, the actuators **170** may take any of several forms, including one or more buttons on a key fob. In an embodiment, the key **100** may require a user to provide biometric data via the biometric sampler **169** or touch screen **162** or provide other unique user indicia via the touch screen **162**. The biometric data may be a representation of a user's fingerprint, retinal scan or other user unique biometric information.

[0025] The memory **166** may include sampled biometric data or unique data for each authorized key user. When a user attempts key **100** activation, the user may be required to provide biometric data via the biometric sampler **169** or unique user indicia via another input. The key **100** may compare the sampled biometric data or unique user indicia to the authorized data in memory **166** and determine whether to grant functionality to the user. The key **100** may limit user functionality based on the user's biometric data, unique user indicia or other input including a key fob.

[0026] In an embodiment the key **100** may transmit a user's biometric data, unique user indicia, or other input to the wagering game machine **102**, wagering game server **252**, or other casino **256**. The wagering game machine **102**, wagering game server **252**, or other casino **256** may compare the sampled biometric data, unique user indicia, or other input to the authorized user data in a database **478**, **494** (FIG. 7) and determine whether the user is authorized to use the key **100**. The wagering game machine **102**, wagering game server **252**, or other casino **256** may transmit an authorization message that may grant or deny a user access to the wagering game machine **102** via the key **100**. The authorization message may also include a user access level where a key **100** or wagering game machine **102** may use the access level to limit or set the functions or controls a user may be able to perform on the wagering game machine **102**.

[0027] In an embodiment the database **478**, **494** or storage unit **130** may include a captured or authorization list for keys **100**. The wagering game machine **102**, wagering game server **252**, or other casino **256** may determine whether the key **100** is on the list and restrict wagering game machine **102** accordingly. For example, keys **100** on a captured list may be denied authorization to wagering game machines **102**. In addition, the wagering game machine **102**, wagering game server **252**, or other casino **256** may compile and store user specific or key specific task lists in a database **478**, **494**, storage unit **130**. The wagering game machine **102**, wagering game server **252**, or other casino **256** may forward a task list to a key **100** along with an authorization message where a user may be able to view the list via the key's **100** display **162**.

[0028] Further, the wagering game machine **102**, wagering game server **252**, or other casino **256** may inform machine, server, or casino attendants via a user perceptible format the identity of a key **100** or user attempting access to a wagering game machine **102**. The wagering game machine **102** may forward authorization requests including a unique key **100** identifier and user identifier to a wagering game server **252** or other casino **256**. The wagering game server **252** or other casino **256** may inform associated attendants of authorization attempts including user indicia and key indicia. In an embodiment a wagering game server **252** or other casino **256** may audibly via a local speaker or telephony including POTS, cellular, or other RF system inform associated attendants of authorization attempts.

[0029] Another form of actuator **170** may include an activity function actuator. For example, after access to the wagering game machine **102** has been granted, perhaps as a function of the authentication unit **136**, an activity function actuator might be operated (e.g., depressed) to reset the machine **102**, or to initiate some other activity that has been pre-programmed, such as opening a diagnostic menu on the primary display **110**. Some embodiments of the key **100** may include actuators representing arrow up and arrow down but-

tons to navigate a displayed menu, either on the primary display 110, or on the key display 162.

[0030] As noted above, the indicators 168 may also take several forms. For example, the key 100 may include an indicator 168 that comprises an activity function indicator. Examples include a small LED that lights to indicate when the key 100 is in the process of communicating over the wireless connection 134, and/or that a battery included in the key 100 is functional. Of course, separate virtual indicators 174 may also be used to indicate similar or identical information, as well as other information, including whether the authorization information 184 has been accepted by the machine 102, and whether or not access to the gaming machine control system 138 has been granted.

[0031] Other embodiments may be realized. For example, a wagering game machine 102, 104 may comprise a gaming machine control system 138 including a wagering game unit 132 operable to receive a wager in association with a wagering game, and a receiver 142 to receive wireless authorization information 184 to authorize access to the gaming machine control system 138. Some embodiments may include an external system interface 124, such as a network interface, to couple to the gaming machine control system 138. As noted previously, the wagering game machine 102 may also include an authentication unit 136 to authenticate the authorization information, as well as a display (e.g., displays 110, 112) to display graphics associated with accessing the gaming machine control system. For example, the display 110 may display a request for entry of an access code, user biometric data or other unique user indicia, as part of authenticating the authorization information, or in addition to it.

[0032] The response may be entered using one of the actuators 170, the touch screen 162, and/or the keypad/keyboard 172. In an embodiment the wagering game machine 102 may include a biometric sampler 121. After authentication via a key 100, a user may be required to provide biometric data to a gaming machine 102 via the biometric sampler 121 prior to accessing the machine 102. In an embodiment, the primary or secondary display 110, 112 may be a touch screen and coupled with the biometric sampler 121.

[0033] In some embodiments, any of the components of the wagering game machine 102 (e.g., the authentication unit 136) can include hardware, firmware, and/or software for performing the operations described herein. Furthermore, any of the components can include machine-readable media including instructions 140 for causing a machine to perform the operations described herein. Machine-readable media includes any mechanism that provides (i.e., stores and/or transmits) information in a form readable by a machine (e.g., a wagering game machine, computer, etc.). For example, tangible machine-readable media includes read only memory (ROM), random access memory (RAM), magnetic disk storage media, optical storage media, flash memory, the main memory 128, and the storage unit 130, etc. Machine-readable media also includes any media suitable for transmitting software over a network.

[0034] FIG. 8 is a block diagram illustrating a system 520 according to various embodiments of the invention. In the system 520 a passive or active RF identification (RFID) device 530 may function as a key 100 and may be employed to enable wireless access of a wagering game machine 102. In the system 520 the wagering game machine 102 may communicate, via a wireless air interface 546, with one or more RFID devices 530. In an embodiment the wagering game

machine 102, via the interface 546 may provide power, query, data, and timing information to an RFID device 530. A RFID device 530, responsive to power, query, data, and timing information may provide response data including a Key ID 548 that uniquely identifies the RFID device 530. The wagering game machine 102 may determine whether the RFID device 530 is an authorized key based on its Key ID 548. The wagering game machine 102 may also forward the Key ID 548 to a wagering game server 252 or casino 256.

[0035] In an embodiment a RFID device 530 may scavenge power from a received radio-frequency signal and may backscatter response data (including its Key ID 548) to the wagering game machine 102 by modulating the impedance of the antenna 542. During a RFID device to wagering game machine 102 transmission, the wagering game machine 102 may transmit a Continuous-Wave (CW) radio signal. The RFID device 530 may backscatter-modulate the CW signal with bits representing its Key ID 548, creating a radio-frequency (RF) information waveform that is transmitted back to the wagering game machine 102.

[0036] In an embodiment the RFID device 530 includes a RFID circuit or chip 540 coupled to an antenna or antennae to facilitate the reception and transmission of radio-frequency signals via the air interface 546. The RFID circuit 540 and the antenna 542 may be located on a base material or substrate (e.g., a plastic or paper material) to constitute the RFID device 530. In an embodiment the RFID device 530 may include a number of subcomponents, which may be implemented on one or more integrated circuits that form part of the RFID device 530. As shown in FIG. 8 the RFID device 530 may include an RF front end 536, a CPU 534, a memory 532, and a power source 538 where the components are coupled together via a bus 544.

[0037] The front end 536 may include components to facilitate the processing of radio-frequency signals received via the coupled antenna 542 and also to facilitate the transmission of a radio-frequency signal (e.g., a modulated backscatter signal) via the coupled antenna 542. The CPU 534 may control the operation and states of the RFID device 530. The memory 532 may store, inter alia, a Key identifier 548, a product identifier, configuration values applicable to configuration of the RFID device 530 and possibly one or more algorithms. In an embodiment, the RFID device 530 may be a passive device that scavenges power from radio-signals received via the air interface 546. Alternatively, the RFID device 530 may be an active device and include a power source 538 to power the RFID device 530. While FIG. 1 describes example embodiments of a wagering game machine, FIG. 2 shows how a plurality of wagering game machines can be connected in a wagering game network. Thus, FIG. 2 is a block diagram illustrating a wagering game machine network according to various embodiments of the invention. As shown in FIG. 2, the wagering game network 206 may include a plurality of casinos 256 connected to a communications network 260.

[0038] Each of the plurality of casinos 256 may include a local area network 258, which in turn may include wagering game machines 202 and mobile wagering game machines 204 connected to a wagering game server 252. The wagering game machines 202, mobile wagering game machines 204, and wagering game server 252 can include hardware and machine-readable media including instructions for carrying out the various methods described herein. In one embodiment, the wagering game server 252 can perform such methods in concert with serving wagering games over the local

area network 258. Any one or more of the wagering game machines 202 and mobile wagering game machines 204 may be similar to or identical to the wagering game machine 102 shown in FIG. 1.

[0039] The wagering game machines 102, 104, 202, 204 described herein can take any suitable form, such as floor standing models, handheld mobile units, bartop models, workstation-type console models, etc. In one embodiment, the wagering game network 206 can include other network devices, such as accounting servers, wide area progressive servers, and/or other devices suitable for use in connection with embodiments of the invention. The components of each casino 256 can communicate over wired 208 and/or wireless connections 234 including cellular and satellite based communication. Furthermore, they can employ any suitable connection technology, such as Bluetooth, 802.11, Ethernet, public switched telephone networks, SONET, etc.

[0040] Thus, further embodiments may be realized. For example, referring now to FIGS. 1 and 2, it can be seen that a wagering game system 160, 206 may comprise a wagering game machine 102, 104, 202, 204 coupled to a receiver (e.g., receiver 142) and a gaming machine control system (e.g., control system 138). The system 160, 206 may also comprise one or more wagering game units (e.g., wagering game unit 132) operable to receive a wager in association with a wagering game, as well as one or more keys 100, 200 to authorize access to the gaming machine control system in the various wagering game machines 102, 104, 202, 204. In some embodiments, the keys 100, 200 may include a wireless mechanism 186 to send authorization information 184 to the receiver 142 in the wagering game machine 102. Thus, the key 200 may be similar to or identical to the key 100, and communicate with the various wagering game machines 102, 104, 202, and 204 using a wireless connection 134, 234.

[0041] In some embodiments, the system 160, 206 may include one or more servers 252 to couple to the gaming machine control systems in the wagering game machines 102, 104, 202, 204 via one or more networks 258, 260. As noted previously, each of the wagering game machines 102, 104, 202, 204 may include an authentication unit 136 coupled to the wagering game unit (e.g. a wagering game unit 132 in the machines 102, 104, 202, 204) to authenticate the authorization information 184 transmitted by the key 100, 200. In some embodiments, the wagering game unit system 206 may include one or more displays 110, 112, 210 to display graphics associated with access to the gaming machine control systems 138 in the machines 102, 104, 202, 204.

[0042] The embodiments described herein may provide a variety of advantages. For example, casino attendants that make use of the keys 100, 200 do not have to physically place a key into a machine to access various features, saving time and effort. At the same time, since the keys 100, 200 may be used so as to never leave the person of the attendant, there is less chance of their being lost or stolen. The keys 100, 200 can be programmed, perhaps depending on the status and responsibility of the attendant that uses them, and the access options selected. Each key 100, 200 can also identify the attendant that uses it, since programming with a unique number that corresponds to the attendant is possible. Thus, attendants endowed with keys 100, 200 may be able to react more quickly to customers, and access the corresponding machines, without having to fumble for keys, while the number of lost and stolen keys may be reduced.

[0043] Many activities of the attendant may be regulated via the use of keys 100, 200. For example, upon granting access to the control system 138, the attendant may be permitted to clear control system memory, such as the main memory 128, or storage unit 130 memory. Paytables may be changed, games may be changed, firmware may be verified, software may be verified, and media may be downloaded from an external source, including from the key 100, 200 itself. Other permitted activities may include, but are not limited to: obtaining game play history, clearing tilts, resetting the wagering game machine, unlocking game features, obtaining information regarding money movement in and out of the wagering game machine, verifying winnings, etc. As noted, user or attendant activities may be limited as a function of user biometric data, user unique indicia or other user input.

[0044] As mentioned previously, the memory 166 in the key 100, 200 may be used to store a variety of information such as the actions performed by the attendant, the date such were performed, the number of times they were performed, the money removed or added, the games changed or selected, game play history, when winnings were verified, clock-in times, clock-out times, key reprogramming times, etc. Such information might also be transferred to the server 252, if desired. The server 252 may transmit tasks to a key 100, 200 where received tasks may be stored in the memory 166 for display to a user. The server 252 may transmit tasks based on a wireless key's location relative to one or more wagering game machines 102, 104 or the user associated with the key 100, 200.

[0045] An apparatus 460 is shown in FIG. 7 that may be used in various embodiments as a server 252. The apparatus 460 may include a central processing unit (CPU) 462, a random access memory (RAM) 464, a read only memory (ROM) 466, a display 468, a user input device 472, a transceiver application specific integrated circuit (ASIC) 474, a microphone 478, a speaker 482, a storage device 486, and an antenna 484. The CPU 462 may include an access module 492.

[0046] In an embodiment, the access or authentication module 492 may receive access or authentication requests or notifications from a key 100 or wagering game machine 102. The access module 492 may generate authentication grant or denial messages for the wagering game machine 102 or key 100 in response to authentication requests or notifications. The access module 492 may, via the display 468, speaker 482, or ASIC 474, provide authentication notification to one or more server attendants where the notification may include identification of wireless key 100, 200 being used to seek access or the user requesting access to a wagering game machine 102.

[0047] The RAM 464 may include an access database 478 where the access database 478 may be used to store received access requests or notifications, captured or authorized wireless key databases, wireless key or user task databases, user unique data, access codes, or user biometric data. The access module 492 may retrieve user data from the access database 478 in response to access requests or notifications to determine whether an authorized or active user or attendant is seeking access to one or more wagering game machines 102. The access module 492 may also determine whether the wireless key 100, 200 associated with the authentication or access request has been captured (stolen) or is authorized to enable wagering game access. The access module 492 may also generate task lists for a specific wireless key 100, 200 or user.

The apparatus **460** may transmit the task list or access messages to a wireless key **100, 200**.

[0048] The ROM **466** is coupled to the CPU **462** and may store program instructions executed by the CPU **462** and access module **492**. The RAM **464** is coupled to the CPU **462** and may store temporary program data, overhead information, and access database **478**. The user input device **472** may comprise an input device such as a keypad, touch pad screen, track ball or other similar input device that allows the user or server attendant to navigate through menus in order to operate the apparatus **460**. The display **468** may be an output device such as a CRT, LCD or other similar screen display that enables the user or server attendant to read, view, or hear access notifications.

[0049] The microphone **488** and speaker **482** may be incorporated into the device **460**. The microphone **488** and speaker **482** may also be separated from the apparatus **460**. Received data may be transmitted to the CPU **462** via a serial bus **476** where the data may include access requests or notifications, access grants or denials, security notifications, or protocol information. The transceiver ASIC **474** may include an instruction set necessary to communicate data signals over the LAN **258**, a wireless network, or cellular network. The ASIC **474** may be coupled to the antenna **484** to communicate signals within a wireless network. The storage device **486** may comprise any convenient form of data storage. The storage device **486** may include an access database **494** where the access database **494** may be used to store received access requests or notifications, captured or authorized wireless key databases, wireless key or user task databases, user unique data, access codes, or user biometric data.

[0050] Any of the components previously described can be implemented in a number of ways, including simulation via software. Thus, the keys **100, 200**; wagering game machine **102**; mobile wagering game machine **104**; payout mechanism **108**; displays **110, 112, 210**; value input device **114**; player input device **116**; information reader **118**; wager input unit **120**; **110** bus **122**; external system interface **124**; CPU **126**; main memory **128**; storage unit **130**; wagering game unit **132**; wireless connections **134, 234**; authentication unit **136**; gaming machine control system **138**; transmitters **140, 178**; receivers **142, 180**; antennas **144, 182**; wagering game systems **160, 260**; display **162**; processor **164**; memory **166**; indicators **168**; actuators **170**; keypads/keyboards **172**; virtual indicators **174**; locations **176**; authorization information **184**; wireless mechanism **186**; encryption engine **188**; apparatus **190**; mobile wagering game machines **204**; wagering game network **206**; wired connections **208**; wagering game server **252**; casinos **256**; local area network **258**; communications network **260**, apparatus **460**, CPU **462**, RAM **464**, ROM **466**, transceiver ASIC **474**, access module **492**, user input **472**, display **468**, microphone **488**, speaker **482**, storage device **486**, and antenna **484** may all be characterized as "modules" herein.

[0051] These modules may include hardware circuitry, single or multi-processor circuits, memory circuits, software program modules and objects, firmware, and combinations thereof, as desired by the architect of the systems **160, 260** and apparatus **190**, and as appropriate for particular implementations of various embodiments. In some embodiments, the modules may be included in a system operation simulation package such as a software electrical signal simulation package, a power usage and distribution simulation package, a network security simulation package, a power/heat dissipa-

tion simulation package, a signal transmission-reception simulation package, or any combination of software and hardware used to simulate the operation of various potential embodiments. Such simulations may be used to characterize or test the embodiments, for example.

[0052] It should also be understood that the apparatus and systems of various embodiments can be used in applications other than wagering game machines. Thus, various embodiments of the invention are not to be so limited. The illustrations of apparatus **190** and systems **160, 260** are intended to provide a general understanding of the structure of various embodiments, and they are not intended to serve as a complete description of all the elements and features of apparatus and systems that might make use of the structures described herein.

[0053] Applications that may include the novel apparatus and systems of various embodiments include electronic circuitry used in high-speed computers, communication and signal processing circuitry, modems, single or multi-processor modules, single or multiple embedded processors, and application-specific modules, including multilayer, multi-chip modules. Such apparatus and systems may further be included as sub-components within a variety of electronic systems, such as data bridges, switches, and hubs; televisions and cellular telephones; personal computers and workstations; medical devices; radios and video players; and vehicles, among others.

Example Operations

[0054] FIGS. 3A-3B comprise a flow diagram illustrating several methods **311** according to various embodiments of the invention. For example, in some embodiments, a method **311** may begin at block **321** with polling (perhaps by one or more wagering game machines) to detect the presence of a wireless key. The method **311** may also begin (or continue) at block **325** with locating the wireless key within a selected distance of the wagering game machine to initiate the process of accessing a gaming machine control system. For example, in some embodiments, the selected distance may be less than one meter, in others, less than 10 cm, and in still others, less than 1 cm.

[0055] The method **311** may continue at block **329** with activating one or more of an authorization actuator included in the wireless key, and an initiation mechanism included in the wagering game machine (e.g., the player input device **116**, such as a push-button, wheel, or joystick) to initiate a process of accessing the gaming machine control system. In some embodiments, the correct activation sequence may involve activating one or more authorization activators included in the key **100** including data biometric sampler **169** substantially simultaneously with locating the key close to the wagering game machine, and/or with activating the initiation mechanism. In some embodiments, these activities may be used to initiate the access process if they are accomplished within a selected time period, i.e., one activity occurs some selected time after another occurs.

[0056] The method **311** may include transmitting the authorization information (using the wireless key) at block **331**. In some embodiments, the method **311** may include also transmitting identification information associated with the wagering game machine at block **331**. The identification information may be unique, perhaps comprising attendant unique data and wireless key **100** device data including a media access control (MAC) address. The address might be

entered using a keypad or keyboard on the key, or at the wagering game machine, via a player input device. The display on the key might even be used to display information about multiple game machines in the area, and the intended machine could be selected using the key, such that individual game machines may be controlled over longer distances. Progressive gaming involves a gaming device, or wagering game machine, that has an increasing jackpot based on a function of credits that are bet. Included are games that award progressive jackpots or a pool based on criteria other than obtaining winning symbols on the machine.

[0057] Progressive gaming may include stand-alone progressive game machines, which comprise a single progressive game that is not a part of a link; multiple game machines, or “linked progressives” that offer common progressive jackpots linked to a progressive controller within a single gaming venue; and multi-site progressive gaming machines that are interconnected across more than one gaming venue. A multi-site progressive gaming machine can offer common progressive jackpots (e.g., a system jackpot) at all participating locations. Some wagering game machines described herein can be identified in a manner similar to or identical to the manner in which networks and servers identify individual machines for linked and multi-site progressives.

[0058] The method **311** may continue with receiving the authorization information from the wireless key at the wagering game machine at block **333**. Receiving the authorization information may include receiving identification information associated with the wireless key, such as wireless key identification information and attendant identification information.

[0059] In some embodiments, the method **311** may also include requesting entry of a code by the wagering game machine at block **337**. If the code entered is evaluated as being incorrect at block **341**, the method **311** may continue at block **321**. If the code entered is evaluated as being correct at block **341**, then the method **311** may continue at block **345** with authenticating the authorization information at block **345**.

[0060] The method **311** may include granting access to the gaming machine control system included in the wagering game machine in response to receiving the authorization information at block **349**. As noted above, the process of accessing the wagering game machine can be initiated by the key alone, or by the wagering game unit (e.g., using polling), or a combination of both (e.g., operating actuators on the key and a player input device on the wagering game machine within a selected period of time. The process of accessing a wagering game machine may include entering biometric data via the wireless key **100**, wager machine **102**, or both). The identification information associated with the wireless key, and received by the wagering game machine, may be recorded by the wagering gaming machine, perhaps in a non-volatile memory, at block **353**.

[0061] In some embodiments, the method **311** may include activating an activity function actuator included in the wireless key (e.g., to reset the wagering game machine) at block **357**, and receiving some indication that an actuator has been activated at block **361**. The method **311** may also include recording attendant activity associated with the wagering game machine in a memory included in the wireless key at block **365**.

[0062] The method **311** may include configuring the wagering game machine at block **369**, perhaps by displaying a menu in response to receiving the authorization information. As noted previously, the menu may be displayed on a

display included in the wagering game machine, or a display included in the wireless key, or both. Configuring the wagering game machine may also include navigating a configuration menu using one or more activity function actuators included in the wireless key.

[0063] In some embodiments, the method **311** may include conducting a number of activities associated with the wagering game machine at block **373**, including but not limited to granting access to a compartment of the wagering game machine to replace supplies, verifying winnings associated with the wagering game, perhaps in response to receiving an activation indication associated with an activity function actuator included in the wireless key. Others may include clearing the control system memory, changing paytables and games, verifying firmware and software, downloading media, obtaining game play history, clearing tilts, resetting the wagering game machine, unlocking game features, obtaining information regarding money moved in and out of the wagering game machine, and verifying winnings.

[0064] Advantages that may accrue include presenting attendants with a small fob that is programmed to correspond to their identity. Without using a physical metal key, they are able to access the administration menu of a wagering game machine, or even reset it after a payout. The machine can be quickly accessed while a record of the attendant that performs each task is produced and stored, either within the key or the machine, or both (as a means of additional security).

[0065] FIG. **5** comprises a flow diagram illustrating a method **450** according to various embodiments of the invention that may be employed by a wagering game machine **102**. In an embodiment the method **450** may include compiling attendant or user access information or identification (activity **452**) and transmitting the compiled information to one or more wagering game servers **252** or casino servers **256** (activity **454**). The compiled information may include wireless key **100** machine unique identification, attendant access codes, key fob codes, or attendant biometric information. The compiled information may be received from the wireless key **100** or wagering game machine **102**. In an embodiment a server **252** or casino server **256** may generate an access denial or grant message in response to an access information/identification message.

[0066] The method **460** may include passing control to the block **321** of method **311** shown in FIG. **3A** when a deny access message is received from a server **252** or casino server **256**. The method **460** may include granting access to the attendant operating the wireless key **100** when a server **252** or casino does not transmit a deny access message or transmits a grant access message. A grant access message may also include a task list specific to the wireless key **100** or user requesting access via the wireless key **100**.

[0067] FIG. **6** comprises a flow diagram illustrating a method **500** according to various embodiments of the invention. In one embodiment, the method **500** may be employed by a server **252** or casino server **256**. The method **500** may include reviewing compiled identification or access information (activity **504**) when an access request or information message is received (activity **502**). In an embodiment the method **500** may include determining whether to grant or allow the requested access (activity **506**). The method **500** may include reviewing the received information to determine whether the key machine **100** (based on its identifier) is registered to an authorized attendant.

[0068] The method 500 may review a captured or authorized wireless key database to determine whether the wireless key is currently authorized to gain access to a wagering game machine. The method 500 may also include determining whether the attendant that is requesting access is currently authorized to use the wireless key 100 including currently employed or scheduled to be maintaining wagering game machines. When the access information includes attendant biometric information the method 500 may include determining whether the biometric data matches recorded attendant biometric data.

[0069] In an embodiment the method 500 may include generating low level notification (activity 508) and forwarding a grant access message (activity 512) when access is granted (activity 506). In an embodiment the low level notification may include visual or audio notification to one or more server 252 or casino 256 attendants. The method 500 may review an active task database to determine whether active tasks have been assigned to the wireless key or attendant associated with the access request. The method 500 may insert active task information in the grant access message. In an embodiment the method 500 may include generating high level notification (activity 514) and forward a prevent access message (activity 516) when access is denied (activity 506). In an embodiment the high level notification may include visual or audio notification to one or more server 252, casino server 256 attendants, local wagering game machine 102 attendants, security personnel, or regional police stations.

[0070] The methods described herein do not have to be executed in the order described, or in any particular order. Moreover, various activities described with respect to the methods identified herein can be executed in repetitive, serial, or parallel fashion. Information, including parameters, commands, operands, and other data, can be sent and received in the form of one or more carrier waves. The information may also be stored in tangible media, including a variety of memory devices, such as volatile and non-volatile media, including CD-ROMs, DVDs, and disk drives.

[0071] One of ordinary skill in the art will understand the manner in which a software program can be launched from a computer-readable medium in a computer-based system to execute the functions defined in the software program. Various programming languages may be employed to create one or more software programs designed to implement and perform the methods disclosed herein. The programs may be structured in an object-orientated format using an object-oriented language such as Java or C++. Alternatively, the programs can be structured in a procedure-orientated format using a procedural language, such as assembly or C. The software components may communicate using a number of mechanisms well known to those skilled in the art, such as application program interfaces or interprocess communication techniques, including remote procedure calls. The teachings of various embodiments are not limited to any particular programming language or environment.

[0072] Thus, other embodiments may be realized, including a machine-readable medium encoded with instructions for directing a machine to perform operations comprising any of the methods described herein.

Example Wagering Game Machine

[0073] FIG. 4 is a perspective view of a wagering game machine, according to example embodiments of the invention. Referring to FIG. 4, the wagering game machine 402

(which may be similar to or identical to the machines 102, 104, 202, 204 described above) may be used in gaming establishments, such as casinos. According to some embodiments, the wagering game machine 402 can be any type of wagering game machine and can have varying structures and methods of operation. For example, the wagering game machine 402 may comprise an electromechanical wagering game machine configured to play mechanical slots, or it may comprise an electronic wagering game machine configured to play video casino games, such as blackjack, slots, keno, poker, blackjack, roulette, etc.

[0074] The wagering game machine 402 may comprise a housing 401 and include input devices, such as wager input devices 444 (perhaps coupled to a wager input unit 120, shown in FIG. 1), and a player input device 416. For output, the wagering game machine 402 may include a primary display 410 for displaying information about a basic wagering game. The primary display 410 can also display information about a bonus wagering game and a progressive wagering game. The wagering game machine 402 may also include a secondary display 412 for displaying wagering game events, wagering game outcomes, and/or signage information. While some components of the wagering game machine 402 are described herein, numerous other elements can exist and can be used in any number or combination to create varying forms of the wagering game machine 402.

[0075] The wager input devices 444 can take any suitable form and may be located on the front of the housing 401. The wager input devices 444 can receive currency and/or credits inserted by a player. The wager input devices 444 can include coin acceptors for receiving coin currency and bill acceptors for receiving paper currency. Additionally, the wager input devices 444 can include ticket readers or barcode scanners for reading information stored on vouchers, cards, or other tangible portable storage devices. The vouchers or cards can authorize access to central accounts, which can transfer money to the wagering game machine 402. Some wagering game machines 402 may utilize RFID technology to identify players and accept payment using an RFID carried by a player without having to enter anything physical into the game.

[0076] The player input device 416 may comprise a plurality of push buttons on a button panel 426 for operating the wagering game machine 402. In addition, or alternatively, the player input device 416 can comprise a touch screen 428 mounted over the primary display 410 and/or secondary display 412.

[0077] The various components of the wagering game machine 402 can be connected directly to, or contained within, the housing 401. Alternatively, some of the wagering game machine's components can be located outside of the housing 401, while being communicatively coupled with the wagering game machine 402 using any suitable wired or wireless communication technology.

[0078] The operation of the basic wagering game can be displayed to the player on the primary display 410. The primary display 410 can also display a bonus game associated with the basic wagering game. The primary display 410 may include a cathode ray tube (CRT), a high resolution liquid crystal display (LCD), a plasma display, light emitting diodes (LEDs), or any other type of display suitable for use in the wagering game machine 402. Alternatively, the primary display 410 can include a number of mechanical reels to display the outcome. In FIG. 4, the wagering game machine 402 is shown as an "upright" version in which the primary display

410 is oriented vertically relative to the player. Alternatively, the wagering game machine can be a “slant-top” version in which the primary display 410 is slanted at about a thirty-degree angle toward the player of the wagering game machine 402. In yet another embodiment, the wagering game machine 402 can be a bartop model, a mobile handheld model, or a workstation console model.

[0079] A player may begin playing a basic wagering game by making a wager via the wager input device 418. The player can initiate play by using the player input device’s buttons or the touch screen 428. The basic game can include arranging a plurality of symbols along a payline 432, which indicates one or more outcomes of the basic game. Such outcomes can be randomly selected in response to player input. At least one of the outcomes, which can include any variation or combination of symbols, can trigger the occurrence of a bonus game.

[0080] In some embodiments, the wagering game machine 402 can also include an information reader 418, which can include a card reader, ticket reader, bar code scanner, RFID transceiver, or computer readable storage medium interface. In some embodiments, the information reader 418 can be used to award complimentary services, restore game assets, track player habits, etc.

[0081] Implementing the apparatus, systems, and methods disclosed herein may operate to provide a more enjoyable game playing experience. This is because attendants that make use of the wireless keys described herein can be more attentive to players and spend less time locating mechanical keys.

[0082] The personal service of the attendant can also improve the overall impression of customer service given by a casino. Rapid access to administrative game features means games can be returned to play more quickly after payouts or tilts—downtime is therefore less. Security may be improved, since wireless keys provide the ability to monitor attendants and their activities. The decreased need for mechanical key-holes on wagering game machines may permit the use of more games in the same amount of floor space. This also means fewer openings may exist in the walls of the wagering game chassis, lessening the chance of game penetration via destroying the lock cylinder with a screwdriver (or similar device), as a means of accessing various components inside the game.

General Comments

[0083] In the following detailed description, reference is made to specific examples by way of drawings and illustrations. These examples are described in sufficient detail to enable those skilled in the art to practice the inventive subject matter, and serve to illustrate how the inventive subject matter may be applied to various purposes or embodiments. Other embodiments are included within the inventive subject matter, as logical, mechanical, electrical, and other changes may be made to the example embodiments described herein. Features or limitations of various embodiments described herein, however essential to the example embodiments in which they are incorporated, do not limit the inventive subject matter as a whole, and any reference to the invention, its elements, operation, and application are not limiting as a whole, but serve only to define these example embodiments.

[0084] Such embodiments of the inventive subject matter may be referred to herein individually or collectively by the term “invention” merely for convenience and without intending to voluntarily limit the scope of this application to any

single invention or inventive concept, if more than one is in fact disclosed. Thus, although specific embodiments have been illustrated and described herein, any arrangement calculated to achieve the same purpose may be substituted for the specific embodiments shown. This disclosure is intended to cover any and all adaptations or variations of various embodiments. Combinations of the above embodiments, and other embodiments not specifically described herein, will be apparent to those of skill in the art upon reviewing the above description.

[0085] The Abstract of the Disclosure is provided to comply with 37 C.F.R. §1.72(b), requiring an abstract that will allow the reader to quickly ascertain the nature of the technical disclosure. It is submitted with the understanding that it will not be used to interpret or limit the scope or meaning of the claims. In addition, in the foregoing Detailed Description, it can be seen that various features are grouped together in a single embodiment for the purpose of streamlining the disclosure. This method of disclosure is not to be interpreted to require more features than are expressly recited in each claim. Rather, inventive subject matter may be found in less than all features of a single disclosed embodiment. Thus the following claims are hereby incorporated into the Detailed Description, with each claim standing on its own as a separate embodiment.

1. An apparatus, comprising:
 - a key to authorize access to a gaming machine control system included in a wagering game machine having a wagering game unit operable to receive a wager in association with a wagering game; and
 - a wireless mechanism included in the key configured to transmit to and receive from the wagering game machine at least information associated with operation of the wagering gaming machine.
- 2.-3. (canceled)
4. The apparatus of claim 1, further comprising: an encryption engine included in the key.
5. The apparatus of claim 1, further comprising: an authorization actuator included in the key to initiate transmission of the authorization information.
6. The apparatus of claim 1, further comprising: an activity function actuator included in the key to initiate functions of the wagering game machine after access to the wagering game machine is granted.
- 7.-11. (canceled)
12. A method comprising:
 - receiving authorization information from a wireless key at a wagering game machine including a wagering game unit operable to receive a wager in association with a wagering game;
 - granting access to a gaming machine control system included in the wagering game machine in response to receiving the authorization information based upon an automatic comparison between the authorization information and existing authorized user data; and
 - transmitting at least information associated with operation of the wagering game machine to the wireless key.
13. The method of claim 12, further including: recording identification information associated with the wireless key.
14. The method of claim 13, wherein the identification information includes at least one of wireless key identification information and attendant identification information.
15. (canceled)

- 16. The method of claim 12, further including: locating the wireless key within a selected distance of the wagering game machine to initiate a process of accessing the gaming machine control system.
- 17. The method of claim 12, further including: activating at least one of an authorization actuator included in the wireless key and an initiation mechanism included in the wagering game machine to initiate a process of accessing the gaming machine control system.
- 18. The method of claim 12, further including: activating an activity function actuator included in the wireless key to reset the wagering game machine.
- 19. The method of claim 12, further including: recording attendant activity associated with the wagering game machine in a memory included in the wireless key.
- 20.-22. (canceled)
- 23. The method of claim 12, further including: navigating a configuration menu using an activity function actuator included in the wireless key.
- 24. (canceled)
- 25. A machine-readable medium having instructions stored therein for directing a machine to perform operations comprising:
 - receiving authorization information from a wireless key at a wagering game machine including a wagering game unit operable to receive a wager in association with a wagering game;
 - granting access to a gaming machine control system included in the wagering game machine in response to receiving the authorization information based upon an automatic comparison between the authorization information and existing authorized user data; and
 - transmitting at least information associated with operation of the wagering game machine to the wireless key.
- 26. The machine-readable medium of claim 25, wherein the operations further comprise:
 - polling to detect presence of the wireless key.
- 27. The machine-readable medium of claim 25, wherein the operations further comprise:

- verifying winnings associated with the wagering game in response to receiving an activation indication associated with an activity function actuator included in the wireless key.
- 28. A wagering game machine system, comprising:
 - a gaming machine control system including a wagering game unit operable to receive a wager in association with a wagering game;
 - a receiver to receive wireless information from a wireless key, the information including authorization information to authorize access to the gaming machine control system; and
 - a transmitter to transmit at least information associated with operation of a wagering game machine comprising the wagering game unit.
- 29. The wagering game machine system of claim 28, including:
 - a network interface to couple to the gaming machine control system.
- 30. The wagering game machine system of claim 28, including:
 - an authentication unit to authenticate the authorization information.
- 31. The wagering game machine system of claim 28, including:
 - a display to display graphics associated with the access to the gaming machine control system.
- 32. The wagering game machine system of claim 28, including:
 - a server to couple to the wagering game machine control system via a network and forward the authorization information that has been received to a wagering game server.
- 33. The wagering game machine system of claim 28, including:
 - a key to authorize access to the gaming machine control system, the key including a wireless mechanism to send the authorization information to the receiver.

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