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(54) SECURE DISTRIBUTED GAMBLING

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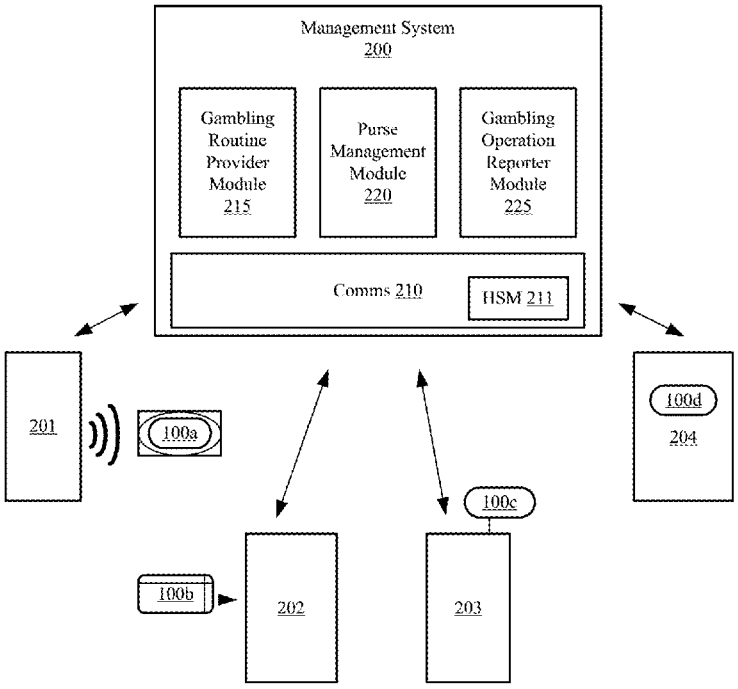
(57) **ABSTRACT**

A secure distributed gambling system and method is described. The system includes a plurality of mobile computing devices and a plurality of secure gambling microprocessors. Each of the plurality of secure gambling microprocessors is coupled with a different one of the plurality of mobile computing devices to provide a plurality of secure stand-alone gambling platforms. A gambling management system is communicatively coupled with one or more of the plurality of secure stand-alone gambling platforms to maintain gambling integrity.



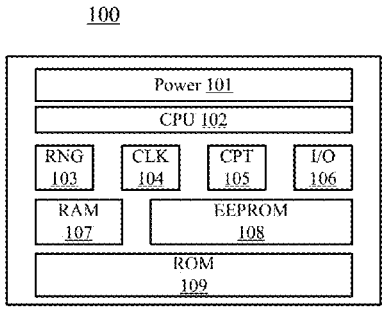

100
Power 101
CPU 102
RNG 103
CLK 104
CPT 105
I/O 106
RAM 107
EEPROM 108
ROM 109

FIG. 1

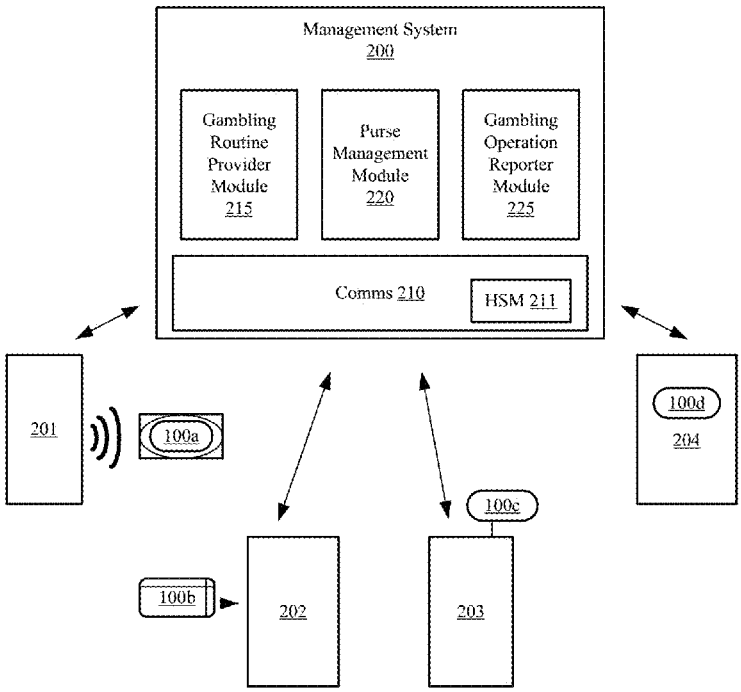

Management System 200
Gambling Routine Provider Module 215
Purse Management Module 220
Gambling Operation Reporter Module 225
Comms 210
HSM 211
201
100a
100d
204
100c
100b
202
203

FIG. 2

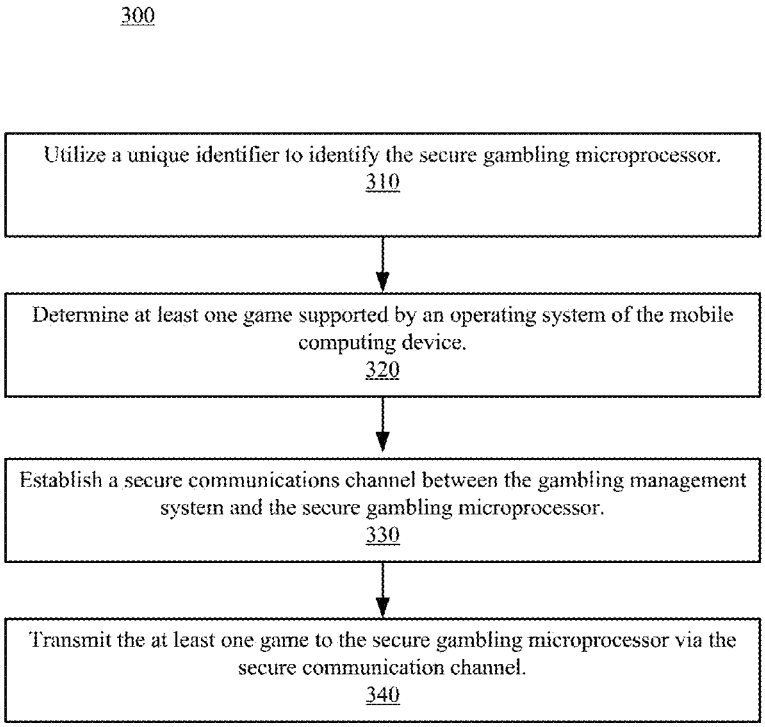

300
Utilize a unique identifier to identify the secure gambling microprocessor.
310
Determine at least one game supported by an operating system of the mobile computing device.
320
Establish a secure communications channel between the gambling management system and the secure gambling microprocessor.
330
Transmit the at least one game to the secure gambling microprocessor via the secure communication channel.
340

FIG. 3

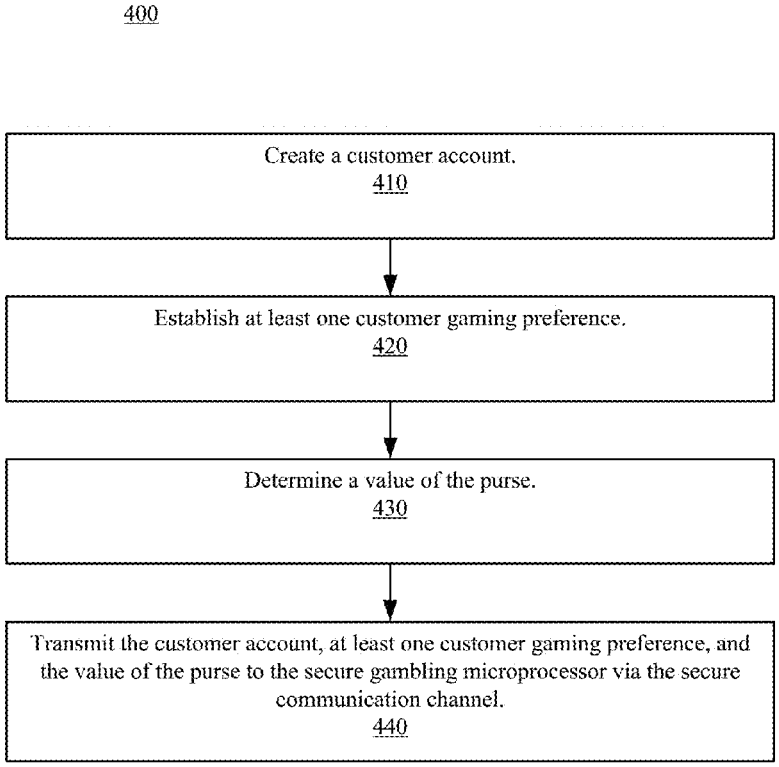

400
Create a customer account.
410
Establish at least one customer gaming preference.
420
Determine a value of the purse.
430
Transmit the customer account, at least one customer gaming preference, and the value of the purse to the secure gambling microprocessor via the secure communication channel.
440

FIG. 4

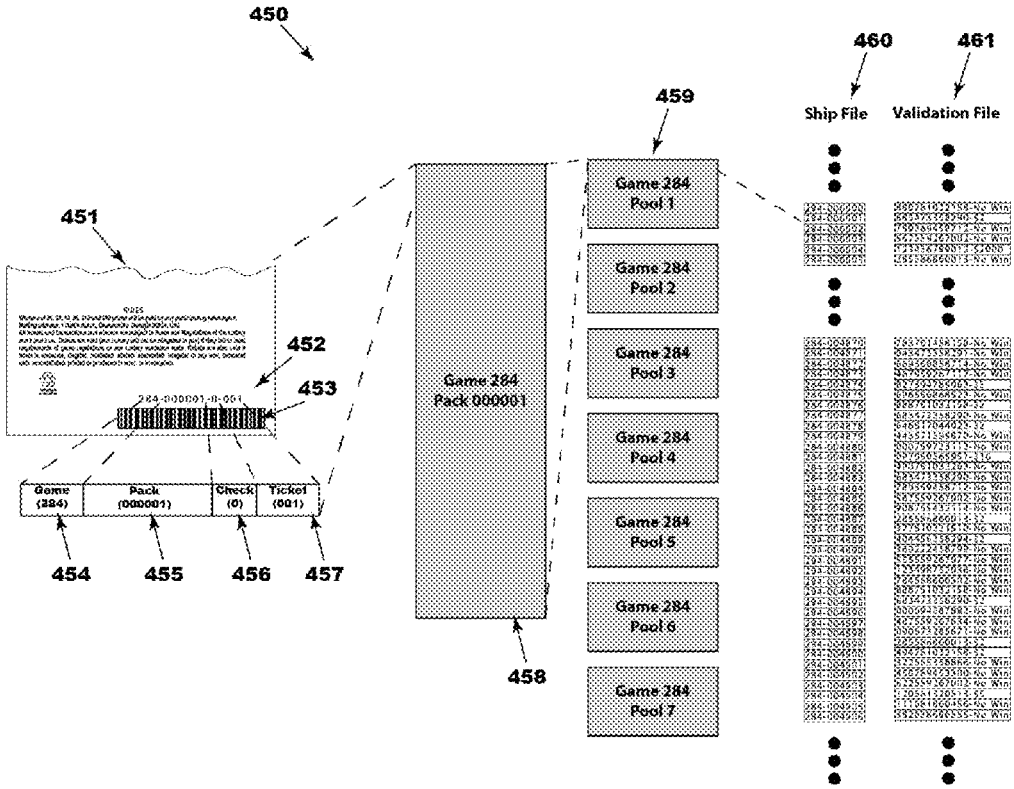


FIG. 4A
PRIOR ART

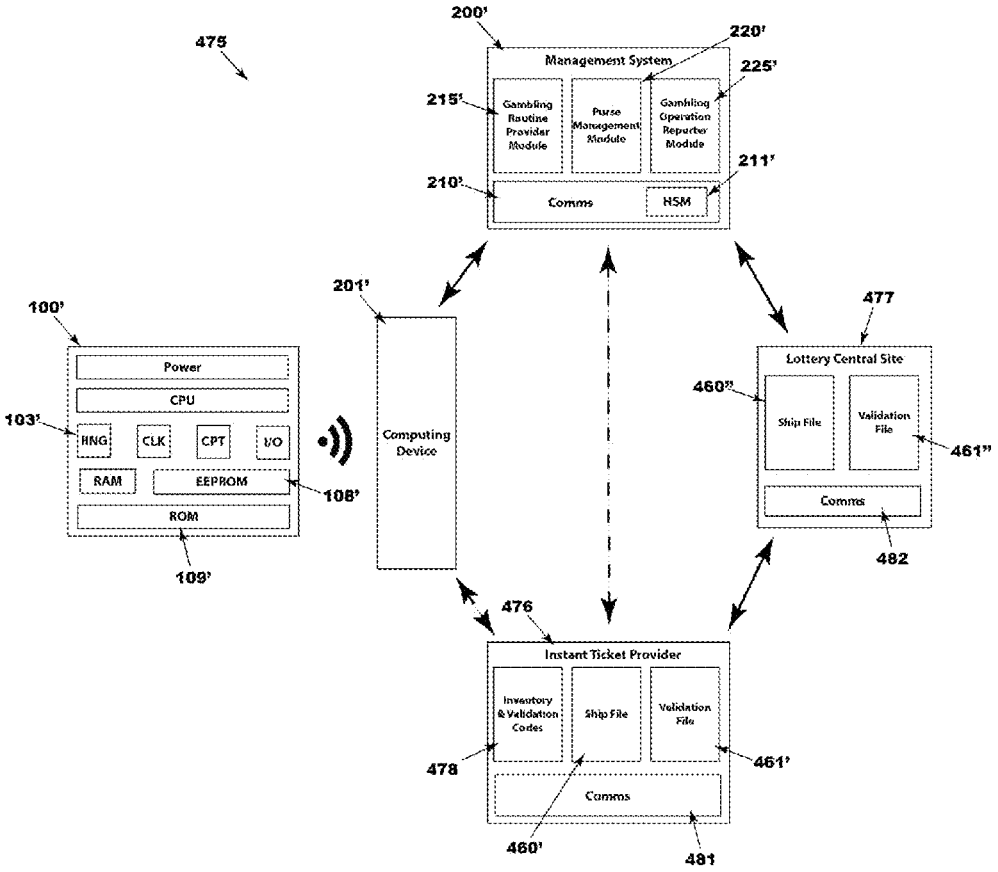

475
200'
220'
Management System
225'
215'
Gambling Routine Provider Module
Purse Management Module
Gambling Operation Reporter Module
211'
210'
Comms
HSM
201'
100'
Power
CPU
103'
RNG
CLK
CPT
I/O
RAM
EEPROM
108'
ROM
109'
Computing Device
477
Lottery Central Site
460"
Ship File
Validation File
461"
Comms
482
476
Instant Ticket Provider
Inventory & Validation Codes
Ship File
Validation File
478
461'
Comms
460'
481

FIG. 4B

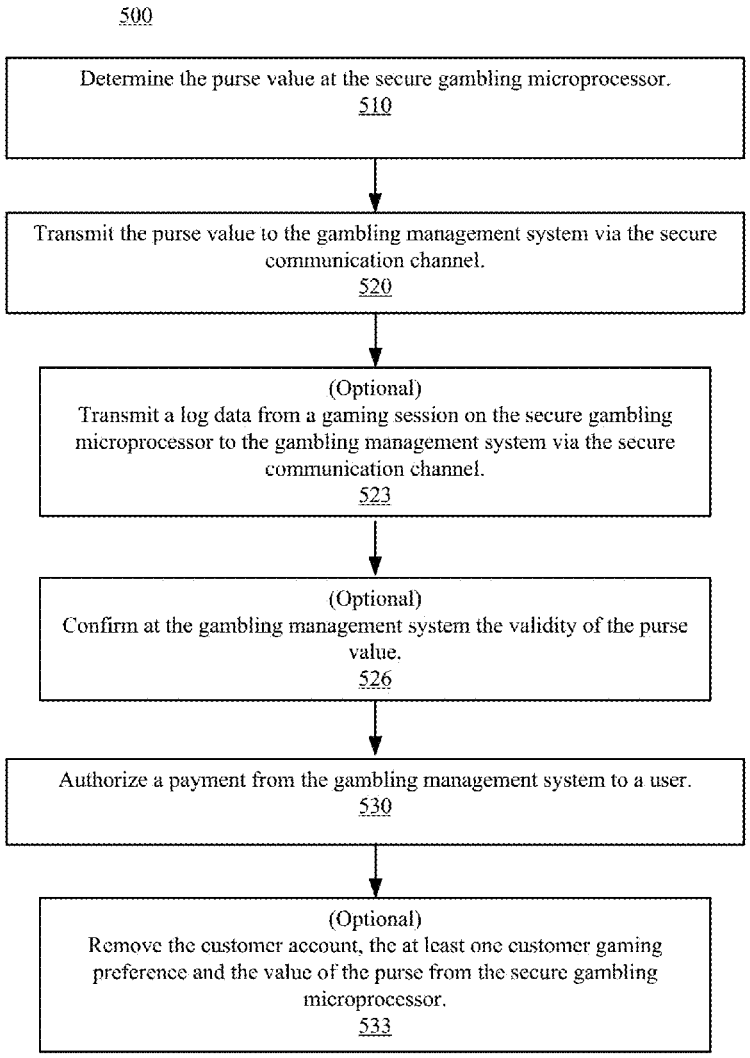

500
Determine the purse value at the secure gambling microprocessor.
510
Transmit the purse value to the gambling management system via the secure communication channel.
520
(Optional)
Transmit a log data from a gaming session on the secure gambling microprocessor to the gambling management system via the secure communication channel.
523
(Optional)
Confirm at the gambling management system the validity of the purse value.
526
Authorize a payment from the gambling management system to a user.
530
(Optional)
Remove the customer account, the at least one customer gaming preference and the value of the purse from the secure gambling microprocessor.
533

FIG. 5

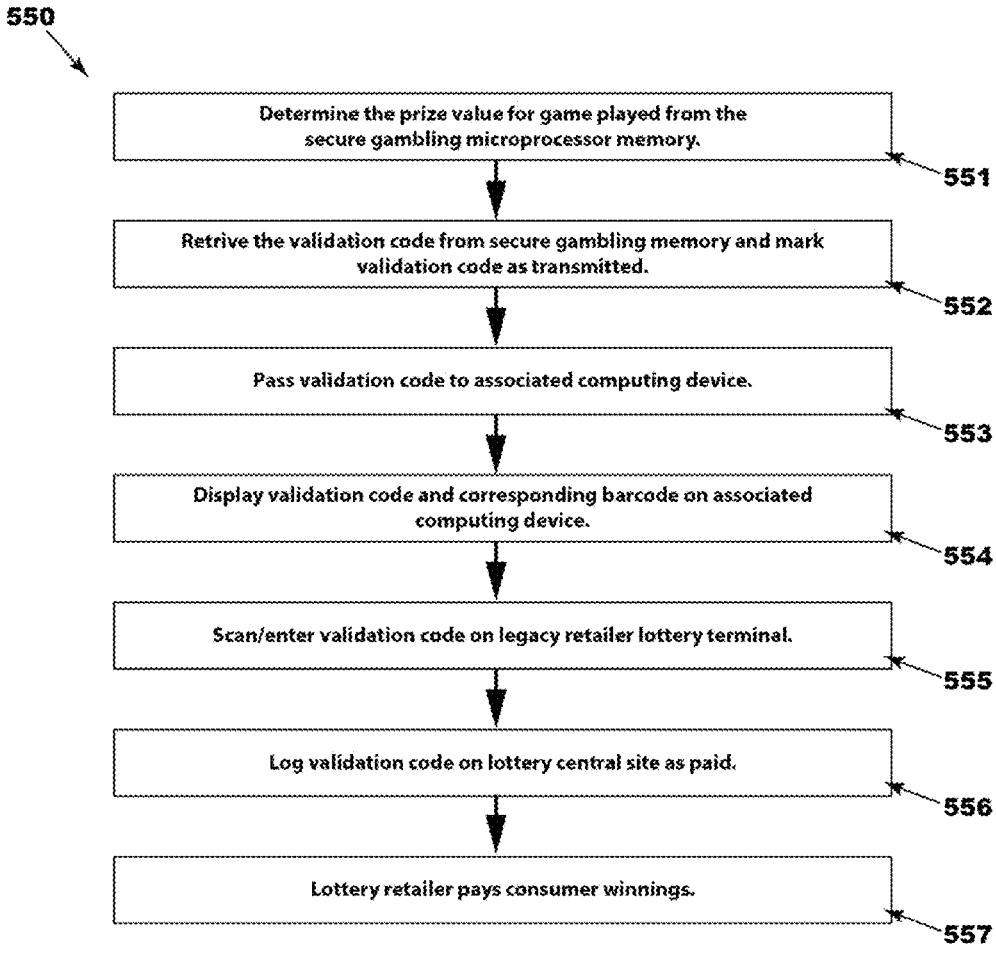

550
Determine the prize value for game played from the secure gambling microprocessor memory.
551
Retrive the validation code from secure gambling memory and mark validation code as transmitted.
552
Pass validation code to associated computing device.
553
Display validation code and corresponding barcode on associated computing device.
554
Scan/enter validation code on legacy retailer lottery terminal.
555
Log validation code on lottery central site as paid.
556
Lottery retailer pays consumer winnings.
557

FIG. 5A

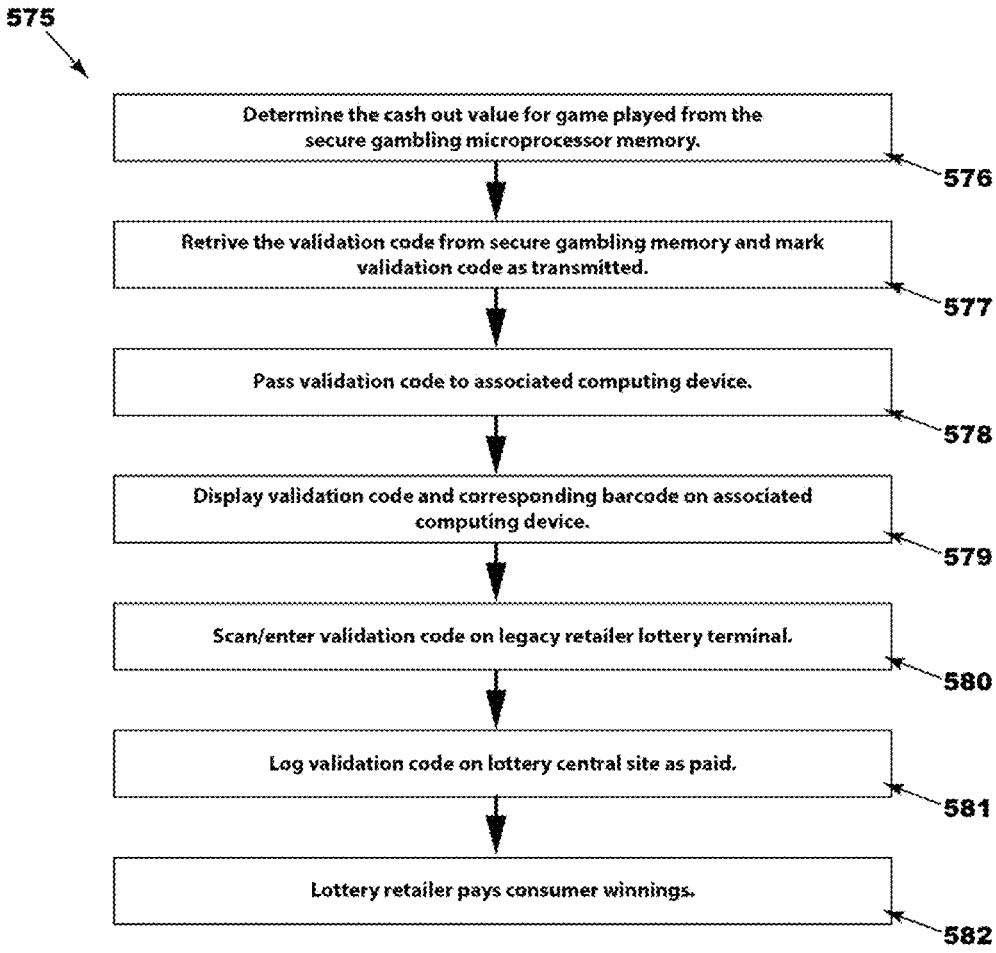

575
Determine the cash out value for game played from the secure gambling microprocessor memory.
576
Retrive the validation code from secure gambling memory and mark validation code as transmitted.
577
Pass validation code to associated computing device.
578
Display validation code and corresponding barcode on associated computing device.
579
Scan/enter validation code on legacy retailer lottery terminal.
580
Log validation code on lottery central site as paid.
581
Lottery retailer pays consumer winnings.
582

FIG. 5B

SECURE DISTRIBUTED GAMBLING

CROSS REFERENCE TO RELATED APPLICATION

[0001] This application claims priority and is a continuation-in-part application to the co-pending patent application Ser. No. 14/326,756, filed on Jul. 9, 2014, entitled "Secure Distributed Gambling," by Gavin Shenker et al., having Attorney Docket No. TAP-002, and assigned to the assignee of the present application, which is herein incorporated by reference in its entirety.

[0002] The application with Ser. No. 14/326,756, claims priority to the then co-pending provisional patent application Ser. No. 61/844,367 entitled "System and Method for Remote Control of Gaming Operations," by Gavin Shenker et al., filed Jul. 9, 2013, having Attorney Docket Number: TAP-002.PRO; which is herein incorporated by reference in its entirety.

BACKGROUND

[0003] Casino gaming, wagering, gambling and lottery operations are constantly changing and growing in markets around the world. Gambling operations are often carefully implemented and strictly regulated to ensure fairness of operations and to avoid fraud.

[0004] However, casino gaming and particularly lottery operations have gradually developed a static (aging) consumer base that is often sited as exploiting problem gamblers with various legislatures debating restrictions or probations being placed on casinos and lotteries. For example, "Stop Predatory Gambling", which advocates an end to state-sponsored gambling recently stated: "State lotteries have a business model that's based on getting up to 70% to 80% of their revenue from 10% of the people that use the lottery . . . " In Minnesota, a pending bipartisan bill would require 25% of lottery billboards to be dedicated to a warning about the odds of winning, cautions about addiction, and information on where problem gamblers can seek help.

[0005] In an attempt to diversify their base and increase sales, casinos and lotteries have come to appreciate the virtues of producing games with more entertainment value that can be sold at a premium price. For instance, ten-dollar instant lottery ticket games with higher paybacks and more ways to win now account for over $5 billion a year in United States lottery sales. But, these higher priced and high-volume games also typically add little unique entertainment value relative to lower priced instant tickets and consequently do not to attract many new consumers.

[0006] Thus, it is highly desirable to develop gaming systems methodologies that provide methods of playing new gaming opportunities, particularly more customized and interactive games. Ideally these gaming methodologies should allow for flexibility and creativity for game designers to tailor games to a wide variety of small targeted segments previously not served by existing gaming offerings, thereby appealing to a broader base of consumers.

[0007] Furthermore, it is also highly desirable to provide a gaming system that allows for secure, offline, gameplay so as to not require players to have or maintain a connection to the Internet in order to participate in gaming. Digital, interactive gaming solutions to date that are designed for personal devices such as phones, laptops and the like, require a constant connection to the Internet because all of the gaming routines reside in online servers. Gaming system providers to date have assumed that the only way to secure gaming systems in conjunction with personal computing devices is to implement all gaming software in server-based systems that include extensive physical and logical security protections.

BRIEF DESCRIPTION OF THE DRAWINGS

[0008] The accompanying drawings, which are incorporated in and form a part of this specification, illustrate various embodiments and, together with the Description of Embodiments, serve to explain principles discussed below. The drawings referred to in this brief description should not be understood as being drawn to scale unless specifically noted.

[0009] FIG. **1** is a block diagram of a secure gambling microprocessor in accordance with an embodiment;

[0010] FIG. **2** is a block diagram illustrating the operable interconnections between a gambling management system, and at least one secure gambling microprocessor in accordance with an embodiment;

[0011] FIG. **3** is a flowchart of a set-up of a secure gambling microprocessor in accordance with an embodiment;

[0012] FIG. **4** is a flowchart of the set-up of a Customer account in the gambling management system and a secure gambling microprocessor in accordance with an embodiment;

[0013] FIG. **4**A is a block diagram of a representative example of traditional, prior art lottery-type instant ticket games as logistically arranged with respect to existing lottery activation and validation systems;

[0014] FIG. **4**B is a block diagram providing a schematic graphical overview of a general embodiment as applied to segregating predetermined output arrays within the secure gambling microprocessor of FIG. **1** in accordance with an embodiment;

[0015] FIG. **5** is a flowchart for unloading of value and other data from a secure gambling microprocessor at the end of a gaming session in accordance with an embodiment;

[0016] FIG. **5**A is a flowchart for unloading of value and other data from a secure gambling microprocessor at the end of a gaming session to a prior art (legacy) lottery instant ticket validation system in accordance with an embodiment; and,

[0017] FIG. **5**B is a flowchart for unloading of value and other data from a secure gambling microprocessor at the end of a gaming session to a prior art (legacy) lottery instant ticket validation system where winning or losing status was determined by a local Random Number Generator (RNG) local to the secure gambling microprocessor that is in accordance with an embodiment.

DESCRIPTION OF EMBODIMENTS

[0018] Reference will now be made in detail to embodiments of the subject matter, examples of which are illustrated in the accompanying drawings. While the subject matter discussed herein will be described in conjunction with various embodiments, it will be understood that they are not intended to limit the subject matter to these embodiments. On the contrary, the presented embodiments are intended to cover alternatives, modifications and equiva-

lents, which may be included within the spirit and scope of the various embodiments as defined by the appended claims. Furthermore, in the Description of Embodiments, numerous specific details are set forth in order to provide a thorough understanding of embodiments of the present subject matter. However, embodiments may be practiced without these specific details. In other instances, well known methods, procedures, components, and circuits have not been described in detail as not to unnecessarily obscure aspects of the described embodiments.

NOTATION AND NOMENCLATURE

[0019] Unless specifically stated otherwise as apparent from the following discussions, it is appreciated that throughout the present Description of Embodiments, discussions utilizing terms such as "selecting", "outputting", "inputting", "providing", "receiving", "utilizing", "obtaining", "coupling", "accessing", "changing", "correlating" or the like, often refer to the actions and processes of an electronic computing device/system, such as a desktop computer, notebook computer, tablet, mobile phone, and electronic personal display, among others. The electronic computing device/system manipulates and transforms data represented as physical (electronic) quantities within the circuits, electronic registers, memories, logic, and/or components and the like of the electronic computing device/system into other data similarly represented as physical quantities within the electronic computing device/system or other electronic computing devices/systems.

Overview

[0020] A distributed gaming system based on tamper resistant secure packages where remote network management of the secure package is provided to support changing gaming routines, purse management and reporting on gaming operations particular to this type of technology implementation is described.

[0021] For example, a system for gambling operations that include a central gambling management system and one or more consumer electronic devices that can serve as gambling devices for offline gaming. The consumer electronic devices are converted to gambling devices by including a tamper-resistant microprocessor having firmware with gambling code and a purse stored thereon, the tamper-resistant microprocessor running secure gaming software to govern all offline gaming-related routines and communications with the central gambling management system. Examples of computing devices include, but are not limited to, mobile phones, tablet computers, personal computers, home entertainment systems, etc. In the following discussion gambling refers to activities such as, but not limited to, Casino gaming, wagering, lottery operations and the like.

[0022] The system includes means for deploying the secure gambling microprocessor in a variety of form factors for use with the consumer electronic devices. Example secure gambling microprocessor form factors include, but are not limited to, smart cards, microSD cards, SIM cards, accessories connected via an input/output (I/O) port, and embedded microprocessors included within the devices. The system also includes means for activating a secure microprocessor, means for loading gaming routines to a secure microprocessor, means for modifying gaming routines in a secure microprocessor, means for securely linking a microprocessor to a specific consumer electronic device, means for establishing a user account in a secure microprocessor, means for loading value to a secure microprocessor, means for unloading value from a secure microprocessor, means for logging gaming results in a secure microprocessor, means for transferring gaming results from a secure microprocessor to the central gambling management system, and means for deactivating a secure microprocessor.

[0023] One embodiment involves a centrally managed gambling management system and one or more secure gaming engines deployed in a variety of form factors, and a typical consumer computing device that includes a graphic user interface (GUI) and specialized application software designed to interact with the secure gambling microprocessor and the gambling management system **200** (FIG. **2**). The combination of secure gambling microprocessor and mobile device enables offline gaming as previously described. In one embodiment, the computing device may be a mobile device such as a laptop, tablet or phone; in another embodiment, the computing device may be a less mobile device such as desktop, tower, or the like. In one embodiment, the secure gambling microprocessor is embedded in a closed loop prepaid gift card issued by a state lottery or casino. In another embodiment, the secure gambling microprocessor is embedded in a hotel keycard that hotel guests use to gain access to their room and may also use the card for loyalty or real money gaming during a stay or after they leave a hotel property. In a preferred embodiment, the secure gambling microprocessor is embedded in a casino players' club card where prepaid funds are loaded onto the card for use with existing casino gaming systems such as slot machines and such funds can also be used to wager on games contained within the gambling microprocessor. In a preferred embodiment, the secure gambling microprocessor is embedded in an open loop prepaid debit or General Purpose Reloadable (GPR) card issued by a state lottery or casino and also branded by a payment association (e.g., Visa, MasterCard, Discover, American Express). The open loop embedded embodiment being preferred because both wagers and winnings may be paid for or loaded onto the associated card account.

[0024] With reference now to FIG. **1**, a block diagram of an embodiment of a secure gambling microprocessor **100** is shown. One embodiment of secure gambling microprocessor **100** includes Power **101**, a Central Processing Unit (CPU) **102**, a Random Number Generator (RNG) **103**, a connection for an external Clock **104**, a Cryptographic Coprocessor (CPT) **105**, an I/O port **106**, Random Access Memory (RAM) **107**, Electrically Erasable Programmable Read Only Memory (EEPROM) **108**, and Read Only Memory (ROM) **109**. The software for gaming operations can be stored and run from ROM **109** or EEPROM **108** and would rely on the support of the RNG **103** and CPT **105** for many of the operations.

[0025] In general, secure gambling microprocessor **100** is a dedicated computer on a chip or microprocessor for carrying out cryptographic operations, embedded in a packaging with multiple physical security measures, which give it a degree of tamper resistance. Although a number of secure microprocessors may be used herewith. In one embodiment, SmartMX designed by NXP is a microprocessor having data encryption capabilities.

[0026] I/O port **106** is a communications interface for secure gambling microprocessor **100** such as a contact

interface according to ISO/IEC 7816, contactless interface according to ISO/IEC 14443A, serial input and output (half-duplex), USB, HDMI or other interfaces.

[0027] In one embodiment RNG **103** uses a cryptographic hash function to approach a uniform distribution of bits from a non-uniformly random source. In another embodiment, RNG **103** is a pseudo-RNG (PRNG) such as a Linear Congruential Generator (LCG) or Mersenner Twister. /dev/random is one example of a file that serves as a pseudorandom number generator.

[0028] In general, CPT **105** is implemented on a high-security, tamper resistant, programmable PCI board. Specialized cryptographic electronics, microprocessor, memory, and random number generator housed within a tamper-responding secure gambling microprocessor **100** provide a highly secure subsystem in which data processing and cryptography can be performed. In one embodiment, CPT **105** is a high-speed 3-DES coprocessor (64-bit parallel), a high-speed AES coprocessor (128-bit parallel), a PKI (RSA, ECC) coprocessor FameXE (32-bit parallel) such as found on a SmartMX by NXP. However, it should be appreciated that although the SmartMX is disclosed herein, the technology is well suited to using other comparable technologies.

[0029] In general, CPU **102** is hardware within a computer that carries out the instructions of a computer program by performing the basic arithmetical, logical, and input/output operations of the system. Two components of CPU **102** are the arithmetic logic unit for performing arithmetic and logical operations, and the control unit for extracting instructions from memory and decoding and executing them, calling on the arithmetic logic unit when necessary. CPU **102** may be multiprocessor, multi-core processors, and the like.

[0030] In one embodiment, the communication protocol to the microprocessor may be either ISO-7816 contact, ISO-14443 contactless, or both. Although a number of components are shown, it should be appreciated that secure gambling microprocessor **100** may include more or fewer components. Moreover, in an embodiment, the components described in secure gambling microprocessor **100** may be substituted for other components that provide similar operational capabilities. That is, there are many other options for implementations of the secure gambling microprocessor **100** that could involve other types of processors (micro or otherwise), modules, computing platforms or the like.

Gambling Management System **200**

[0031] With reference now to FIG. **2**, an embodiment of a gambling management system **200** is shown as part of a network accessible system that includes a human readable management interface such as a Web Browser (not shown in FIG. **2**) used to set up and control gaming operations taking place in the secure gambling microprocessor **100** and associated mobile devices **201-204**.

[0032] In one embodiment, FIG. **2** also includes a plurality of mobile computing devices **201-204**, and a plurality of secure gambling microprocessors **100***a*-**100***d*. In one embodiment, each of the plurality of secure gambling microprocessors **100***a*-**100***d* are coupled with a different one of the plurality of mobile devices **201-204** to provide a plurality of secure stand-alone gambling platforms. As described in detail herein, gambling management system **200** is communicatively coupled with one or more of the plurality of secure stand-alone gambling platforms to maintain gambling integrity.

[0033] In one embodiment, gambling management system **200** includes a gambling routine provider module **215** that contains a number of gambling games such as poker, blackjack, and the like for a number of different user platforms. Gambling management system **200** also includes a purse management module **220** used to manage a purse or monetary amount, and a gambling operation reporter module **225** that is used to review gaming activity for fairness of operation and to avoid fraud. In one embodiment, gambling management system **200** also includes standard network data communications **210** interfaces (e.g., TCP/IP) to support communications with secure gambling microprocessor **100** and mobile devices **201-204**.

[0034] In an alternative embodiment, gambling routine provider module **215** dispenses predetermined arrays of plays where the outcome (i.e., winning or losing status) of each game was determined in advance by a separate secure process. This embodiment has the advantage of utilizing external, possibly third party, gaming systems that have potentially already been approved by applicable regulator and government agencies, thereby reducing the requirements of detailed regulatory approval for network accessible system **200** and consequently expediting real world deployment. In a preferred embodiment, the dispensed predetermined array is compatible with lottery instant ticket shuffles and validation systems.

[0035] In one embodiment, gambling management system **200** will also include a dedicated security component such as a Hardware Security Module **211** (HSM) that is responsible for cryptographic key storage and operations in support of secure communication between the gambling management system **200** and the secure gambling microprocessor **100** and to secure the various management operations that are initiated within the gambling management system **200** and carried out in the secure gambling microprocessor **100**. In one embodiment, the secure channel communication between the secure gambling microprocessor **100** and the gaming management system may be over a wired or wireless network. In another embodiment, the secure channel communication may be over a mobile network, or the like.

[0036] In one embodiment set up of secure gambling microprocessor **100** by the gambling management system **200** involves in part, the identification of which secure gambling microprocessor **100** will be used in the gaming operation, determining which games will be playable on secure gambling microprocessor **100**, which game options will be supported on each, which mobile devices will be used in conjunction with each secure gambling microprocessor **100**, and then activating the secure gambling microprocessor **100** by securely transmitting all associated gambling management data thereto.

[0037] In an embodiment, the secure gambling microprocessor **100** includes software operating in a tamper-resistant microprocessor. The microprocessors are capable of running multiple, secure, software applications. For example, in one embodiment the secure gambling microprocessor **100** software is responsible for all offline gaming routines including possible storage of predetermined winning and losing status on a game by game basis as well as secure communication with the gambling management system **200**.

[0038] The security and integrity of the software operations in the microprocessor is maintained through cryptographic operations that take place within the tamper-resistant microprocessor. The security model for this invention relies on "end-to-end" security between the gambling management system **200** and secure gambling microprocessor **100** where the authenticity and integrity of all communication can be verified by either "end" (gambling management system **200** or secure gambling microprocessor **100**). The data channel can also be encrypted end-to-end if required. This protection helps mitigate potential fraud involving the transmission of gambling management data to a secure gambling microprocessor **100** that was not created by the gambling management system **200** and similarly protects against fraud involving the transmission of gaming data from a secure gambling microprocessor **100** to the gambling management system **200** that did not originate from a secure gambling microprocessor **100**. One embodiment, implements end-to-end communication security via cryptographic operations such as HSM **211**, which provides a secure channel.

[0039] In one embodiment, non-secure functions related to the user interface are implemented outside of the secure gambling microprocessor **100**. In this embodiment, mobile applications such as those that are designed for the Android or iOS operating systems **201** through **204** are used to create the user interface for gaming. The mobile applications then interact with the secure gambling microprocessor **100** via application programming interfaces. These application programming interfaces are also used for any communication between the mobile application and secure gambling microprocessor **100** as required to support communication of management data between the gambling management system **200** and secure gambling microprocessor **100** as described below.

[0040] With reference still to FIG. **2**, a number of implementations between secure gambling microprocessor **100** and mobile devices are shown. For example, mobile device **201** illustrates an implementation in which secure gambling microprocessor **100***a* interacts with mobile device **201** via an ISO-14443 contactless interface and antenna. Mobile device **202** illustrates another implementation in which secure gambling microprocessor **100***b* is a component in a microSD package. Mobile device **203** provides yet another example implementation in which secure gambling microprocessor **100***c* utilizes an I/O port of the mobile device **203**. For example, the I/O port may be an audio jack, USB (Universal Serial Bus) port, HDMI (High-Definition Multimedia Interface) port, or the like which acts as the communications interface between mobile device **203** and secure gambling microprocessor **100***c*. Mobile device **204** illustrates yet another embodiment wherein the secure gambling microprocessor **100***d* is an embedded microprocessor such as a SIM (Subscriber Identity Module) card or chip integrated as a part of the mobile device **204** circuitry.

Contactless Communication Secure Gambling Microprocessor

[0041] In one embodiment, secure gambling microprocessor **100***a* in combination with mobile device **201** illustrates an implementation where the secure gambling microprocessor **100***a* communicates via contactless with mobile device **201**. For example, in one embodiment secure gambling microprocessor **100***a* includes an integrated ISO-14443 contactless communications interface and antenna, or the like. As such, secure gambling microprocessor **100***a* is capable of communication with a mobile device **201** or other device that supports ISO-14443, Near Field Communication (NFC) protocols, Bluetooth, or the like.

[0042] In operation, mobile device **201** is used to transmit gambling management data from the gambling management system **200** to secure gambling microprocessor **100***a* by first transmitting the data to a mobile application on the mobile device **201** via the mobile device's Cellular or Wi-Fi radio communications interface. The mobile device **201** then uses its NFC communications interface to transmit the data to secure gambling microprocessor **100***a*.

[0043] In general, the user interface for gaming is implemented as a mobile application. In this particular example, the mobile device could be a mobile phone, tablet computer, laptop computer, notebook computer, personal digital assistant, or the like. For example, mobile device **201** may be running an operating system that includes support for NFC. In one embodiment, gaming takes place by executing the mobile application and ensuring that the secure gambling microprocessor **100***a* is in proximity to mobile device **201** to support communication between mobile device **201** and secure gambling microprocessor **100***a* via the NFC to ISO-14443 interfaces. In a preferred embodiment, the secure gambling microprocessor **100***a* is embedded in a plastic card (e.g., debit card or GPR card), proximity communicating with mobile device **201** via NFC.

Insertable Secure Gambling Microprocessor

[0044] In one embodiment, secure gambling microprocessor **100***b* in combination with mobile device **202** illustrates an implementation where the secure gambling microprocessor **100***b* is a tamper-resistant microprocessor in an insertable package such as, a microSD package. In one embodiment, secure gambling microprocessor **100***b* is inserted into the mobile device's microSD slot. Once in the slot, the I/O interface of the secure gambling microprocessor **100** uses the contact interface of the microSD card to communicate with the mobile device.

[0045] In operation, mobile device **202** is used to transmit gambling management data from the gambling management system **200** to secure gambling microprocessor **100***b* by first transmitting the data to a mobile application on mobile device **202** via the mobile device's cellular or Wi-Fi radio communications interface. Mobile device **202** then uses its microSD interface to transmit the data to secure gambling microprocessor **100***b*.

[0046] In one embodiment, the user interface for gaming is implemented as a mobile application. In this example, mobile device **202** could be a tablet computer, mobile phone or the like running an operating system that includes support for a microSD card. Gaming takes place by executing the mobile application on mobile device **202** that then interacts with secure gambling microprocessor **100***b* via the microSD communications interface.

I/O Port Secure Gambling Microprocessor

[0047] In one embodiment, secure gambling microprocessor **100***c* in combination with mobile device **203** illustrates an implementation that involves the packaging of a tamper-resistant secure gambling microprocessor **100***c* in an accessory device that can then be inserted into a mobile device

203 I/O port. This accessory device includes circuitry that enables communication between secure gambling microprocessor **100***c* I/O port and mobile device **203**, using the I/O interface. As described herein, the I/O port may be an audio jack, an HDMI jack, a USB jack or other communications port.

[0048] In operation, mobile device **203** is used to transmit gambling management data from the gambling management system **200** to secure gambling microprocessor **100***c* by first transmitting the data to a mobile application on mobile device **203** via the mobile device's cellular or Wi-Fi radio communications interface. The mobile device then uses the mobile device's I/O port interface to transmit the data to secure gambling microprocessor **100***c*.

[0049] In one embodiment, the user interface for gaming is implemented as a mobile application. In this particular example, mobile device **203** could be a tablet computer, mobile phone or the like, running an operating system that includes support for an I/O port accessory. Gaming takes place by executing the mobile application on mobile device **203** that then interacts with secure gambling microprocessor **100***c* via the I/O port.

Fixedly Integrated Secure Gambling Microprocessor

[0050] In one embodiment, secure gambling microprocessor **100***d* in combination with mobile device **204** illustrates yet another implementation that involves more permanent integration of secure gambling microprocessor **100***d* in mobile device **204** in comparison with the previous examples. Examples of this implementation include use of the tamper-resistant Subscriber Identity Module (SIM) of a mobile device to host the secure gambling microprocessor **100** software. Another variation of this implementation could involve hosting of the secure gambling microprocessor **100** software in a tamper-resistant microprocessor that is included as a part of the main circuitry of mobile device **204**.

[0051] In operation, mobile device **204** is used to transmit gambling management data from the gambling management system **200** to secure gambling microprocessor **100***d* by first transmitting the data to a mobile application on mobile device **204** via the mobile device's cellular or Wi-Fi radio communications interface. The mobile application then uses application programming interfaces to transmit the data to secure gambling microprocessor **100***d*.

[0052] In one embodiment, the user interface for gaming is implemented as a mobile application. In this example, mobile device **204** could be a tablet computer, mobile phone, laptop, or the like running an operating system where the device includes a tamper-resistant microprocessor in the form of a SIM or other embedded component. Gaming takes place by executing the mobile application on mobile device **204** that then interacting with secure gambling microprocessor **100***d* via application programming interfaces to secure gambling microprocessor **100***d*.

[0053] Although a number of iterations of secure gambling microprocessors are described. It should be noted that secure gambling microprocessor **100** could be built as a standalone system in many form factors such as paper-type advertisements for a magazine, newspaper, poster, etc. Secure gambling microprocessor **100** could also be contained within items such as a key fob, plastic card (e.g., debit or credit), etc. In another embodiment, secure gambling microprocessor **100** could also be electronically integrated within larger systems such as a digital billboard system, home entertainment system, home appliance, automobile, kiosk, etc. For examples, secure gambling microprocessor **100** may be implemented in a fashion similar to secure gambling microprocessor **100***d* where secure gambling microprocessor **100** is integrated within a larger system that is typically responsible for data communications and can support the data communication needs of secure gambling microprocessor **100** to the gambling management system **200** and can also provide a user interface for gaming applications.

Mobile Device

[0054] In one embodiment, the mobile device **201-204** utilizes mobile operating systems such as, but not limited to, Android, iOS, Windows Phone, RIM Blackberry OS, and the like. It should also be noted that the present invention is platform and device independent. Data communication between the mobile device and gambling management system **200** is accomplished via the integrated cellular and/or Wi-Fi radios of the mobile device.

[0055] However, communication between mobile device and secure gambling microprocessor **100** depends upon the type of secure gambling microprocessor package. For example, secure gambling microprocessor **100***a* will utilize an NFC capability in the mobile device, while communication between a mobile device and secure gambling microprocessor **100***b*-**100***d* would take place via an application-programming interface of the secure gambling microprocessor and application software running within the mobile device. Although NFC, Wi-Fi, and Cellular radio communication are all cited as examples, any other communications interface capable of transmitting the desired data between the subsystems may be utilized.

Gaming Setup and Management

[0056] Reference will now be made to FIG. **3**, a flowchart **300** of a method of setting-up secure gambling microprocessor **100** in accordance with an embodiment.

[0057] With reference now to **310** of FIG. **3** and FIG. **2**, one embodiment utilizes a unique identifier to identify the secure gambling microprocessor **100**. For example, each secure gambling microprocessor **100** will be identified by a unique identifier such as a serial number or the like that allows the gambling management system **200** to correctly and securely communicate with each secure gambling microprocessor **100**. In one embodiment, the unique identifier is automatically determined by secure gambling microprocessor **100** or gambling management system **200**. In another embodiment a Casino operator interacts with the management interface of the gambling management system **200** to provide the unique identifier of secure gambling microprocessor **100**.

[0058] Referring now to **320** of FIG. **3** and FIG. **2**, one embodiment determines at least one game supported by the operating system of the mobile computing device. In one embodiment, the determination is performed by the gambling management system **200**. In another embodiment, the determination is performed by a user such as the Casino or Lottery operator.

[0059] With reference now to **330** of FIG. **3** and FIG. **2**, one embodiment establishes a communication channel between secure gambling microprocessor **100** and the gambling management system **200** via the computing device.

For example, the gambling management system **200** uses secure gambling microprocessor **100** identifiers and internal systems such as the hardware security module **211** to set up Secure Channel communication between the gambling management system **200** and secure gambling microprocessor **100**.

[0060] With reference now to **340** of FIG. **3** and FIG. **2**, one embodiment transmits the at least one game to secure gambling microprocessor **100** via the secure communication channel. For example, the gambling management system **200** transmits all required software and settings to each secure gambling microprocessor **100** and sets the state of those secure gambling microprocessor **100** to active.

[0061] In general, there is a wide range of variations on how much or how little software and data is transmitted to the secure gambling microprocessor **100**. For example, in one embodiment, all gaming software could be loaded to the secure gambling microprocessor **100** during the data transmission. Alternatively, no gaming software is transmitted as it has been previously loaded via some other process such as during the production and distribution of the tamper-resistant microprocessors hosting the secure gambling microprocessor **100** software. In either of these two examples, predetermined arrays of plays where the outcome (i.e., winning or losing status) of each game was determined in advance by a separate secure process could also be loaded into the secure gambling microprocessor **100**. This embodiment has the advantage of utilizing external, possibly third party, gaming systems that have potentially already been approved by applicable regulator and government agencies, thereby reducing the requirements of detailed regulatory approval and consequently expediting real world deployment. In a preferred embodiment, the dispensed predetermined array is compatible with lottery instant ticket shuffles and validation systems.

Customer Account Setup

[0062] Reference will now be made to FIG. **4**, a flowchart **400** of a method of establishing a customer account for the system in FIG. **2**. In general, flowchart **400** may be utilized in a stand-alone format or may be used after the flowchart **300** described in FIG. **3**.

[0063] Referring now to **410** of FIG. **4** and FIG. **2**, one embodiment creates a customer account based on the unique identifier of secure gambling microprocessor **100**. In one embodiment, the customer account is automatically created by gambling management system **200**. In another embodiment, a Casino operator interacts with the management interface of the gambling management system **200** to create the customer account.

[0064] With reference now to **420** of FIG. **4** and FIG. **2**, one embodiment establishes at least one customer gaming preference. For example, the customer gaming preference includes specifying what games (e.g., poker, blackjack, slots) and game preferences (e.g., payout table for poker, game theme) the Customer chooses, and the like. In a preferred embodiment, the gaming preference such as a theme can vary by unique batches of secure microprocessors to support marketing arrangements. For example, a state lottery may allow individual retailers to include some unique branding in the user interface application of the game as implemented in a mobile application such as an Android application. In such an embodiment, a single Android application user interface could dynamically change branding themes based on preferences set in individual gambling microprocessors during the process described in **420**. To illustrate this example, a state lottery may issue secure gambling microprocessors to two different retailers (retailer A and retailer B) for sale within the state. Secure gambling microprocessors for retailer A include a branded theme preference specific to retailer A. Likewise, secure gambling microprocessors for retailer B include a branded theme preference specific to retailer B. The state offers a single Android application to provide a Graphical User Interface (GUI) for interacting with the secure gambling microprocessors. When players use the Android application with secure gambling microprocessors sold by retailer A, the Android application reads the game theme preference from the secure gambling microprocessors and displays in the GUI some branding specific to retailer A. Similarly, when players use the same Android application with secure gambling microprocessors sold by retailer B, the Android application reads the game theme preference from the secure gambling microprocessors and displays in the GUI some branding specific to retailer B.

[0065] With reference now to **430** of FIG. **4** and FIG. **2**, one embodiment determines a value of the purse. That is, how much value the Customer wishes to load to secure gambling microprocessor **100** for gambling, and which secure gambling microprocessor **100** will be used by the Customer.

[0066] With reference now to **440** of FIG. **4** and FIG. **2**, one embodiment transmits the customer account, the at least one customer gaming preference, and the value of the purse to secure gambling microprocessor **100** via the secure communication channel HSM **111**.

[0067] In one embodiment, in order to transmit the information, a secure channel is established. In one embodiment the secure channel includes secure communications between secure gambling microprocessor **100** and mobile device **201** with which it will be used. An example of this linking process would be to use some unique identifier from the mobile device **201**, such as a Message Authentication Code (MAC) Address or the like, to ensure that the secure gambling microprocessor **100** is only used in conjunction with that specific mobile device.

[0068] Once the secure communications is established between secure gambling microprocessor **100** and mobile device **102**, gambling management system **200** uses secure gambling microprocessor **100** identifiers and internal systems such as the hardware security module **211** to set up secure channel communication between the gambling management system **200** and secure gambling microprocessor **100**. In one embodiment, the secure channel is automatically established by gambling management system **200**. In another embodiment a Casino or Lottery operator interacts with the management interface of the gambling management system **200** to establish the secure channel.

[0069] Once the secure channel is established, gambling management system **200** transmits all required account data, game settings, link information for the mobile device, optionally arrays of plays with predetermined outcomes, and value to secure gambling microprocessor **100**. At this point the secure gambling microprocessor **100** can be used with its associated mobile device and mobile application for gaming in a distributed manner. That is, secure gambling microprocessor **100** will allow a user to gamble on the associated mobile device until the purse is empty without requiring the

user to access gambling management system **200**. In one embodiment, secure gambling microprocessor **100** does not need to contact gambling management system **200** again until the purse needs to be reloaded, a different game is selected by the user, or the user wishes to cash out.

Example Operation

[0070] The following is an example of an operation distributed gaming system based on tamper resistant secure packages where remote network management of the secure package is provided to support changing gaming routines, purse management and reporting on gaming operations particular to this type of technology implementation.

[0071] In other words, a person can receive a secure gambling microprocessor **100** with a gambling game thereon. The user can couple secure gambling microprocessor **100** with a computing device that includes a Graphic User Interface (GUI).

[0072] For example, a user wishes to play blackjack for real money. The user would order a blackjack secure gambling microprocessor **100**. When ordering the blackjack secure gambling microprocessor **100**, the user will have a number of choices, including, but not limited to, purchasing a blackjack secure gambling microprocessor **100** with a pre-loaded purse having a pre-defined monetary amount loaded thereon, selecting a free blackjack secure gambling microprocessor **100** with an empty purse, selecting a free blackjack secure gambling microprocessor **100** with a few introductory dollars in the purse, etc.

[0073] In one embodiment, if the user has ordered a blackjack secure gambling microprocessor **100** with a pre-loaded purse, once the secure gambling microprocessor **100** was communicatively coupled with the computing device, the user would be able to begin playing blackjack. In one embodiment, the blackjack secure gambling microprocessor **100** would not need to communicate with gambling management system **200** prior to the user using the secure gambling microprocessor **100** to gamble.

[0074] However, if the user selected a blackjack secure gambling microprocessor **100** with an empty purse, or ran out of money in the pre-loaded purse, the user would utilize the computing device to initiate secure communications between gambling management system **200** and the blackjack secure gambling microprocessor **100**. During the communications, gambling management system **200** would also be able to perform a number of diagnostics and evaluations, including, but not limited to, providing updates to at least a portion of the secure gambling microprocessor **100**; ensuring the security of the secure gambling microprocessor **100**; determining the monetary value of the purse; and authorizing transfer of additional funds from a user authorized account; e.g., a bank account, to the purse on the blackjack secure gambling microprocessor **100**.

[0075] Once the gaming management system had loaded or reloaded the purse in the blackjack secure gambling microprocessor **100**, the user would be able to again play blackjack. Moreover, as described above, once the purse had a value and secure gambling microprocessor **100** is securely communicatively coupled with the computing device, the user would be able to gamble without having to maintain any connection with gambling management system **200**. In one embodiment, the user could continue to gamble without communicating with gambling management system **200** until the user's purse was empty or the user wanted to cash out.

[0076] In an additional example, the user may be tired of playing blackjack or otherwise want to play a different game. In this case, the user will access gambling management system **200** via the secure channel and request gambling management system **200** to add poker (or the like) to the secure gambling microprocessor **100**. In one embodiment, gambling management system **200** will add the poker game to the secure gambling microprocessor **100** and the secure gambling microprocessor **100** will have both poker and blackjack. In another embodiment, gambling management system **200** will remove the blackjack game when the poker game is added. In yet another embodiment, gambling management system **200** may offer the user a set of games that can be added to the secure gambling microprocessor **100**, or the user may select any number of games from a list of available games.

[0077] In another embodiment, gambling management system **200** may contact the user with an offer to provide a new or different game to the user's secure gambling microprocessor **100**. In addition, periodic communication may occur between the secure gambling microprocessor and the gambling management system via the communication channel. In general, the periodic communication may include providing updates to at least a portion of the secure gambling microprocessor **100**, monitoring a security of the secure gambling microprocessor **100**; and determining a monetary value of the purse.

[0078] In general, when the games are added or changed, gambling management system **200** will not modify the purse value on the secure gambling microprocessor **100**. Thus, if a user had 100 dollars in her purse when she decided to add a poker game to secure gambling microprocessor **100**, she would have 100 dollars in her purse after the poker game was added, regardless of whether any other games were removed or not.

[0079] In another embodiment, secure gambling microprocessor **100** functions only as a game starting seed(s) generator wherein actual game play simulation and interaction is conducted by non-secure software resident on the connected computing device. In this embodiment game type selection (e.g., blackjack, poker, craps) and play is executed on the connected computing device with the starting seed(s) determining ultimately how much (if any) money is won. This embodiment has the advantage of a potentially richer gaming environment due to presumably greater memory and process capabilities resident on the connected computing device in contrast to the relatively limited resources available on the secure gambling microprocessor **100** while still maintaining security against fraudulent alteration of the connected computing device's software. Since the seed(s) that determine the game outcome are generated by the secure gambling microprocessor **100**, an auditable trial is maintained of the intended game outcome that can be verified by the gambling management system **200** independent of the connected computing device. Additionally, by offloading actual game play and associated functionality to the connected computing device memory is freed in the secure gambling microprocessor **100** for storing potentially large predetermined arrays of plays where the outcome of each game was determined in advance.

[0080] Before describing how this independence is enabled by this embodiment, it may be useful to first provide a brief description of the current state of the art of instant ticket production and validation. The concept is to ensure that a common lexicon is established of existing legacy systems prior to describing the present invention. This description of legacy instant ticket production and validation is provided in the discussion of FIG. **4**A.

[0081] FIG. **4**A depicts a representative example of the variable human readable inventory control number **452** and the associated barcode **453** on the back **451** of a traditional printed lottery-type instant ticket. As shown in FIG. **4**A, the variable printed human readable inventory control number and the associated barcode are imaged on the ticket back **451** and therefore accessible (by design) to the retailer prior to purchase of the ticket. Also presented in FIG. **4**A is a taxonomy of a typical instant ticket's human readable inventory control number's **452** and **453** data: starting with a three or four decimal digit game number **454** identifying the game, followed by a variable length pack number **455** (six decimal digits as shown in FIG. **4**A), a one or two digit modulo check number **456**, and a variable digit ticket number **457** (three decimal digits as shown in FIG. **4**A) uniquely identifying the ticket in a pack. The taxonomy of the instant ticket's barcode **453** data is similar to the human readable inventory control number **452** with the barcode **453** and human readable images embodying identical inventory control data **454** through **457**; however, the barcode **453** can embody other data in addition to the inventory control data.

[0082] As previously stated, the instant ticket inventory control data **454** through **457** typically found on the back **451** of a lottery ticket is accessible via human readable inventory control number **452** and barcode **453** to the retailer and others prior to purchase and play of the ticket. This is because, as its name implies, the instant ticket inventory control data **454** through **457** embodied as human readable inventory control number **452** and barcode **453** indicia are used for tracking the individual ticket through its life cycle of production, warehouse storage, shipping, pack activation by the retailer, sale, and redemption. Therefore, for security reasons against retailer pick-out, there is no cleartext win or lose information embedded in the instant ticket human readable number **452** or machine-readable barcode **453**. However, in some embodiments, win or lose validation information is included in the machine-readable barcode **453**, but this information is always encoded as ciphertext and never accessible in cleartext from an unplayed ticket.

[0083] At the system level **450** logistical tracking, activation, and validation of lottery-type instant tickets **451** is accomplished by grouping tickets together in packs **458**. The number of tickets per pack will vary depending on the game and ticket retail value, but all tickets **451** in a pack **458** will have sequential inventory control numbers **452** and **453**. There are several reasons for arranging lottery-type instant tickets in packs, a primary reason is that instant tickets **451** are ordered and shipped in packs **458** with the pack **458** being the fundamental unit of reconciliation. Since instant tickets **451** are shipped in packs **458**, the pack **458** is also the fundamental unit of activation on the overall instant ticket system **451**—i.e., there is typically no individual (ticket) level of activation, the smallest quantization of activation on a typical instant ticket system **450** is at the pack **458** level. Thus, when a retailer receives a new pack of tickets **458**, he or she must first activate the pack **458** on the system **450** before placing the tickets on sale. Pack **458** level activation thereby enables instant tickets to be shipped via common carrier since un-activated or stolen packs **458** would be automatically flagged on the system **450** with any tickets **451** in the pack **458** flagged when redemption was attempted.

[0084] In addition to shipping, reconciliation and activation, some games may be structured such that there are a specified minimum number and/or types of winners within a pack **458**. In these embodiments, the arrangement of winning tickets is not truly random, but are randomly distributed within a defined structure to ensure that all retailers receive approximately the same number of low- and mid-tier winners per pack as well as to aid in ensuring sufficient cash is on hand for paying low- and mid-tier prizes.

[0085] A given number of packs **458** are then arranged on the system **450** as a pool **459**. The purpose of a pool **459** is to reconcile all low- and mid-tier (and possibly high-tier) prizes into a predetermined prize structure. While the size of a pool **459** can vary from game-to-game it is essential that a pool **459** be sufficiently large to inhibit tracking unsold winning tickets by the public.

[0086] All of the produced packs **458** for a given game are logged in a digital ship file **460** by the ticket manufacturer and loaded on the system **450** prior to the game being placed on sale. The ship file contains a listing of all the manufactured packs **458** identifying (typically by omission) any pack **458** numbers that were destroyed in the manufacturing process. As a game is placed on sale the ship file is routinely expanded with information such as: "pack 'X' shipped to retailer 'Y', "pack 'X' activated," "pack 'X' stolen," etc. Thus, the ship file enables logistical tracking of all manufactured packs **458** in an instant ticket game; however, the ship file **460** does not contain any win or lose information and cannot be linked (without appropriate cryptographic seeds or keys) to the validation file **461**.

[0087] The validation file **461** contains the validation codes (not shown in FIG. **4**A) for all tickets within a game with the validation codes effectively providing pointers to the prize value (if any) of a ticket **451** on the system **450**. The validation code is effectively inaccessible on unplayed or unsold tickets due to it being covered by a scratch-off coating. Thus, the cleartext validation code is inaccessible on unplayed or unsold tickets **451**. Therefore, the security of the system **450** is derived from the validation file **461** being unassociated with the ship file **460**, as well as the physical unplayed tickets' inventory control information **452** and **453**.

[0088] Both the ship **460** file and the validation file **461** are generated by the instant ticket manufacturer before the tickets are shipped to the lottery. All lottery logistical and validation systems **450** currently require the ship file **460** and validation file **461** to be loaded on the system **450** prior to instant tickets being shipped to retailers and placed on sale. Once loaded onto the system **450**, the basic validation file **461** typically cannot be altered (other than possibly flagged additions—e.g., redeemed, stolen, etc.), thereby ensuring the integrity of the instant ticket game and its predetermined payout.

[0089] An embodiment **475** of the present invention for reliably and securely storing large numbers of predetermined winning and losing game outcomes within the secure gambling microprocessor **100'** that is compatible with

legacy lottery instant ticket validation systems **450** is provided in FIG. **4**B. As shown in FIG. **4**B, the secure gambling microprocessor **100'** is, as before, networked with game management system **200'** via its associated computing device **201'**. However, in this example embodiment **475** the secure gambling microprocessor **100'** is also networked to a legacy lottery central site validation system **477** as well as a lottery instant ticket provider **476** via their communications (Comms) systems (**482** and **481**, respectively) to the management system's **200'** Comms **210'**.

[0090] This example embodiment **475** has the advantage of being compatible with existing instant ticket lottery validation **477** and production **476** systems and therefore can conduct validations and redemptions on said legacy lottery systems without the need for an external banking or purse system **220'**. In this embodiment, instant ticket **451** inventory control (**454** through **457**—FIG. **4**A) and validation information is loaded from the lottery instant ticket provider's **476** (FIG. **4**B) generated inventory & validation codes **478** are downloaded into secure gambling microprocessor's **100'** Electronically Erasable Programmable Read Only Memory (EEPROM) **108'** thereby enabling secure gambling microprocessor's **100'** to communicate with its associated computing device **201'** such that the consumer can play a game that will ultimately culminate in the prize value (if any) pre-assigned to the loaded instant ticket **451** (FIG. **4**A) by the instant ticket provider **476** (FIG. **4**B) at the time of instant ticket game generation **478** that will validate for the same prize value on the lottery central site **477**.

[0091] The instant ticket **451** (FIG. **4**A) inventory control (**454** through **457**) and validation information can be loaded into the secure gambling microprocessor's **100'** (FIG. **4**B) EEPROM **108'** or Read Only Memory (ROM) **109'** at the time of manufacture. Alternatively and preferably, instant ticket data may be loaded into the secure gambling microprocessor's **100'** EEPROM **108'** via the management system **200'** and associated computing device **201'**. The preferred embodiment, having the advantages of flexible instant ticket game play as well as allowing the consumer to repeatedly purchase multiple virtual instant tickets.

[0092] As was discussed in FIG. **4**A, instant tickets **451** are logistically grouped in packs **458** that are units of activation on legacy lottery instant ticket systems. Multiplicities of packs **458** are then grouped into pools **459** primarily for the purpose of prize fund balancing. In a preferred embodiment, virtual instant ticket packs **458** rather than virtual individual instant tickets **451** are loaded onto the secure gambling microprocessor's **100'** (FIG. **4**B) EEPROM **108'** or ROM **109'** at either the time of manufacturer or via the network enabled by the associated computing device **201'** and the management system **200'**. By loading virtual packs **458** rather than virtual individual instant tickets **451**, the secure gambling microprocessor **100'** may execute multiplicities of game plays and corresponding prize awards without the need for further downloads. Virtual packs **458** may be paid for in entirety or preferably the virtual pack represents the theoretical retail value of the plays loaded the secure gambling microprocessor **100'** with the consumer purchasing and thereby unlocking each virtual instant ticket **451** at different times. In this embodiment, the consumer may not purchase all of the virtual instant tickets **451** within a virtual pack **458**. However, since the packs **458** and tickets **451** exist in a virtual embodiment there is for all practical matters no cost associated with downloading virtual instant tickets **451** that may never be played. In fact, if the secure gambling microprocessor's **100'** EEPROM **108'** is sufficiently large, virtual pools **459** comprising multiplicities of packs **458** and tickets **451** may be loaded. This embodiment has the advantages of fewer communications downloads as well as the possible consumer psychological benefit of being able to advertise that every secure gambling microprocessor **100'** is carrying or embodying the top prize.

[0093] Virtual packs **458** or pools **459** being downloaded to the secure gambling microprocessor **100'** does have the disadvantage of a potential security vulnerability assuming an insider gained access to the prizes awarded for a given pack or pool. The security vulnerability being realized by an insider with knowledge of the sequence of the winning and losing virtual tickets **451** in a pack **458** or pool **459** possibly gaining an illicit advantage by developing an exit strategy for each secure gambling microprocessor **100'**—i.e., determining the optimum time to stop playing when total winnings maximally exceed the total value paid for virtual tickets **451** purchased. While various countermeasures are typically employed with real world instant ticket validation systems **477** to avoid this situation, the problem remains as a theoretical security flaw. Fortunately, in a preferred embodiment, downloaded virtual packs **458** or pools **459** of virtual instant tickets **451** may be shuffled within the secure gambling microprocessor **100'** using the internal RNG **103'** such that the play sequence of the virtual tickets **451** within a pack **458** or pool **459** would be unknown. In this embodiment, the RNG **103'** would rearrange the stack of virtual tickets **451** within a pack **458** or pool **459** such that the sequence of virtual tickets dispensed for play would be unknown to anyone; however, since each shuffled virtual instant ticket **451** would still only be played once, the total amount of prizes awarded would still be as planned.

[0094] In an alternative embodiment, the pack **458** or pool **459** of virtual tickets **451** downloaded to the secure gambling microprocessor **100'** would only embody prize awards for any conceivable denomination (e.g., "$1, $2, $3, . . . $52, $53, $54, . . . $107, $108, $109, . . . ") that could be won by a consumer playing a series of games where the winning or losing status was determined by the secure gambling microprocessor's **100'** RNG **103'**. Thus, with this alternative embodiment, the instant ticket provider **476** would only generate instant tickets used for cashing out winnings with the legacy lottery central site **477** system. This embodiment having the advantages of reduced compliance with United States banking laws as well as retaining the lottery's brick and mortar retailer network with the associated political benefits of supporting local (to the lottery's jurisdiction) commerce, while at the same time enabling essentially portable slot machine type gaming.

[0095] As is apparent to one skilled in the art, the instant ticket data simply provides a game outcome that can be validated on a legacy instant ticket system and only provides an outcome prize value (if any) with not necessarily any impact on game type, game play, or number of plays. Game play interaction, graphics, and style being preferably handled by the associated computing device **201'** with the secure gambling microprocessor **100'** simply determining the game's outcome either by the virtual ticket **451** pulled off of the stack or by the internal RNG **103'**. The essential concept being that the gambling system remains secure from malicious hacking or manipulation with all win or lose gaming decisions performed by the secure gambling micro-

processor **100'** while still maintaining a highly desirable feature of enabling offline gameplay

[0096] As previously discussed in FIG. **4**A, each instant ticket's **451** inventory control (**454** through **457**) and validation information has a corresponding entry in the ship **460** and validation file **461** that identifies the ticket's **451** status (e.g., activated, stolen) in the ship file **460** and its winning or non-winning value in the validation file **461**. As illustrated in FIG. **4**B the ship **460'** and validation **461'** files are generated by the instant ticket provider **476** at the time of game generation where winning values are pseudorandomly assigned to inventory and validation codes **478**. Thus, downloaded virtual instant tickets **451**, packs **458**, and pools **459** statuses can be tracked by the lottery central site **477** throughout the secure gambling microprocessor's **100'** lifecycle. Among enhanced security and other features, this tracking process also allows the secure gambling microprocessors **100'** to be placed on sale within easy reach of the consumer (e.g., on display pegs in an aisle) since the secure gambling microprocessor **100'** would be essentially worthless unless its downloaded virtual instant ticket **451**, pack **458**, or pool **459** has been registered as activated on the lottery central site **477** ship **460"** and validation **461"** files. With activation of the associated virtual instant ticket **451**, pack **458**, or pool **459** only occurring at the time of sale shoplifting of the secure gambling microprocessors **100'** would offer no economic gain and indeed the secure gambling microprocessors **100'** could even be given away to the consumer with the consumer only paying for virtual instant tickets **451**, packs **458**, or pools **459** when they are downloaded to the device.

Account Value Unload

[0097] Reference will now be made to FIG. **5**, a flowchart **500** of a method of unloading the value or other data for the system in FIG. **2**. In general, flowchart **500** may be utilized in a stand-alone format or may be used after one or more of flowcharts **300** and **400** described in FIGS. **3** and **4** respectively. At flowchart **500**, a user decides to "cash out" from gaming, which entails transferring the value from the purse of secure gambling microprocessor **100** to the gambling management system **200**.

[0098] In general, flowchart **500** is utilized when the user wants to cash out the purse. In general, the user would utilize the computing device to initiate secure communications between gambling management system **200** and the blackjack secure gambling microprocessor **100** as described herein. Gambling management system **200** would determine the size of the purse and provide the funds from the purse to the user in one of a number of payment methods. For example, gambling management system **200** may deposit the funds back into the user's bank account; cut the user a check, or the like.

[0099] With reference now to **510** of FIG. **5** and FIG. **2**, one embodiment determines the purse value at secure gambling microprocessor **100**. For example, gambling management system **200** may automatically identify which secure gambling microprocessor **100** will have its value unloaded and the amount requested by the Customer to be unloaded. In another embodiment, a Casino or Lottery operator interacts with the management interface of the gambling management system **200** to identify which secure gambling microprocessor **100** will have its value unloaded and the amount requested by the Customer to be unloaded.

[0100] With reference now to **520** of FIG. **5** and FIG. **2**, one embodiment transmits the purse value to gambling management system **200** via the secure communications channel **211**. As described herein, in one embodiment the gambling management system **200** uses the secure gambling microprocessor **100** identifiers and internal systems such as the hardware security module to set up secure channel communication between the gambling management system **200** and secure gambling microprocessor **100**.

[0101] With reference now to **523** of FIG. **5** and FIG. **2**, one embodiment transmits the requested value unload along with optional log data from the gaming session back to the gambling management system **200**. In addition, at **526** optional confirmation of the validity of the purse value is performed by gambling management system **200**.

[0102] With reference now to **530** of FIG. **5** and FIG. **2**, one embodiment authorizes payment from gambling management system **200** to the user. In addition, at **533**, if the customer has completed gaming with secure gambling microprocessor **100**, and the secure gambling microprocessor **100** belongs to the Casino, the Customer's account may also be removed from the secure gambling microprocessor **100** so that a different Customer may use it. In another embodiment, if the secure gambling microprocessor **100** belongs to the Customer, the account will remain on the secure gambling microprocessor **100** for future use.

[0103] In other words, the entire mobile device may be reusable. For example, a user may be at a casino and want to play blackjack in his room, at a lunch table, pool side, or the like, but may not have a computing device. The user would go to the cashier's cage and request a mobile device, such as a tablet or the like, with a secure gambling microprocessor **100** coupled therewith. The secure gambling microprocessor **100** on the mobile device would be loaded with the blackjack game and an amount of money added to the purse.

[0104] In addition, a mobile device may have more than one player's account thereon. For example, a first user may have an account on a secure gambling microprocessor **100** on a mobile device that includes a number of games and a purse. In addition, a number of additional users may also have an account on the same secure gambling microprocessor **100** on the same mobile device. For example, a first user has his own login to his account and has a purse with a 5,000.00 dollar value. A second user also has her own login to her account on the same device with the same secure gambling microprocessor **100** and she has a purse with a 25,000.00 dollar value. An n^{th} user also has a login to an account on the same device with the same secure gambling microprocessor **100** and has a purse with a 2,000.00 dollar value.

[0105] In another embodiment, the games may also be different for one or more user's account on the same device with the same secure gambling microprocessor **100**. For example, the first user may only have a blackjack game, the second user may only have a roulette game, and the nth user may have access to a number of games.

[0106] The user would then take the mobile device to his room or other location, and play blackjack. When the user was done playing, he would return the mobile device to the cashier's cage. At that time, the blackjack secure gambling microprocessor **100** would communicate with the gaming management system to determine the value of the user's purse. In one embodiment, the determining would also

include the gaming management system ensuring the security of the blackjack secure gambling microprocessor **100** and the purse contents thereon. If the user had money in the purse, the user would be paid.

[0107] In one embodiment, after the mobile device was returned and the user paid, the secure gambling microprocessor **100** would be returned to default and the mobile device would await the next user.

[0108] With reference now to **550** of FIG. **5**A and FIG. **4**A, and FIG. **4**B, one embodiment determines the prize value at secure gambling microprocessor **100'** wherein the payout for a predetermined game occurs in conjunction with a legacy lottery central site **477** system. As shown in FIG. **5**A, the payout process starts at the conclusion of a winning game that outcome was predetermined by a virtual instant ticket **451** downloaded to the secure gambling microprocessor **100'** when the prize value for the winning game previously played is retrieved from EEPROM **108'** memory **551**. Next, the secure gambling microprocessor **100'** notates in its memory that the virtual instant ticket **451** has been successfully played with its validation code transmitted (**552** and **553**) to the associated computing device **201'**. The associated computing device **201'** then displays the validation code **554** both in a human readable form and in a barcode format that is compatible with legacy lottery terminal scanners. If the associated computing device **201'** is a desktop computer or some other non-portable device, the validation code may be printed with the hardcopy presented for validation.

[0109] When the validation code is presented for redemption at a legacy lottery retailer the validation code is keyed into the terminal by the retailer or preferably scanned in by decoding the validation barcode **555**. The validation code is transmitted to the legacy lottery central site **477** where the code is verified with the ship **460"** and validation **461"** files to ensure that it represents a legitimate winner, the winning amount, has not been previously redeemed, and that the virtual instant ticket **451** is from an activated pack **458** that has not been stolen. Assuming the validation code passes all required tests at the central site **477**, it is logged as paid **556** with a message is transmitted back to the retailer instructing him or her to pay the consumer the winnings **557**. Thus, even though the actual gaming portions were maintained as a virtual instant ticket embodied in the secure gambling microprocessor **100'** with the game itself being a video interactive experience, the resulting winnings are paid via legacy lottery systems by an authorized lottery retailer.

[0110] As an alternative to cashing out, the consumer has the option to use his or her winnings to purchase additional plays on the gaming environment with the winnings. In this embodiment, the consumer would elect to roll over his or her winnings into new game play. The logistical tracking of the purchasing of additional plays would be maintained by either the purse management module **220'** (FIG. **4**B) or entirely within the EEPROM **108'** of the secure gambling microprocessor **100'**.

[0111] With reference now to **575** of FIG. **5**B and FIG. **4**A, and FIG. **4**B, another embodiment determines the payout value at secure gambling microprocessor **100'** wherein the payout may be an accumulation of multiple plays (e.g., determined by RNG **103'**) in conjunction with a legacy lottery central site **477** system. As shown in FIG. **5**B, this embodiment **575** is virtually identical to the previous embodiment (**550**) with the exception of the initial step **576**. With embodiment **575**, the consumer elects to cash out **576** at any given time; hence the consumer's total prize winnings can be a variable between a minimum value (e.g., $1) and some theoretical maximum value (e.g., $500). Thus, to enable validations and redemptions on a legacy lottery instant ticket system **477**, a virtual pack **458** or pool **459** would have been downloaded to the secure gambling microprocessor **100'** before the redemption process begins. This virtual pack **458** or pool **459** would embody an array of virtual instant tickets **451** with each ticket awarding a different prize level in the predefined range (e.g., ticket "001" pays $1, ticket "002" pays $2, ticket "003" pays $3 . . .) such that there would be one validation code associated with a virtual pack **458** or pool **459** that would equate to the payout value at the time the consumer elected to cash out. Therefore, the lottery central site **477** would process one validation per pack **458** or pool **459** that would provide the proper payout value to the consumer. Of course in this embodiment **575**, the vast majority of virtual instant tickets **451** would never be validated, but since the tickets are virtual and only exist as reprogrammable bits in the secure gambling microprocessor's **100'** EEPROM **108'** memory there is virtually no cost associated with generating a large number of unused tickets. To allow for multiple validations and redemptions that could potentially have the same prize value more than one virtual pack **458** or pool **459** could be downloaded to the secure gambling microprocessor's **100'** EEPROM **108'** memory at a time. The remainder of the validation and redemption process for embodiment **575** is identical to embodiment **550**.

[0112] After the cash out value has been determined the secure gambling microprocessor **100'** notates in its memory that the virtual instant ticket **451** has been successfully played with its validation code transmitted (**577** and **578**) to the associated computing device **201'**. The associated computing device **201'** then displays the validation code **559** both in a human readable form and in a barcode format that is compatible with legacy lottery terminal scanners. If the associated computing device **201'** is a desktop computer or some other non-portable device, the validation code may be printed with the hardcopy presented for validation. When the validation code is presented for redemption at a legacy lottery retailer the validation code is keyed into the terminal by the retailer or preferably scanned in by decoding the validation barcode **580**. The validation code is transmitted to the legacy lottery central site **477** where the code is verified with the ship **460"** and validation **461"** files to ensure that it represents a legitimate winner, the winning amount, has not been previously redeemed, and that the virtual instant ticket **451** is from an activated pack **458** that has not been stolen. Assuming the validation code passes all required tests at the central site **477**, it is logged as paid **580** with a message transmitted back to the retailer instructing him or her to pay the consumer the cash out winnings **582**.

[0113] In one embodiment, the Lottery Central Site **477** notifies the Management System **200'** of all interactions involving individual secure gambling microprocessors **100'** so that the Management System **200'** can stay synchronized with the Lottery Central Site **477** and the Management System **200'** can opportunistically perform additional operations with the secure gambling processor **100'** by using the Computing Device **201'** to relay messages to the secure gambling processing **100'** from time to time. One example of such opportunistic operations would be to send a message to the secure gambling microprocessor **100'** that confirms that

specific winning tickets have been redeemed. This communication does not provide any additional security advantage over the processes previously described, but it does enable the Computing Device to communicate with the secure gambling microprocessor **100'** and display in the Graphical User Interface of the Computing Device **201'**, the state of which winnings have been redeemed and to allow an update message from the Management System **200'** to be received by the secure gambling microprocessor **100'** indicating which specific winnings have been redeemed

[0114] The present technology may be described in the general context of computer-executable instructions, such as program modules, being executed by a computer. Generally, program modules include routines, programs, objects, components, data structures, etc., that perform particular tasks or implement particular abstract data types. The present technology may also be practiced in distributed computing environments where tasks are performed by remote processing devices that are linked through a communications network. In a distributed computing environment, program modules may be located in both local and remote computer-storage media including memory-storage devices.

[0115] The foregoing Description of Embodiments is not intended to be exhaustive or to limit the embodiments to the precise form described. Instead, example embodiments in this Description of Embodiments have been presented in order to enable persons of skill in the art to make and use embodiments of the described subject matter. Moreover, various embodiments have been described in various combinations. However, any two or more embodiments may be combined. Although some embodiments have been described in a language specific to structural features and/or methodological acts, it is to be understood that the subject matter defined in the appended claims is not necessarily limited to the specific features or acts described above. Rather, the specific features and acts described above are disclosed by way of illustration and as example forms of implementing the claims and their equivalents.

What is claimed is:

1. A distributed gambling method comprising:

communicatively coupling a secure gambling microprocessor with a mobile computing device having a graphic user interface, the secure gambling microprocessor comprising:

a firmware with gambling code and a purse stored thereon;

establishing a communication channel between the secure gambling microprocessor and a gambling management system via the mobile computing device;

activating, at the gambling management system, the secure gambling microprocessor coupled with the mobile device;

providing periodic communication between the secure gambling microprocessor and the gambling management system via the communication channel, the periodic communication comprising:

providing updates to at least a portion of the secure gambling microprocessor;

monitoring a security of the secure gambling microprocessor; and

determining a monetary value of the purse; and

authorizing payment to or from the secure gambling microprocessor via the gambling management system.

2. The method of claim **1** further comprising:

providing an end-to-end security between the gambling management system and the secure gambling microprocessor where the authenticity and integrity of all communication can be verified by either the secure gambling microprocessor or the gambling management system.

3. The method of claim **1** further comprising:

encrypting the communication channel from end-to-end between the gambling management system and the secure gambling microprocessor to provide a secure channel.

4. The method of claim **1** further comprising:

utilizing Near Field Communication (NFC) for said communications channel.

5. The method of claim **1** further comprising:

utilizing a Bluetooth communication for said communications channel.

6. The method of claim **1** further comprising:

utilizing a Wi-Fi communication for said communications channel.

7. The method of claim **1** further comprising:

utilizing a mobile device communication for said communications channel.

8. A distributed gambling system comprising:

a plurality of mobile computing devices;

a plurality of secure gambling microprocessors, each of the plurality of secure gambling microprocessors coupled with a different one of the plurality of mobile computing devices to provide a plurality of secure stand-alone gambling platforms; and

a gambling management system communicatively coupled with one or more of the plurality of secure stand-alone gambling platforms to maintain gambling integrity.

9. The system of claim **8** wherein said secure gambling microprocessor is a tamper resistant secure gambling microprocessor comprising:

a firmware with gambling code and a purse stored thereon.

10. The system of claim **8** wherein said secure gambling microprocessor is in a form factor from the group consisting of: debit, credit, closed loop prepaid, General Purpose Reloadable (GPR) card, hotel room key card, smart cards, microSD cards, and SIM cards.

11. The system of claim **8** wherein at least one of the plurality of secure gambling microprocessors is coupled with a different one of the plurality of mobile computing devices via a communications port.

12. The system of claim **8** wherein at least one of the plurality of secure gambling microprocessors is embedded in a different one of the plurality of mobile computing devices.

13. The system of claim **8** wherein said gambling management system comprises:

a gambling routine provider module;

a purse management module; and

a gambling operation reporter module.

14. The system of claim **8** wherein said gambling management system comprises:

a network data communications interface; and

a hardware security module.

15. The system of claim **8** wherein the plurality of mobile computing devices are selected from the group consisting of:

mobile phones, tablet computers, laptop computers, notebook computers, and personal digital assistants.

16. A distributed gambling method comprising:

communicatively coupling a secure gambling microprocessor with a mobile computing device having a graphic user interface, the secure gambling microprocessor comprising:

a firmware with gambling code and a purse stored thereon;

establishing a secure communication channel between the secure gambling microprocessor and a gambling management system via the mobile computing device;

activating, at the gambling management system, the secure gambling microprocessor coupled with the mobile device;

providing periodic communication between the secure gambling microprocessor and the gambling management system via the secure communication channel, the periodic communication comprising:

providing updates to at least a portion of the secure gambling microprocessor;

monitoring a security of the secure gambling microprocessor; and

determining a monetary value of the purse; and

authorizing payment to or from the secure gambling microprocessor.

17. The method of claim **16** wherein the gambling management system further comprises:

utilizing a unique identifier to identify the secure gambling microprocessor;

determining at least one game supported by an operating system of the mobile computing device;

establishing a secure communications channel between the gambling management system and the secure gambling microprocessor; and

transmitting the at least one game to the secure gambling microprocessor via the secure communication channel.

18. The method of claim **17** wherein the gambling management system further comprises:

creating a customer account;

establishing at least one customer gaming preference;

determining a value of the purse; and

transmitting the customer account, the at least one customer gaming preference, and the value of the purse to the secure gambling microprocessor via the secure communication channel.

19. The method of claim **16** further comprising:

determining the purse value at the secure gambling microprocessor;

transmitting the purse value to the gambling management system via the secure communication channel; and

authorizing a payment from the gambling management system to a user.

20. The method of claim **19** further comprising:

transmitting a log data from a gaming session on the secure gambling microprocessor to the gambling management system via the secure communication channel;

confirming at the gambling management system the validity of the purse value.

21. The method of claim **20** further comprising:

removing the customer account, the at least one customer gaming preference and the value of the purse from the secure gambling microprocessor.

22. The method of claim **16** wherein the gambling management system payout is accomplished via the management system.

23. The method of claim **16** wherein the gambling management system payout is accomplished via a legacy lottery validation system.

24. The method of claim **23** wherein the legacy lottery system is an instant ticket validation system.

25. The method of claim **24** wherein virtual instant tickets, packs, and pools are downloaded into the secure gambling microprocessor's memory.

26. The method of claim **25** wherein virtual instant tickets, packs, and pools are downloaded into the secure gambling microprocessor's memory at the time of manufacture.

27. The method of claim **25** wherein virtual instant tickets, packs, and pools are downloaded into the secure gambling microprocessor's memory encrypted over a network.

28. The method of claim **16** wherein the secure gambling microprocessor only passes starting seed(s) to the associated computing device that ultimately determine the game's outcome.

29. The method of claim **16** wherein winnings from previous plays may be used to purchase additional wagers on the secure system without the need to cash out.

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