US 20250265896A1

(19) **United States**

(12) **Patent Application Publication** (10) **Pub. No.: US 2025/0265896 A1**

**Rollo, III et al.** (43) **Pub. Date: Aug. 21, 2025**

(54) **ELECTRONIC GAMING SYSTEM USING HISTORICAL RANDOMLY DRAWN SPORT BETTING OUTCOMES**

(71) Applicant: **Aristocrat Technologies, Inc.**, Las Vegas, NV (US)

(72) Inventors: **Donald Rollo, III**, Dacula, GA (US); **Cody Herrick**, Las Vegas, NV (US); **Alisa Mirabal**, Henderson, NV (US)

(21) Appl. No.: **18/887,864**

(22) Filed: **Sep. 17, 2024**

**Related U.S. Application Data**

(60) Provisional application No. 63/554,318, filed on Feb. 16, 2024.

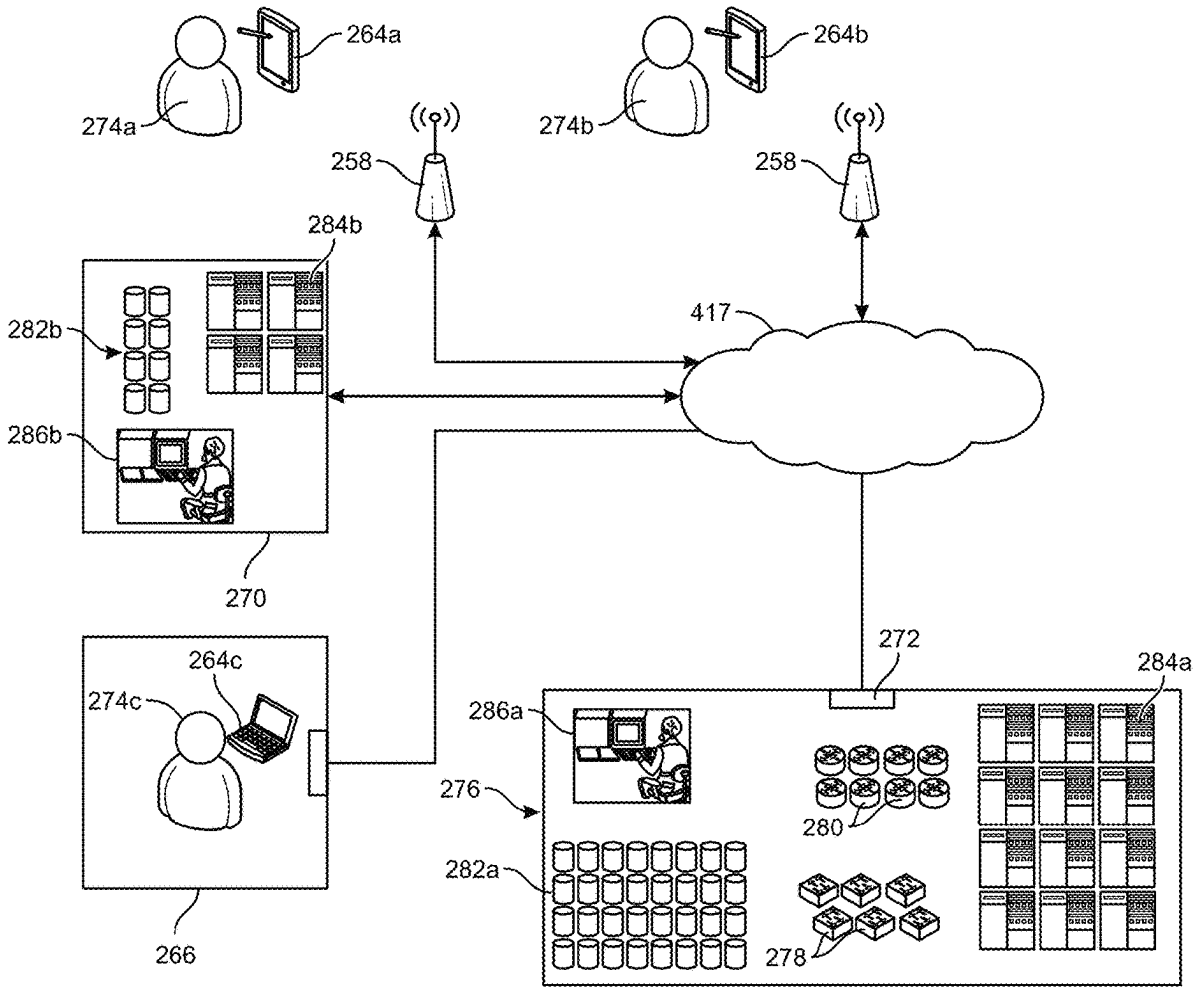
**Publication Classification**

(51) **Int. Cl.**
***G07F 17/32*** (2006.01)

(52) **U.S. Cl.**
CPC ..... ***G07F 17/3225*** (2013.01); ***G07F 17/3211*** (2013.01); ***G07F 17/3262*** (2013.01); ***G07F 17/3288*** (2013.01)

(57) **ABSTRACT**

An electronic gaming machine is provided that includes a display device and a game controller in communication with the display device. The game controller is configured to access historical sporting occurrences that are stored in a database, compile the historical sporting occurrences into winning patterns for an electronic betting game, generate a betting ticket that includes a pattern of identifiers, where a value associated with each identifier is determined randomly based on at least one of the accessed historical sporting occurrences, determine that the betting ticket has at least partially matched one of the winning patterns specified in the electronic betting game, and causing display, on the display device, of an indication that the betting ticket has at least partially matched one of the winning patterns specified in the electronic betting game. Other corresponding methods and computer-readable media are also provided.



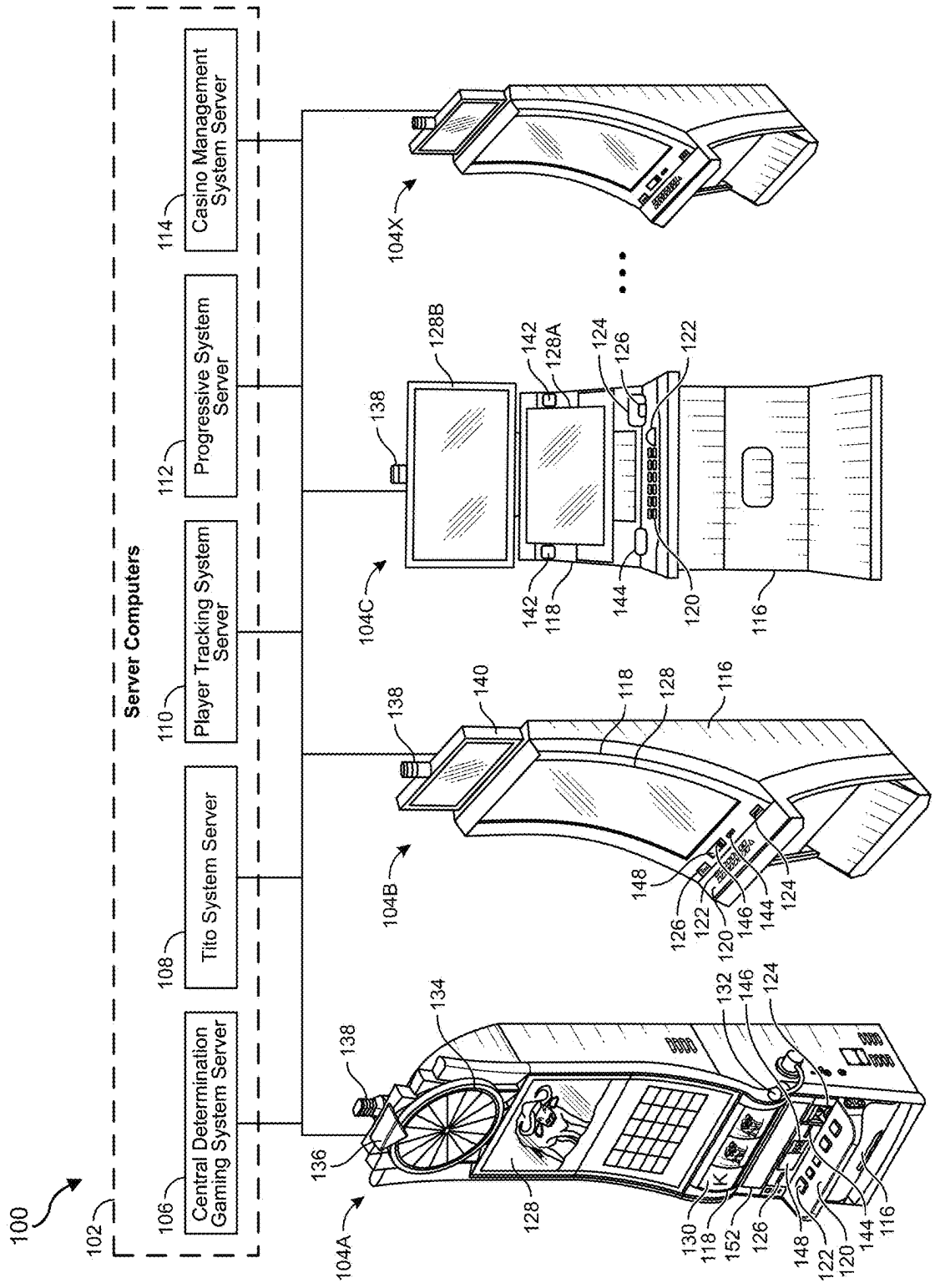

100
102
Server Computers
106
Central Determination Gaming System Server
108
Tito System Server
110
Player Tracking System Server
112
Progressive System Server
114
Casino Management System Server
104A
104B
104C
104X
128
128A
128B
116
118
120
122
124
126
130
132
134
136
138
140
142
144
146
148
152

FIG. 1

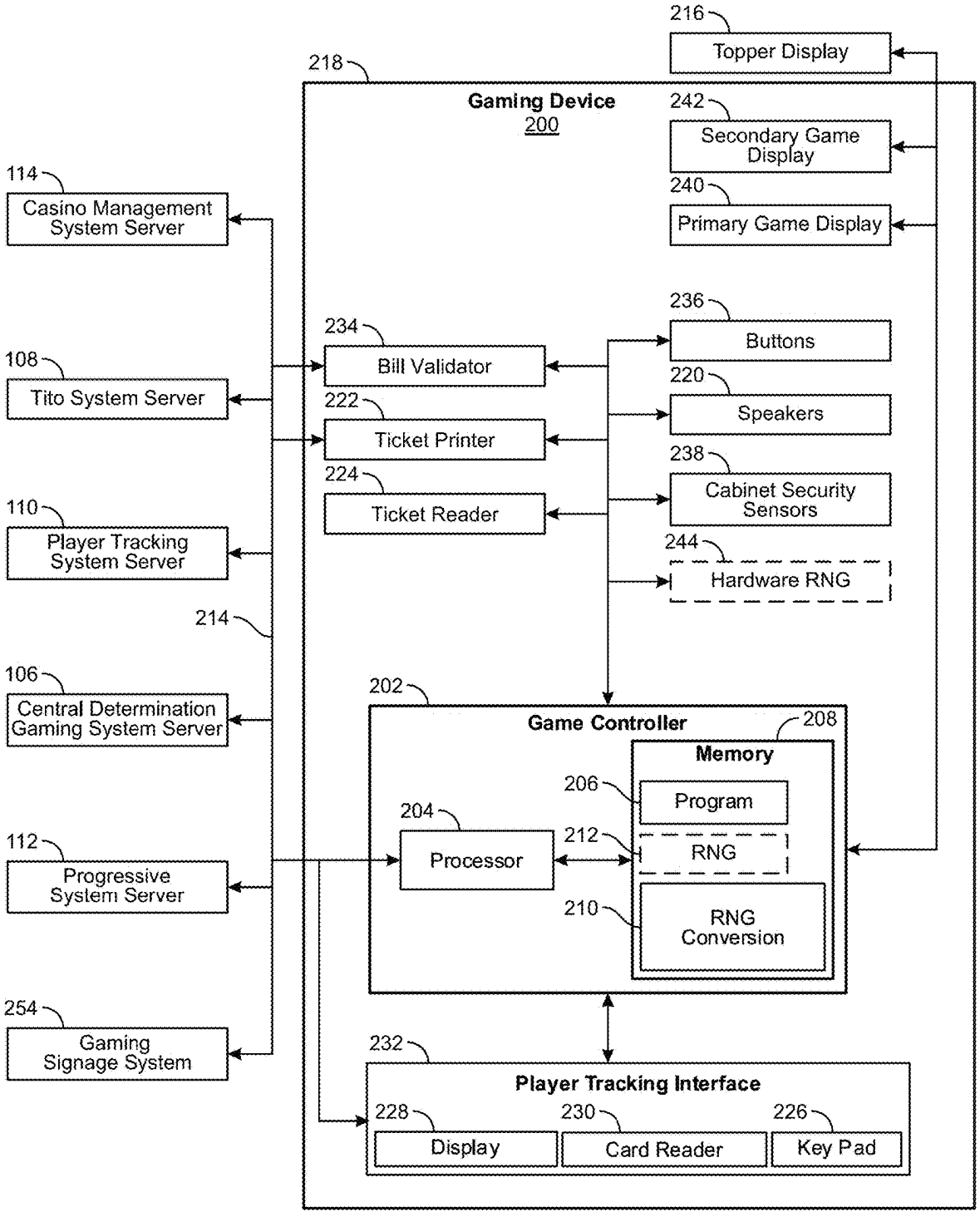

216
Topper Display
218
Gaming Device
200
242
Secondary Game Display
240
Primary Game Display
114
Casino Management System Server
108
Tito System Server
110
Player Tracking System Server
214
106
Central Determination Gaming System Server
112
Progressive System Server
254
Gaming Signage System
234
Bill Validator
222
Ticket Printer
224
Ticket Reader
236
Buttons
220
Speakers
238
Cabinet Security Sensors
244
Hardware RNG
202
Game Controller
208
Memory
206
Program
204
Processor
212
RNG
210
RNG Conversion
232
Player Tracking Interface
228
Display
230
Card Reader
226
Key Pad

*FIG. 2A*

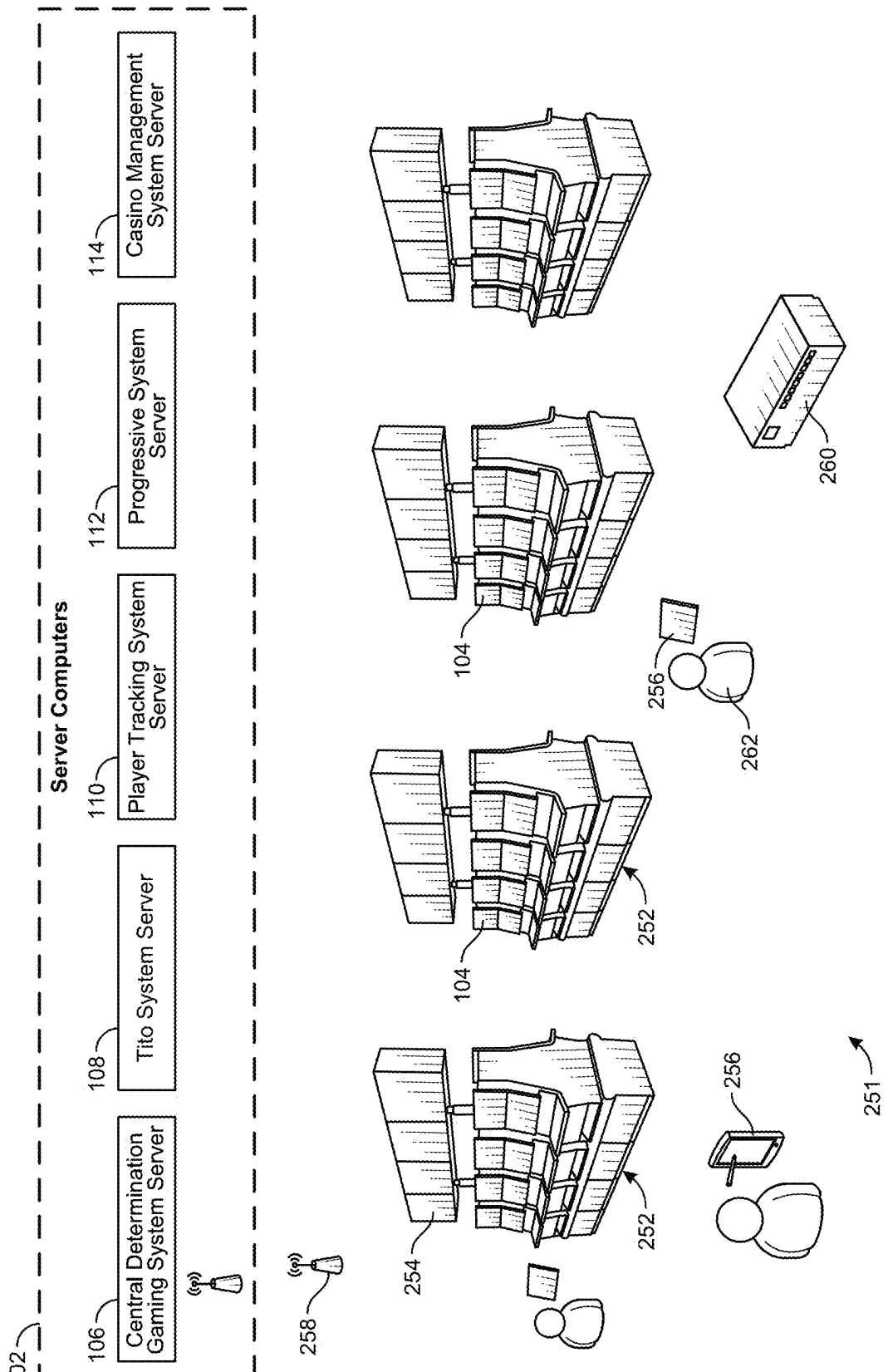

102
Server Computers
106
Central Determination Gaming System Server
108
Tito System Server
110
Player Tracking System Server
112
Progressive System Server
114
Casino Management System Server
258
254
252
104
256
262
260
251

FIG. 2B

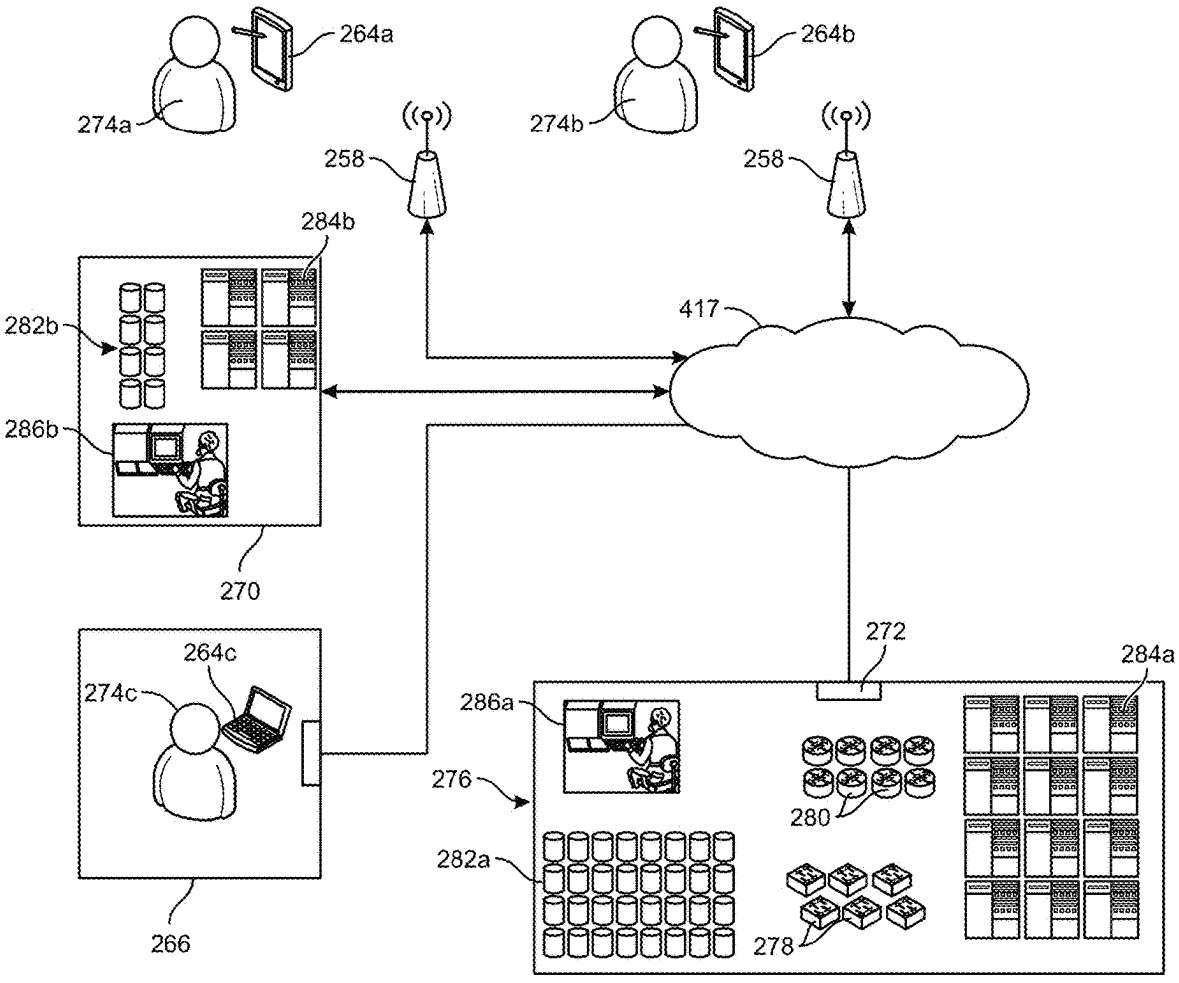

264a
274a
264b
274b
258
258
284b
282b
417
286b
270
272
284a
264c
274c
286a
276
280
282a
278
266

FIG. 2C

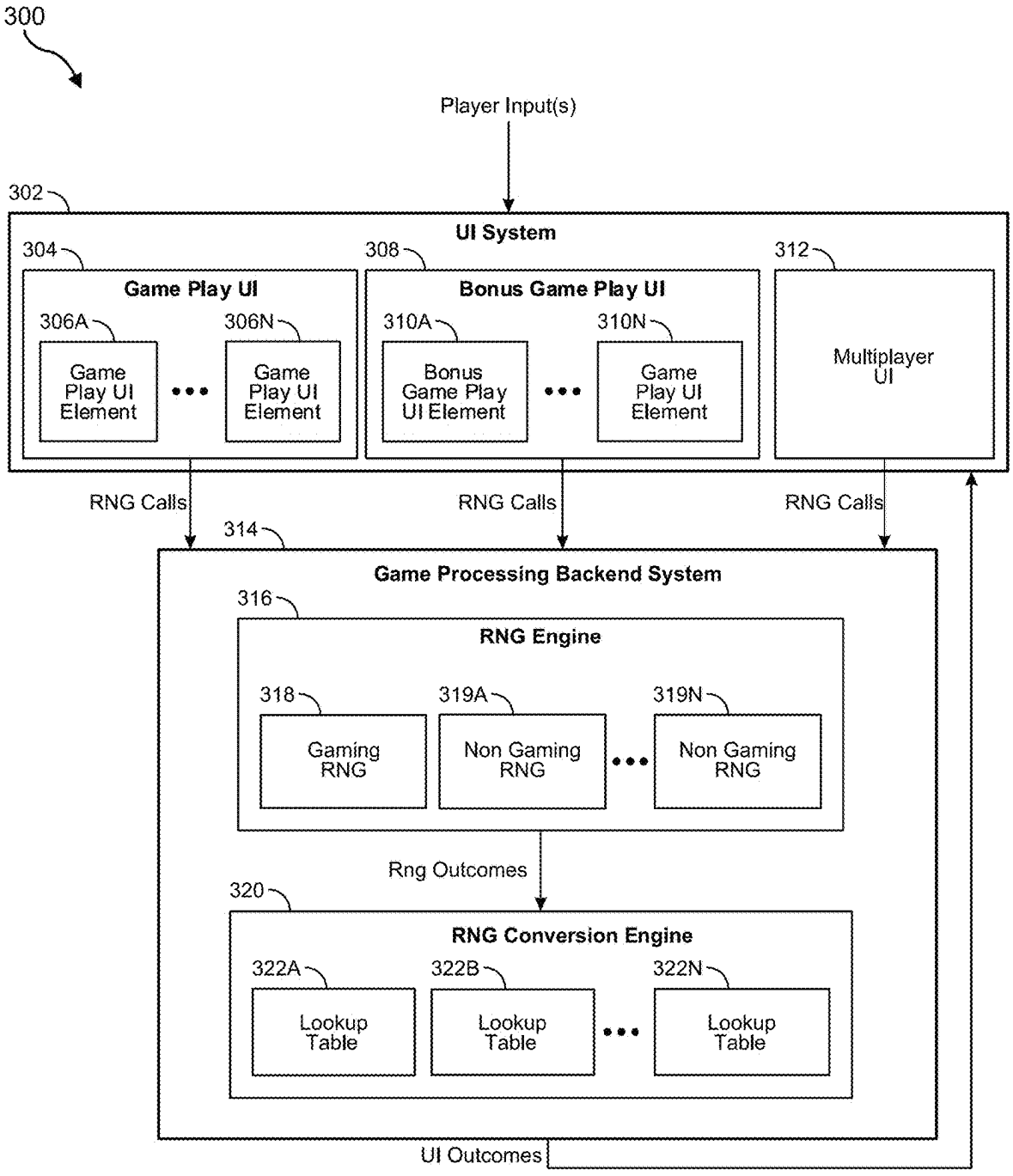

300
Player Input(s)
302
UI System
304
Game Play UI
306A
Game Play UI Element
306N
Game Play UI Element
308
Bonus Game Play UI
310A
Bonus Game Play UI Element
310N
Game Play UI Element
312
Multiplayer UI
RNG Calls
RNG Calls
RNG Calls
314
Game Processing Backend System
316
RNG Engine
318
Gaming RNG
319A
Non Gaming RNG
319N
Non Gaming RNG
Rng Outcomes
320
RNG Conversion Engine
322A
Lookup Table
322B
Lookup Table
322N
Lookup Table
UI Outcomes

*FIG. 3*

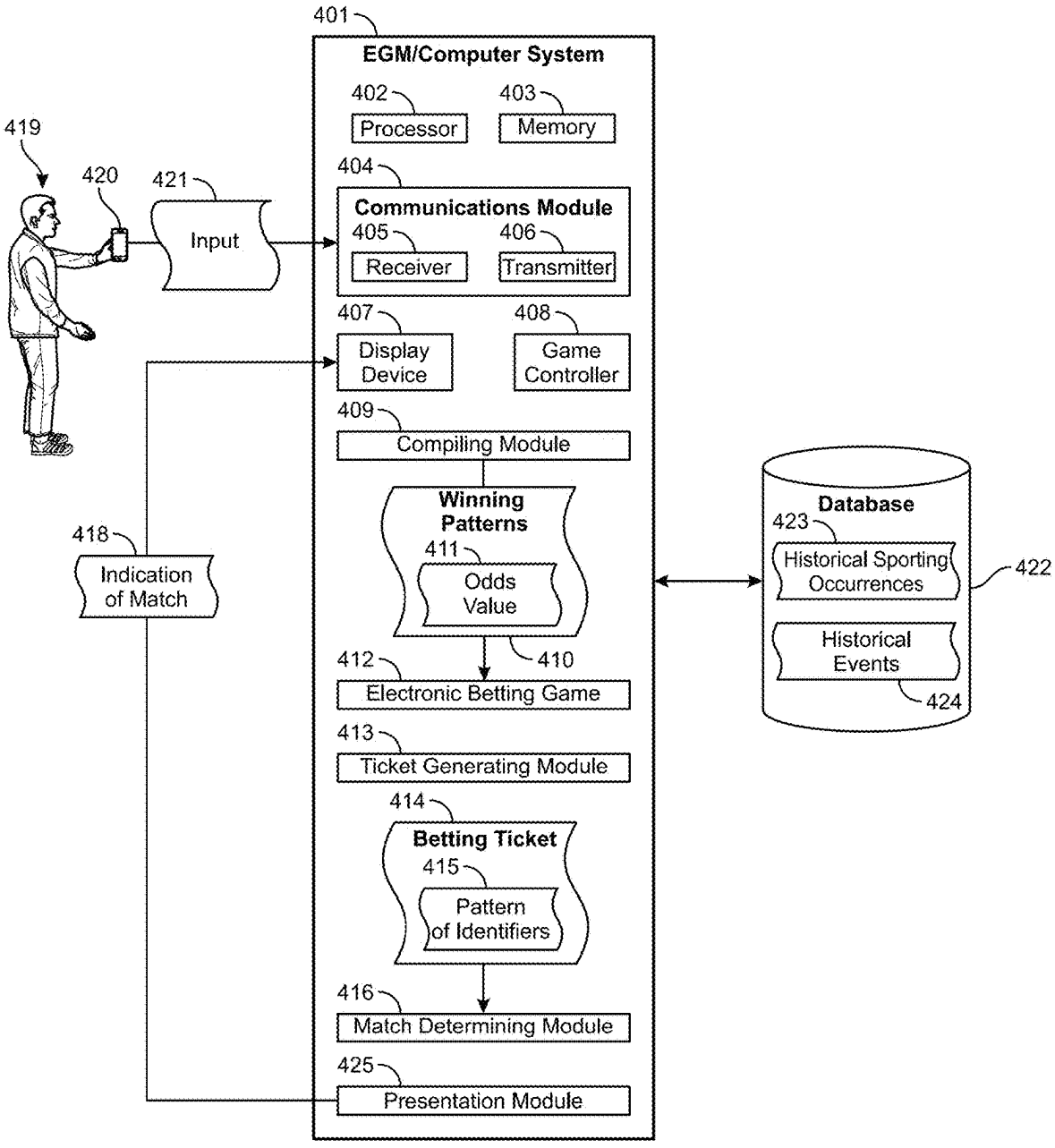

401
EGM/Computer System
402
Processor
403
Memory
404
Communications Module
405
Receiver
406
Transmitter
407
Display Device
408
Game Controller
409
Compiling Module
Winning Patterns
411
Odds Value
410
412
Electronic Betting Game
413
Ticket Generating Module
414
Betting Ticket
415
Pattern of Identifiers
416
Match Determining Module
425
Presentation Module
419
420
421
Input
418
Indication of Match
Database
423
Historical Sporting Occurrences
422
Historical Events
424

FIG. 4

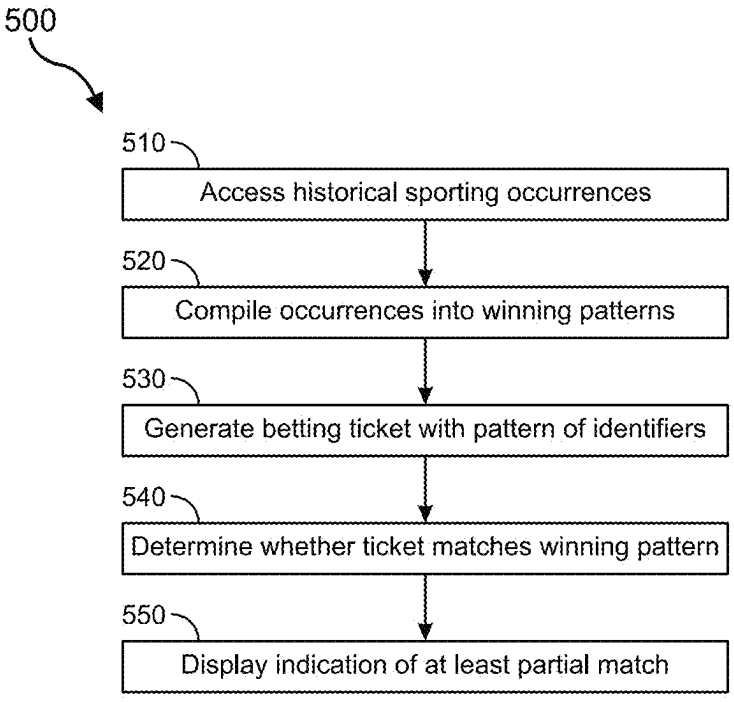

500
510
Access historical sporting occurrences
520
Compile occurrences into winning patterns
530
Generate betting ticket with pattern of identifiers
540
Determine whether ticket matches winning pattern
550
Display indication of at least partial match

*FIG. 5*

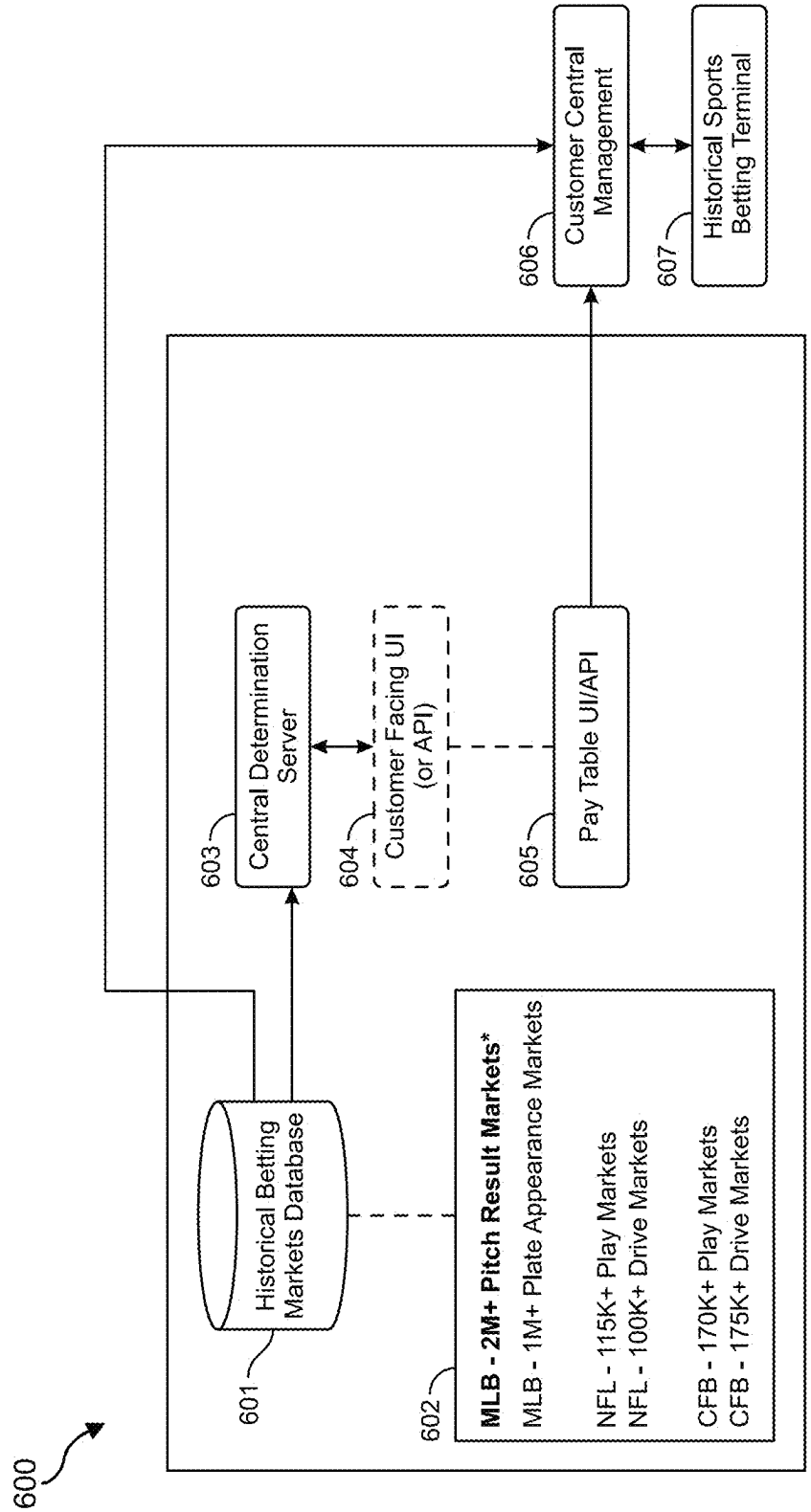

600
601
Historical Betting Markets Database
602
MLB - 2M+ Pitch Result Markets*
MLB - 1M+ Plate Appearance Markets
NFL - 115K+ Play Markets
NFL - 100K+ Drive Markets
CFB - 170K+ Play Markets
CFB - 175K+ Drive Markets
603
Central Determination Server
604
Customer Facing UI (or API)
605
Pay Table UI/API
606
Customer Central Management
607
Historical Sports Betting Terminal

FIG. 6

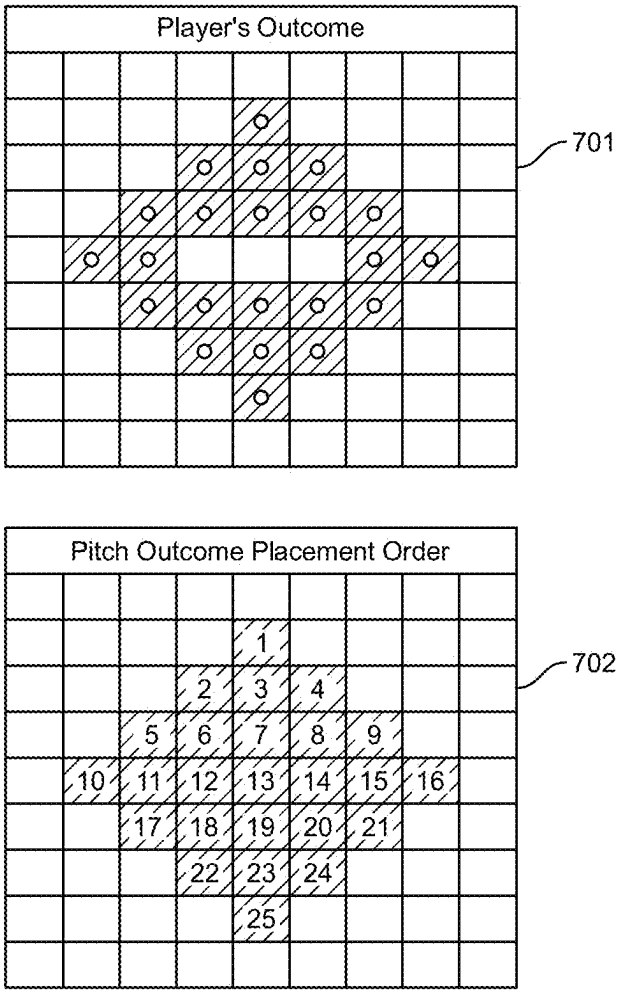

Player's Outcome
701
Pitch Outcome Placement Order
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
702

FIG. 7A

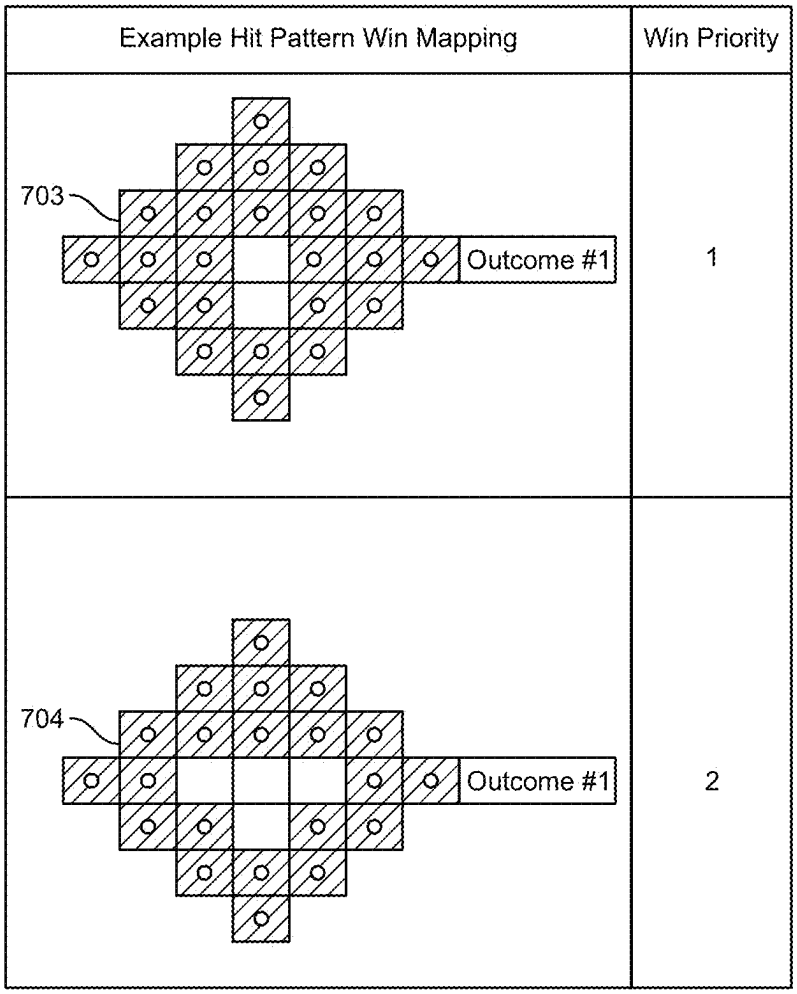

Example Hit Pattern Win Mapping
Win Priority
703
Outcome #1
1
704
Outcome #1
2

FIG. 7B

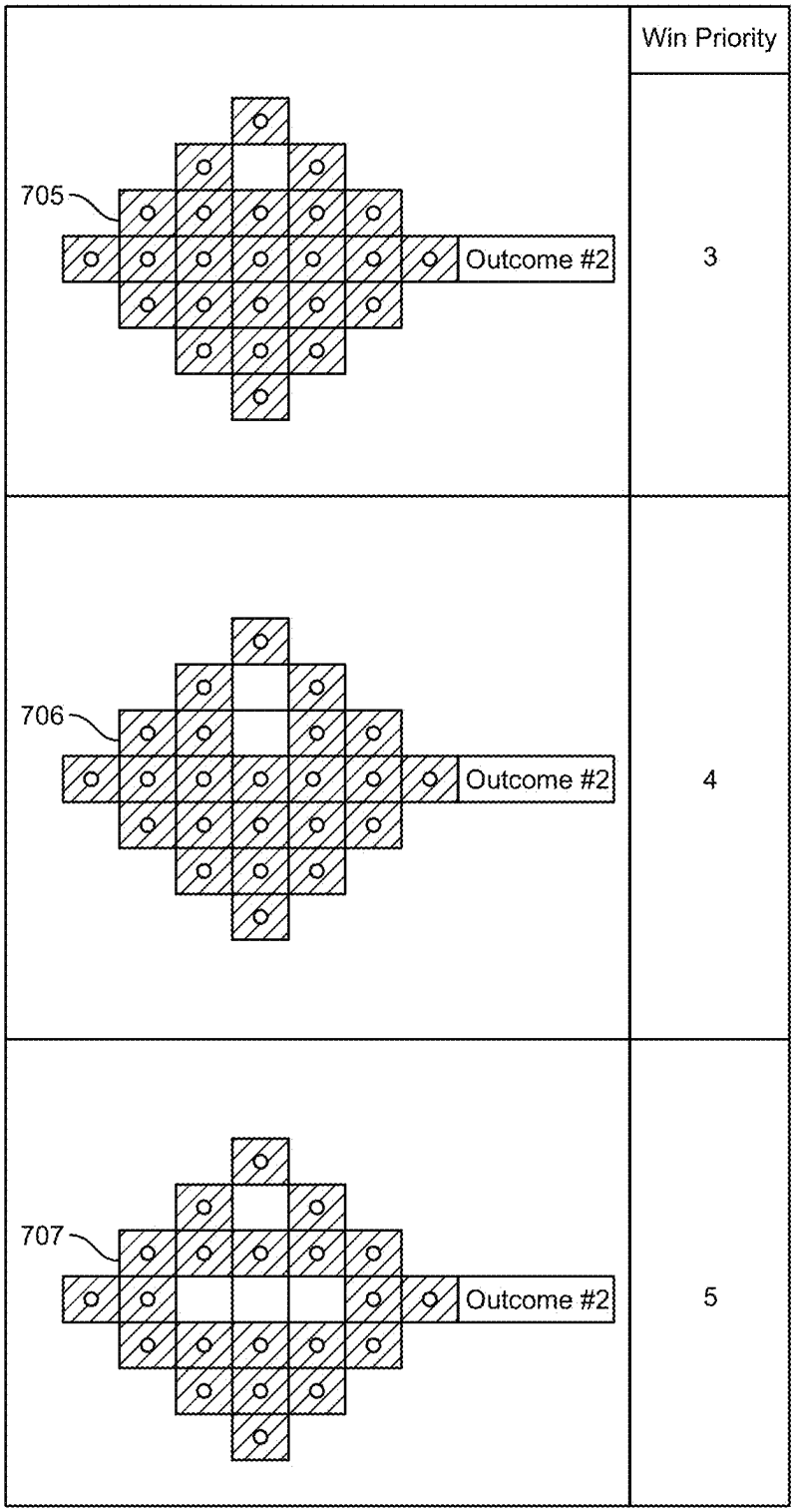



FIG. 7C

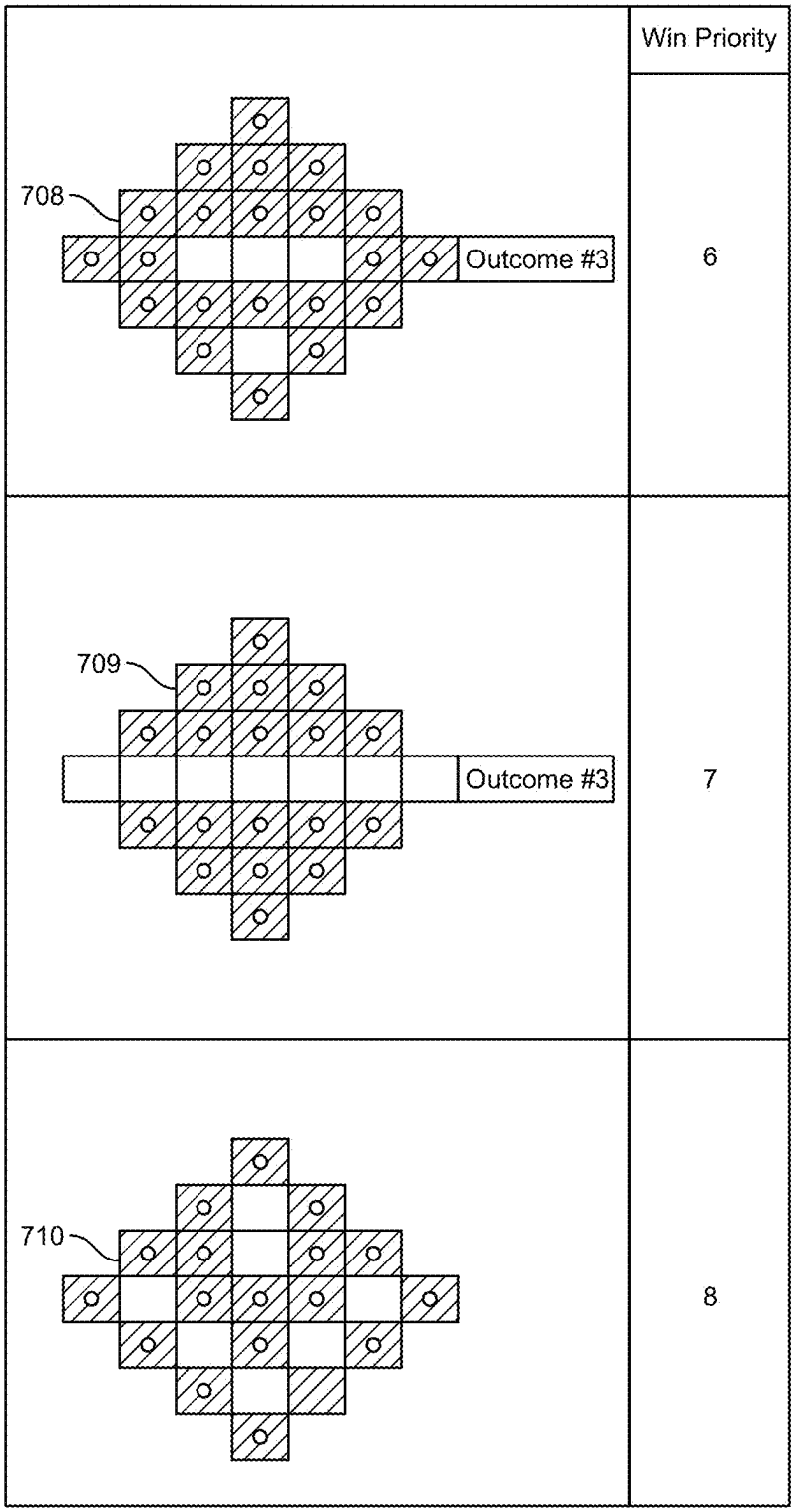



FIG. 7D

# ELECTRONIC GAMING SYSTEM USING HISTORICAL RANDOMLY DRAWN SPORT BETTING OUTCOMES

## CROSS REFERENCE TO RELATED APPLICATIONS

**[0001]** This application claims priority to and the benefit of U.S. Provisional Application No. 63/554,318, filed Feb. 16, 2024, entitled "Electronic Gaming System Using Historical Randomly Drawn Sport Betting Outcomes," the disclosure of which is incorporated, in its entirety, by this reference.

## BACKGROUND

**[0002]** Electronic gaming machines ("EGMs") or gaming devices provide a variety of wagering games such as slot games, video poker games, video blackjack games, roulette games, video bingo or lottery games, keno games and other types of games that are frequently offered at casinos and other locations. Play on EGMs typically involves a player establishing a credit balance by inputting money, or another form of monetary credit, and placing a monetary wager (from the credit balance) on one or more outcomes of an instance (or single play) of a primary or base game. Game outcomes are often driven by referencing the output of a random number generator (RNG) running on a microprocessor of the EGM. In some cases, a player may qualify for a special mode of the base game, a secondary game, or a bonus round of the base game by attaining a certain winning combination or triggering event in, or related to, the base game, or after the player is randomly awarded the special mode, secondary game, or bonus round. In the special mode, secondary game, or bonus round, the player is given an opportunity to win extra game credits, game tokens or other forms of payout. In the case of "game credits" that are awarded during play, the game credits are typically added to a credit meter total on the EGM and can be provided to the player upon completion of a gaming session or when the player wants to "cash out."

**[0003]** "Slot" type games are often displayed to the player in the form of various symbols arrayed in a row-by-column grid or matrix. The outcome of each spin of a slot type game is determined by the specific numbers selected by the RNG. The RNG uses a complex mathematical based algorithm for generating the numbers. Specific matching combinations of symbols along predetermined paths (or paylines) through the matrix indicate the outcome of the game. The display typically highlights winning combinations/outcomes for identification by the player. Matching combinations and their corresponding awards are usually shown in a "pay-table" which is available to the player for reference. Often, the player may vary his/her wager to include differing numbers of paylines and/or the amount bet on each line. By varying the wager, the player may sometimes alter the frequency or number of winning combinations, frequency or number of secondary games, and/or the amount awarded.

**[0004]** As the sports betting industry continues to evolve there has been an increase in acceptance, adoption, and availability of a subset of in-play wagering that allows players to wager on individual moments in a game in real-time. These so-called "micro bets" allow for in-play wagering and are available in sports such as football, baseball, basketball, tennis, boxing, and mixed martial arts. Examples of micro bets include which player will record the next touchdown or three-pointer, whether a player will make or miss their next shot attempt, whether the next play in a football game will be a rush or pass, a first down, a sack, or a touchdown, etc.

**[0005]** Furthermore, technical innovation has made it more convenient to place sports betting wagers from a player's smart phone, or from a computer terminal connected to the internet. These micro bets can also be combined to create other forms of "exotic bets," which include parlays, teasers, prop bets, and other forms of micro bets on specific in-game occurrences. This increased adoption and acceptance of sports betting has led to a significant increase in the types of wagers that can be placed on any given sporting event. The introduction of micro-betting and other forms of exotic bets within sporting events has significantly increased the number of different bets that can be made on any single sporting event, beyond merely wagering on the winner of the event. This, in turn, has increased the availability and accessibility of historical sports betting data.

**[0006]** For example, millions of records of historical event data are available from baseball micro-betting data. Other historical sports betting may include Historical Horse Racing (HHR), which allows players to bet on the outcome of past horse racing events. HHR systems often include networked processors or computers (e.g., servers, databases, and wagering terminals) to manage one or more common betting pools in a pari-mutuel wagering environment. In addition to accepting wagers and calculating odds and prices of the wagers, these HHR systems must make pool allocations and maintain separate math models and separate pari-mutuel wagering pools for different denominations and bet levels offered by each of the separate math models.

## BRIEF SUMMARY

**[0007]** As will be described in greater detail below, the present disclosure generally describes electronic gaming systems and methods that are designed to allow wagering on randomly drawn events that are based on historical data.

**[0008]** In one embodiment, an electronic gaming machine is provided. The electronic gaming machine (EGM) may include a display device and a game controller in communication with the display device. The game controller may include at least one processor and at least one memory. The game controller may be configured to access multiple historical sporting occurrences that are stored in a database, where the historical sporting occurrences are tied to at least one historical sporting event and are selected from a group of potential historical sporting occurrences that occurred in the past. The game controller may also compile the accessed historical sporting occurrences into multiple winning patterns for an electronic betting game. The winning patterns each include a calculated odds value of occurring, and the winning patterns are conformed to a specified distribution of odds that is designed to enforce a defined range of possible winning outcomes within the electronic betting game.

**[0009]** The game controller may further generate a betting ticket that includes a pattern of identifiers, where a value associated with each identifier is determined randomly based on at least one of the accessed historical sporting occurrences. The game controller may also determine that the betting ticket has at least partially matched at least one of the winning patterns specified in the electronic betting game and cause display, on the display device, of an indication that the

betting ticket has at least partially matched at least one of the winning patterns specified in the electronic betting game.

**[0010]** In some cases, the game controller may further be configured to initiate a settlement payout to the user based on a prize amount associated with the at least partially matched winning patterns in the electronic betting game. In some examples, a selection by the user may randomly populate a grid, as part of the betting ticket, with values for each identifier in the grid. In some embodiments, the historical sporting occurrences may include pitches made in baseball games, and the values for the identifiers in the grid may be randomly populated with pitching outcomes including strike, ball, or in-play.

**[0011]** In some examples, the group of potential historical sporting occurrences may be closed to further sporting occurrences. In other cases, the group of potential historical sporting occurrences may be open to receiving new, historical sporting occurrences based on new sporting events. In some embodiments, the new sporting occurrences may be compiled into the winning patterns in a manner that maintains an initial calculated odds value of occurring.

**[0012]** In some cases, at least one of the winning patterns may be based on a combination of sporting occurrences from a combination of sporting events for different types of sports. In some examples, compiling the accessed historical sporting occurrences into the winning patterns in the electronic betting game may include compiling sporting occurrences from multiple different sports into the winning patterns in the electronic betting game. In some embodiments, different winning patterns may be generated for each of multiple different types of historical sporting occurrences.

**[0013]** In some embodiments, the game controller may further receive a selection from the user as input to the game controller that includes two different types of historical sporting occurrences, and each of the two different types of historical sporting occurrences may include a different number of winning patterns. In some cases, the game controller may access the sporting occurrences in the database via an application programming interface (API) designed to control communication and data access with the database. In some examples, the game controller may initiate a settlement payout to the user via an API that controls communication and data access with an electronic payment system. In some embodiments, the historical sporting occurrences may be implemented by the game controller as a random outcome generator for populating the betting ticket.

**[0014]** In addition to the above-described game controller and electronic gaming machine, a corresponding computer-implemented method may also be provided. The method may include accessing a plurality of historical sporting occurrences that are stored in a database, where the historical sporting occurrences are tied to at least one historical sporting event and are selected from a group of potential historical sporting occurrences that occurred in the past, compiling the accessed historical sporting occurrences into a plurality of winning patterns for an electronic betting game, where the winning patterns each include a calculated odds value of occurring, and where the winning patterns are conformed to a specified distribution of odds that is designed to enforce a defined range of possible winning outcomes within the electronic betting game, generating a betting ticket that includes a pattern of identifiers, wherein a value associated with each identifier is determined randomly based on at least one of the accessed historical sporting occurrences, determining that the betting ticket has at least partially matched at least one of the winning patterns specified in the electronic betting game, and causing display, on the display device, of an indication that the betting ticket has at least partially matched at least one of the winning patterns specified in the electronic betting game.

**[0015]** Still further, a corresponding non-transitory computer-readable medium may be provided that includes one or more computer-executable instructions that, when executed by at least one processor of a computing device, cause the computing device to: access a plurality of historical sporting occurrences that are stored in a database, where the historical sporting occurrences are tied to at least one historical sporting event and are selected from a group of potential historical sporting occurrences that occurred in the past, compile the accessed historical sporting occurrences into a plurality of winning patterns for an electronic betting game, where the winning patterns each include a calculated odds value of occurring, and where the winning patterns are conformed to a specified distribution of odds that is designed to enforce a defined range of possible winning outcomes within the electronic betting game, generate a betting ticket that includes a pattern of identifiers, where a value associated with each identifier is determined randomly based on at least one of the accessed historical sporting occurrences, determine that the betting ticket has at least partially matched at least one of the winning patterns specified in the electronic betting game, and cause display, on the display device, of an indication that the betting ticket has at least partially matched at least one of the winning patterns specified in the electronic betting game.

**[0016]** Features from any of the embodiments described herein may be used in combination with one another in accordance with the general principles described herein. These and other embodiments, features, and advantages will be more fully understood upon reading the following detailed description in conjunction with the accompanying drawings and claims.

## BRIEF DESCRIPTION OF THE DRAWINGS

**[0017]** The accompanying drawings illustrate a number of exemplary embodiments and are a part of the specification. Together with the following description, these drawings demonstrate and explain various principles of the present disclosure.

**[0018]** FIG. **1** is an exemplary diagram showing several EGMs networked with various gaming related servers.

**[0019]** FIG. **2**A is a block diagram showing various functional elements of an exemplary EGM.

**[0020]** FIG. **2**B depicts a casino gaming environment according to one example.

**[0021]** FIG. **2**C is a diagram that shows examples of components of a system for providing online gaming according to some aspects of the present disclosure.

**[0022]** FIG. **3** illustrates, in block diagram form, an implementation of a game processing architecture algorithm that implements a game processing pipeline for the play of a game in accordance with various implementations described herein.

**[0023]** FIG. **4** illustrates an electronic gaming or computing environment in which the embodiments described herein may operate.

**[0024]** FIG. **5** illustrates a flow diagram of an exemplary method for providing a wagering game using historical data.

**[0025]** FIG. **6** illustrates an electronic gaming architecture in which historical sports data is provided to a betting terminal.

**[0026]** FIGS. **7**A-**7**D illustrate embodiments in which a user's outcomes are matched against winning outcomes to determine whether the user is a winner or partial winner.

**[0027]** Throughout the drawings, identical reference characters and descriptions indicate similar, but not necessarily identical, elements. While the exemplary embodiments described herein are susceptible to various modifications and alternative forms, specific embodiments have been shown by way of example in the appendices and will be described in detail herein. However, the exemplary embodiments described herein are not intended to be limited to the particular forms disclosed. Rather, the present disclosure covers all modifications, equivalents, and alternatives falling within this disclosure.

## DETAILED DESCRIPTION OF EXEMPLARY EMBODIMENTS

**[0028]** The embodiments herein are generally directed to an electronic gaming system for wagering using historical randomly drawn sport betting outcomes. The electronic wagering system may include an electronic gaming machine (EGM). The EGM may include a display, one or more input devices, a wager acceptor, and a game controller coupled to the display, the input devices, and the wager acceptor. The game controller may be configured to control the display to present various wager options and to determine a selection of one of the wager options associated with a set of awards via one or more of the input devices. The set of awards may be determined based on the results of various historical sporting events.

**[0029]** The proliferation and accessibility of sports betting, and the resulting micro-betting data in connection with historical sports wagers, allows for the creation of a random outcome generating engine. Historical event-driven gaming systems benefit from utilizing alternative sports and micro-betting data. These historical event-driven gaming systems open up math models that do not rely on race participants finishing in a ranked order, or rely on the necessity to make pool allocations, or the necessity to maintain separate math models and separate pari-mutuel wagering pools for different denominations and bet levels offered by each math model.

**[0030]** Various systems and methods may be described herein that generate random outcomes based on previous historical sports betting data. These systems and methods may include retrieving data related to various sporting events that occurred in the past. In some cases, the retrieved data may also include wagering data regarding those events. Each of the historical events (e.g., sports events) may have included multiple participants (e.g., baseball players in a historical baseball game). The wagering data may include information about both the event and its participants. In at least some embodiments, a user may be able to manually select one or more micro bets that make up a wager. In other cases, the system may pre-select each of the bets that make up the wager or "betting ticket" for the user. This betting ticket may then be used in an electronic betting game.

**[0031]** In one embodiment, a wager for an electronic betting game may be made up of baseball pitching data. A prize for the wager may be calculated based on the difference between the predicted outcomes in the wager submitted by the user, and the final outcomes of the participants based on actual historical events. Various EGM terminals, terminal configurations, and user interface aspects related to these systems and methods are also disclosed herein. Still further, at least in some cases, the embodiments described herein may combine elements of a Class II bingo machine with the use of randomly chosen historical pitching data to determine wins and losses.

**[0032]** As noted above, sports betting, including betting on football, baseball, basketball, tennis, boxing, mixed martial arts, etc. has continued to grow in acceptance, adoption and availability. Furthermore, some technical innovations have made it more convenient to place sports betting wagers from a player's smart phone, or from a computer terminal connected to the internet. These advancements in sports betting have led to the availability of a subset of in-play or "in-game" wagering that allows players to wager on individual moments in a game in real-time (often referred to as micro bets). Still further, sports betting has opened up the ability to place "exotic bets" which include parlays, teasers, prop bets, and micro bets on specific in-game occurrences. Exotic bets may be combined with micro bets, creating even more sports betting opportunities for distinct wagers.

**[0033]** When combined with emerging regulatory environments permitting wagering on sporting events in certain jurisdictions, there has been a significant increase in the types of wagers that can be placed on a given sporting event. The introduction of micro-betting and other forms of exotic bets within sporting events has significantly increased the number of different bets that can be made on any single sporting event, beyond merely wagering on the winner of the event. This, in turn, has encouraged the proliferation and use of historical sports betting data. For instance, in at least some of the embodiments herein, historical major league baseball records tracking historical event data may be used to create a random outcome generating engine. These random outcomes may then be used to populate grids which are matched to users' grids. If the users' grids at least partially match the system-populated grids, the user will win at least a portion of a prize. These embodiments will be explained further below with regard to FIGS. **1**-**7**D.

**[0034]** FIG. **1** illustrates several different models of EGMs which may be networked to various gaming related servers. Shown is a system **100** in a gaming environment including one or more server computers **102** (e.g., slot servers of a casino) that are in communication, via a communications network, with one or more gaming devices **104**A-**104**X (EGMs, slots, video poker, bingo machines, etc.) that can implement one or more aspects of the present disclosure. The gaming devices **104**A-**104**X may alternatively be portable and/or remote gaming devices such as, but not limited to, a smart phone, a tablet, a laptop, or a game console. Gaming devices **104**A-**104**X utilize specialized software and/or hardware to form non-generic, particular machines or apparatuses that comply with regulatory requirements regarding devices used for wagering or games of chance that provide monetary awards.

**[0035]** Communication between the gaming devices **104**A-**104**X and the server computers **102**, and among the gaming devices **104**A-**104**X, may be direct or indirect using one or more communication protocols. As an example, gaming devices **104**A-**104**X and the server computers **102** can communicate over one or more communication networks, such as over the Internet through a website main-

tained by a computer on a remote server or over an online data network including commercial online service providers, Internet service providers, private networks (e.g., local area networks and enterprise networks), and the like (e.g., wide area networks). The communication networks could allow gaming devices **104**A-**104**X to communicate with one another and/or the server computers **102** using a variety of communication-based technologies, such as radio frequency (RF) (e.g., wireless fidelity (WiFi®) and Bluetooth®), cable TV, satellite links and the like.

**[0036]** In some implementations, server computers **102** may not be necessary and/or preferred. For example, in one or more implementations, a stand-alone gaming device such as gaming device **104**A, gaming device **104**B or any of the other gaming devices **104**C-**104**X can implement one or more aspects of the present disclosure. However, it is typical to find multiple EGMs connected to networks implemented with one or more of the different server computers **102** described herein.

**[0037]** The server computers **102** may include a central determination gaming system server **106**, a ticket-in-ticket-out (TITO) system server **108**, a player tracking system server **110**, a progressive system server **112**, and/or a casino management system server **114**. Gaming devices **104**A-**104**X may include features to enable operation of any or all servers for use by the player and/or operator (e.g., the casino, resort, gaming establishment, tavern, pub, etc.). For example, game outcomes may be generated on a central determination gaming system server **106** and then transmitted over the network to any of a group of remote terminals or remote gaming devices **104**A-**104**X that utilize the game outcomes and display the results to the players.

**[0038]** Gaming device **104**A is often of a cabinet construction which may be aligned in rows or banks of similar devices for placement and operation on a casino floor. The gaming device **104**A often includes a main door which provides access to the interior of the cabinet. Gaming device **104**A typically includes a button area or button deck **120** accessible by a player that is configured with input switches or buttons **122**, an access channel for a bill validator **124**, and/or an access channel for a ticket-out printer **126**.

**[0039]** In FIG. **1**, gaming device **104**A is shown as a Relm XL™ model gaming device manufactured by Aristocrat® Technologies, Inc. As shown, gaming device **104**A is a reel machine having a gaming display area **118** comprising a number (typically 3 or 5) of mechanical reels **130** with various symbols displayed on them. The mechanical reels **130** are independently spun and stopped to show a set of symbols within the gaming display area **118** which may be used to determine an outcome to the game.

**[0040]** In many configurations, the gaming device **104**A may have a main display **128** (e.g., video display monitor) mounted to, or above, the gaming display area **118**. The main display **128** can be a high-resolution liquid crystal display (LCD), plasma, light emitting diode (LED), or organic light emitting diode (OLED) panel which may be flat or curved as shown, a cathode ray tube, or other conventional electronically controlled video monitor.

**[0041]** In some implementations, the bill validator **124** may also function as a "ticket-in" reader that allows the player to use a casino issued credit ticket to load credits onto the gaming device **104**A (e.g., in a cashless ticket ("TITO") system). In such cashless implementations, the gaming device **104**A may also include a "ticket-out" printer **126** for outputting a credit ticket when a "cash out" button is pressed. Cashless TITO systems are used to generate and track unique bar-codes or other indicators printed on tickets to allow players to avoid the use of bills and coins by loading credits using a ticket reader and cashing out credits using a ticket-out printer **126** on the gaming device **104**A. The gaming device **104**A can have hardware meters for purposes including ensuring regulatory compliance and monitoring the player credit balance. In addition, there can be additional meters that record the total amount of money wagered on the gaming device, total amount of money deposited, total amount of money withdrawn, total amount of winnings on gaming device **104**A.

**[0042]** In some implementations, a player tracking card reader **144**, a transceiver for wireless communication with a mobile device (e.g., a player's smartphone), a keypad **146**, and/or an illuminated display **148** for reading, receiving, entering, and/or displaying player tracking information is provided in gaming device **104**A. In such implementations, a game controller within the gaming device **104**A can communicate with the player tracking system server **110** to send and receive player tracking information.

**[0043]** Gaming device **104**A may also include a bonus topper wheel **134**. When bonus play is triggered (e.g., by a player achieving a particular outcome or set of outcomes in the primary game), bonus topper wheel **134** is operative to spin and stop with indicator arrow **136** indicating the outcome of the bonus game. Bonus topper wheel **134** is typically used to play a bonus game, but it could also be incorporated into play of the base or primary game.

**[0044]** A candle **138** may be mounted on the top of gaming device **104**A and may be activated by a player (e.g., using a switch or one of buttons **122**) to indicate to operations staff that gaming device **104**A has experienced a malfunction or the player requires service. The candle **138** is also often used to indicate a jackpot has been won and to alert staff that a hand payout of an award may be needed.

**[0045]** There may also be one or more information panels **152** which may be a back-lit, silkscreened glass panel with lettering to indicate general game information including, for example, a game denomination (e.g., $0.25 or $1), pay lines, pay tables, and/or various game related graphics. In some implementations, the information panel(s) **152** may be implemented as an additional video display.

**[0046]** Gaming devices **104**A have traditionally also included a handle **132** typically mounted to the side of main cabinet **116** which may be used to initiate game play.

**[0047]** Many or all the above-described components can be controlled by circuitry (e.g., a game controller) housed inside the main cabinet **116** of the gaming device **104**A, the details of which are shown in FIG. **2**A.

**[0048]** An alternative example gaming device **104**B illustrated in FIG. **1** is the Arc™ model gaming device manufactured by Aristocrat® Technologies, Inc. Note that where possible, reference numerals identifying similar features of the gaming device **104**A implementation are also identified in the gaming device **104**B implementation using the same reference numbers. Gaming device **104**B does not include physical reels and instead shows game play functions on main display **128**. An optional topper screen **140** may be used as a secondary game display for bonus play, to show game features or attraction activities while a game is not in play, or any other information or media desired by the game designer or operator. In some implementations, the optional

topper screen **140** may also or alternatively be used to display progressive jackpot prizes available to a player during play of gaming device **104**B.

**[0049]** Example gaming device **104**B includes a main cabinet **116** including a main door which opens to provide access to the interior of the gaming device **104**B. The main or service door is typically used by service personnel to refill the ticket-out printer **126** and collect bills and tickets inserted into the bill validator **124**. The main or service door may also be accessed to reset the machine, verify and/or upgrade the software, and for general maintenance operations.

**[0050]** Another example gaming device **104**C shown is the Helix™ model gaming device manufactured by Aristocrat® Technologies, Inc. Gaming device **104**C includes a main display **128**A that is in a landscape orientation. Although not illustrated by the front view provided, the main display **128**A may have a curvature radius from top to bottom, or alternatively from side to side. In some implementations, main display **128**A is a flat panel display. Main display **128**A is typically used for primary game play while secondary display **128**B is typically used for bonus game play, to show game features or attraction activities while the game is not in play or any other information or media desired by the game designer or operator. In some implementations, example gaming device **104**C may also include speakers **142** to output various audio such as game sound, background music, etc.

**[0051]** Many different types of games, including mechanical slot games, video slot games, video poker, video black jack, video pachinko, keno, bingo, and lottery, may be provided with or implemented within the depicted gaming devices **104**A-**104**C and other similar gaming devices. Each gaming device may also be operable to provide many different games. Games may be differentiated according to themes, sounds, graphics, type of game (e.g., slot game vs. card game vs. game with aspects of skill), denomination, number of paylines, maximum jackpot, progressive or non-progressive, bonus games, and may be deployed for operation in Class **2** or Class **3**, etc.

**[0052]** FIG. **2**A is a block diagram depicting exemplary internal electronic components of a gaming device **200** connected to various external systems. All or parts of the gaming device **200** shown could be used to implement any one of the example gaming devices **104**A-X depicted in FIG. **1**. As shown in FIG. **2**A, gaming device **200** includes a topper display **216** or another form of a top box (e.g., a topper wheel, a topper screen, etc.) that sits above cabinet **218**. Cabinet **218** or topper display **216** may also house a number of other components which may be used to add features to a game being played on gaming device **200**, including speakers **220**, a ticket printer **222** which prints bar-coded tickets or other media or mechanisms for storing or indicating a player's credit value, a ticket reader **224** which reads bar-coded tickets or other media or mechanisms for storing or indicating a player's credit value, and a player tracking interface **232**. Player tracking interface **232** may include a keypad **226** for entering information, a player tracking display **228** for displaying information (e.g., an illuminated or video display), a card reader **230** for receiving data and/or communicating information to and from media or a device such as a smart phone enabling player tracking. FIG. **2**A also depicts utilizing a ticket printer **222** to print tickets for a TITO system server **108**. Gaming device **200** may further include a bill validator **234**, player-input buttons **236** for player input, cabinet security sensors **238** to detect unauthorized opening of the cabinet **218**, a primary game display **240**, and a secondary game display **242**, each coupled to and operable under the control of game controller **202**.

**[0053]** The games available for play on the gaming device **200** are controlled by a game controller **202** that includes one or more processors **204**. Processor **204** represents a general-purpose processor, a specialized processor intended to perform certain functional tasks, or a combination thereof. As an example, processor **204** can be a central processing unit (CPU) that has one or more multi-core processing units and memory mediums (e.g., cache memory) that function as buffers and/or temporary storage for data. Alternatively, processor **204** can be a specialized processor, such as an application specific integrated circuit (ASIC), graphics processing unit (GPU), field-programmable gate array (FPGA), digital signal processor (DSP), or another type of hardware accelerator. In another example, processor **204** is a system on chip (SoC) that combines and integrates one or more general-purpose processors and/or one or more specialized processors. Although FIG. **2**A illustrates that game controller **202** includes a single processor **204**, game controller **202** is not limited to this representation and instead can include multiple processors **204** (e.g., two or more processors).

**[0054]** FIG. **2**A illustrates that processor **204** is operatively coupled to memory **208**. Memory **208** is defined herein as including volatile and nonvolatile memory and other types of non-transitory data storage components. Volatile memory is memory that do not retain data values upon loss of power. Nonvolatile memory is memory that do retain data upon a loss of power. Examples of memory **208** include random access memory (RAM), read-only memory (ROM), hard disk drives, solid-state drives, universal serial bus (USB) flash drives, memory cards accessed via a memory card reader, floppy disks accessed via an associated floppy disk drive, optical discs accessed via an optical disc drive, magnetic tapes accessed via an appropriate tape drive, and/or other memory components, or a combination of any two or more of these memory components. In addition, examples of RAM include static random-access memory (SRAM), dynamic random access memory (DRAM), magnetic random access memory (MRAM), and other such devices. Examples of ROM include a programmable read-only memory (PROM), an erasable programmable read-only memory (EPROM), an electrically erasable programmable read-only memory (EEPROM), or other like memory device. Even though FIG. **2**A illustrates that game controller **202** includes a single memory **208**, game controller **202** could include multiple memories **208** for storing program instructions and/or data.

**[0055]** Memory **208** can store one or more game programs **206** that provide program instructions and/or data for carrying out various implementations (e.g., game mechanics) described herein. Stated another way, game program **206** represents an executable program stored in any portion or component of memory **208**. In one or more implementations, game program **206** is embodied in the form of source code that includes human-readable statements written in a programming language or machine code that contains numerical instructions recognizable by a suitable execution system, such as a processor **204** in a game controller or other system. Examples of executable programs include: (1) a

compiled program that can be translated into machine code in a format that can be loaded into a random access portion of memory **208** and run by processor **204**; (2) source code that may be expressed in proper format such as object code that is capable of being loaded into a random access portion of memory **208** and executed by processor **204**; and (3) source code that may be interpreted by another executable program to generate instructions in a random access portion of memory **208** to be executed by processor **204**.

**[0056]** Alternatively, game programs **206** can be set up to generate one or more game instances based on instructions and/or data that gaming device **200** exchanges with one or more remote gaming devices, such as a central determination gaming system server **106** (not shown in FIG. **2**A but shown in FIG. **1**). For purposes of this disclosure, the term "game instance" refers to a play or a round of a game that gaming device **200** presents (e.g., via a user interface (UI)) to a player. The game instance is communicated to gaming device **200** via the network **214** and then displayed on gaming device **200**. For example, gaming device **200** may execute game program **206** as video streaming software that allows the game to be displayed on gaming device **200**. When a game is stored on gaming device **200**, it may be loaded from memory **208** (e.g., from a read only memory (ROM)) or from the central determination gaming system server **106** to memory **208**.

**[0057]** Gaming devices, such as gaming device **200**, are highly regulated to ensure fairness and, in many cases, gaming device **200** is operable to award monetary awards (e.g., typically dispensed in the form of a redeemable voucher). Therefore, to satisfy security and regulatory requirements in a gaming environment, hardware and software architectures are implemented in gaming devices **200** that differ significantly from those of general-purpose computers. Adapting general purpose computers to function as gaming devices **200** is not simple or straightforward because of: (1) the regulatory requirements for gaming devices **200**, (2) the harsh environment in which gaming devices **200** operate, (3) security requirements, (4) fault tolerance requirements, and (5) the requirement for additional special purpose componentry enabling functionality of an EGM. These differences require substantial engineering effort with respect to game design implementation, game mechanics, hardware components, and software.

**[0058]** One regulatory requirement for games running on gaming device **200** generally involves complying with a certain level of randomness. Typically, gaming jurisdictions mandate that gaming devices **200** satisfy a minimum level of randomness without specifying how a gaming device **200** should achieve this level of randomness. To comply, FIG. **2**A illustrates that gaming device **200** could include an RNG **212** that utilizes hardware and/or software to generate RNG outcomes that lack any pattern. The RNG operations are often specialized and non-generic in order to comply with regulatory and gaming requirements. For example, in a slot game, game program **206** can initiate multiple RNG calls to RNG **212** to generate RNG outcomes, where each RNG call and RNG outcome corresponds to an outcome for a reel. In another example, gaming device **200** can be a Class II gaming device where RNG **212** generates RNG outcomes for creating Bingo cards. In one or more implementations, RNG **212** could be one of a set of RNGs operating on gaming device **200**. More generally, an output of the RNG **212** can be the basis on which game outcomes are determined by the game controller **202**. Game developers could vary the degree of true randomness for each RNG (e.g., pseudorandom) and utilize specific RNGs depending on game requirements. The output of the RNG **212** can include a random number or pseudorandom number (either is generally referred to as a "random number").

**[0059]** In FIG. **2**A, RNG **212** and hardware RNG **244** are shown in dashed lines to illustrate that RNG **212**, hardware RNG **244**, or both can be included in gaming device **200**. In one implementation, instead of including RNG **212**, gaming device **200** could include a hardware RNG **244** that generates RNG outcomes. Analogous to RNG **212**, hardware RNG **244** performs specialized and non-generic operations in order to comply with regulatory and gaming requirements. For example, because of regulation requirements, hardware RNG **244** could be a random number generator that securely produces random numbers for cryptography use. The gaming device **200** then uses the secure random numbers to generate game outcomes for one or more game features. In another implementation, the gaming device **200** could include both hardware RNG **244** and RNG **212**. RNG **212** may utilize the RNG outcomes from hardware RNG **244** as one of many sources of entropy for generating secure random numbers for the game features.

**[0060]** Another regulatory requirement for running games on gaming device **200** includes ensuring a certain level of RTP. Similar to the randomness requirement discussed above, numerous gaming jurisdictions also mandate that gaming device **200** provides a minimum level of RTP (e.g., RTP of at least 75%). A game can use one or more lookup tables (also called weighted tables) as part of a technical solution that satisfies regulatory requirements for randomness and RTP. In particular, a lookup table can integrate game features (e.g., trigger events for special modes or bonus games; newly introduced game elements such as extra reels, new symbols, or new cards; stop positions for dynamic game elements such as spinning reels, spinning wheels, or shifting reels; or card selections from a deck) with random numbers generated by one or more RNGs, so as to achieve a given level of volatility for a target level of RTP. (In general, volatility refers to the frequency or probability of an event such as a special mode, payout, etc. For example, for a target level of RTP, a higher-volatility game may have a lower payout most of the time with an occasional bonus having a very high payout, while a lower-volatility game has a steadier payout with more frequent bonuses of smaller amounts.) Configuring a lookup table can involve engineering decisions with respect to how RNG outcomes are mapped to game outcomes for a given game feature, while still satisfying regulatory requirements for RTP. Configuring a lookup table can also involve engineering decisions about whether different game features are combined in a given entry of the lookup table or split between different entries (for the respective game features), while still satisfying regulatory requirements for RTP and allowing for varying levels of game volatility.

**[0061]** FIG. **2**A illustrates that gaming device **200** includes an RNG conversion engine **210** that translates the RNG outcome from RNG **212** to a game outcome presented to a player. To meet a designated RTP, a game developer can set up the RNG conversion engine **210** to utilize one or more lookup tables to translate the RNG outcome to a symbol element, stop position on a reel strip layout, and/or randomly chosen aspect of a game feature. As an example, the lookup

tables can regulate a prize payout amount for each RNG outcome and how often the gaming device **200** pays out the prize payout amounts. The RNG conversion engine **210** could utilize one lookup table to map the RNG outcome to a game outcome displayed to a player and a second lookup table as a pay table for determining the prize payout amount for each game outcome. The mapping between the RNG outcome to the game outcome controls the frequency in hitting certain prize payout amounts.

**[0062]** FIG. **2**A also depicts that gaming device **200** is connected over network **214** to player tracking system server **110**. Player tracking system server **110** may be, for example, an OASIS® system manufactured by Aristocrat® Technologies, Inc. Player tracking system server **110** is used to track play (e.g. amount wagered, games played, time of play and/or other quantitative or qualitative measures) for individual players so that an operator may reward players in a loyalty program. The player may use the player tracking interface **232** to access his/her account information, activate free play, and/or request various information. Player tracking or loyalty programs seek to reward players for their play and help build brand loyalty to the gaming establishment. The rewards typically correspond to the player's level of patronage (e.g., to the player's playing frequency and/or total amount of game plays at a given casino). Player tracking rewards may be complementary and/or discounted meals, lodging, entertainment and/or additional play. Player tracking information may be combined with other information that is now readily obtainable by a casino management system.

**[0063]** When a player wishes to play the gaming device **200**, he/she can insert cash or a ticket voucher through a coin acceptor (not shown) or bill validator **234** to establish a credit balance on the gaming device. The credit balance is used by the player to place wagers on instances of the game and to receive credit awards based on the outcome of winning instances. The credit balance is decreased by the amount of each wager and increased upon a win. The player can add additional credits to the balance at any time. The player may also optionally insert a loyalty club card into the card reader **230**. During the game, the player views with one or more UIs, the game outcome on one or more of the primary game display **240** and secondary game display **242**. Other game and prize information may also be displayed.

**[0064]** For each game instance, a player may make selections, which may affect play of the game. For example, the player may vary the total amount wagered by selecting the amount bet per line and the number of lines played. In many games, the player is asked to initiate or select options during course of game play (such as spinning a wheel to begin a bonus round or select various items during a feature game). The player may make these selections using the player-input buttons **236**, the primary game display **240** which may be a touch screen or using some other device which enables a player to input information into the gaming device **200**.

**[0065]** During certain game events, the gaming device **200** may display visual and auditory effects that can be perceived by the player. These effects add to the excitement of a game, which makes a player more likely to enjoy the playing experience. Auditory effects include various sounds that are projected by the speakers **220**. Visual effects include flashing lights, strobing lights or other patterns displayed from lights on the gaming device **200** or from lights behind the information panel **152** (FIG. **1**).

**[0066]** When the player is done, he/she cashes out the credit balance (typically by pressing a cash out button to receive a ticket from the ticket printer **222**). The ticket may be "cashed-in" for money or inserted into another machine to establish a credit balance for play.

**[0067]** Additionally, or alternatively, gaming devices **104**A-**104**X and **200** can include or be coupled to one or more wireless transmitters, receivers, and/or transceivers (not shown in FIGS. **1** and **2**A) that communicate (e.g., Bluetooth® or other near-field communication technology) with one or more mobile devices to perform a variety of wireless operations in a casino environment. Examples of wireless operations in a casino environment include detecting the presence of mobile devices, performing credit, points, comps, or other marketing or hard currency transfers, establishing wagering sessions, and/or providing a personalized casino-based experience using a mobile application. In one implementation, to perform these wireless operations, a wireless transmitter or transceiver initiates a secure wireless connection between a gaming device **104**A-**104**X and **200** and a mobile device. After establishing a secure wireless connection between the gaming device **104**A-**104**X and **200** and the mobile device, the wireless transmitter or transceiver does not send and/or receive application data to and/or from the mobile device. Rather, the mobile device communicates with gaming devices **104**A-**104**X and **200** using another wireless connection (e.g., WiFi® or cellular network). In another implementation, a wireless transceiver establishes a secure connection to directly communicate with the mobile device. The mobile device and gaming device **104**A-**104**X and **200** sends and receives data utilizing the wireless transceiver instead of utilizing an external network. For example, the mobile device would perform digital wallet transactions by directly communicating with the wireless transceiver. In one or more implementations, a wireless transmitter could broadcast data received by one or more mobile devices without establishing a pairing connection with the mobile devices.

**[0068]** Although FIGS. **1** and **2**A illustrate specific implementations of a gaming device (e.g., gaming devices **104**A-**104**X and **200**), the disclosure is not limited to those implementations shown in FIGS. **1** and **2**. For example, not all gaming devices suitable for implementing implementations of the present disclosure necessarily include top wheels, top boxes, information panels, cashless ticket systems, and/or player tracking systems. Further, some suitable gaming devices have only a single game display that includes only a mechanical set of reels and/or a video display, while others are designed for bar counters or tabletops and have displays that face upwards. Gaming devices **104**A-**104**X and **200** may also include other processors that are not separately shown. Using FIG. **2**A as an example, gaming device **200** could include display controllers (not shown in FIG. **2**A) configured to receive video input signals or instructions to display images on game displays **240** and **242**. Alternatively, such display controllers may be integrated into the game controller **202**. The use and discussion of FIGS. **1** and **2** are examples to facilitate ease of description and explanation.

**[0069]** FIG. **2**B depicts a casino gaming environment according to one example. In this example, the casino **251** includes banks **252** of EGMs **104**. In this example, each bank **252** of EGMs **104** includes a corresponding gaming signage system **254** (also shown in FIG. **2**A). According to

this implementation, the casino **251** also includes mobile gaming devices **256**, which are also configured to present wagering games in this example. The mobile gaming devices **256** may, for example, include tablet devices, cellular phones, smart phones and/or other handheld devices. In this example, the mobile gaming devices **256** are configured for communication with one or more other devices in the casino **251**, including but not limited to one or more of the server computers **102**, via wireless access points **258**.

**[0070]** According to some examples, the mobile gaming devices **256** may be configured for stand-alone determination of game outcomes. However, in some alternative implementations the mobile gaming devices **256** may be configured to receive game outcomes from another device, such as the central determination gaming system server **106**, one of the EGMs **104**, etc.

**[0071]** Some mobile gaming devices **256** may be configured to accept monetary credits from a credit or debit card, via a wireless interface (e.g., via a wireless payment app), via tickets, via a patron casino account, etc. However, some mobile gaming devices **256** may not be configured to accept monetary credits via a credit or debit card. Some mobile gaming devices **256** may include a ticket reader and/or a ticket printer whereas some mobile gaming devices **256** may not, depending on the particular implementation.

**[0072]** In some implementations, the casino **251** may include one or more kiosks **260** that are configured to facilitate monetary transactions involving the mobile gaming devices **256**, which may include cash out and/or cash in transactions. The kiosks **260** may be configured for wired and/or wireless communication with the mobile gaming devices **256**. The kiosks **260** may be configured to accept monetary credits from casino patrons **262** and/or to dispense monetary credits to casino patrons **262** via cash, a credit or debit card, via a wireless interface (e.g., via a wireless payment app), via tickets, etc. According to some examples, the kiosks **260** may be configured to accept monetary credits from a casino patron and to provide a corresponding amount of monetary credits to a mobile gaming device **256** for wagering purposes, e.g., via a wireless link such as a near-field communications link. In some such examples, when a casino patron **262** is ready to cash out, the casino patron **262** may select a cash out option provided by a mobile gaming device **256**, which may include a real button or a virtual button (e.g., a button provided via a graphical user interface) in some instances. In some such examples, the mobile gaming device **256** may send a "cash out" signal to a kiosk **260** via a wireless link in response to receiving a "cash out" indication from a casino patron. The kiosk **260** may provide monetary credits to the casino patron **262** corresponding to the "cash out" signal, which may be in the form of cash, a credit ticket, a credit transmitted to a financial account corresponding to the casino patron, etc.

**[0073]** In some implementations, a cash-in process and/or a cash-out process may be facilitated by the TITO system server **108**. For example, the TITO system server **108** may control, or at least authorize, ticket-in and ticket-out transactions that involve a mobile gaming device **256** and/or a kiosk **260**.

**[0074]** Some mobile gaming devices **256** may be configured for receiving and/or transmitting player loyalty information. For example, some mobile gaming devices **256** may be configured for wireless communication with the player tracking system server **110**. Some mobile gaming devices **256** may be configured for receiving and/or transmitting player loyalty information via wireless communication with a patron's player loyalty card, a patron's smartphone, etc.

**[0075]** According to some implementations, a mobile gaming device **256** may be configured to provide safeguards that prevent the mobile gaming device **256** from being used by an unauthorized person. For example, some mobile gaming devices **256** may include one or more biometric sensors and may be configured to receive input via the biometric sensor(s) to verify the identity of an authorized patron. Some mobile gaming devices **256** may be configured to function only within a predetermined or configurable area, such as a casino gaming area.

**[0076]** FIG. **2**C is a diagram that shows examples of components of a system for providing online gaming according to some aspects of the present disclosure. As with other figures presented in this disclosure, the numbers, types and arrangements of gaming devices shown in FIG. **2**C are merely shown by way of example. In this example, various gaming devices, including but not limited to end user devices (EUDs) **264***a*, **264***b* and **264***c* are capable of communication via one or more networks **417**. The networks **417** may, for example, include one or more cellular telephone networks, the Internet, etc. In this example, the EUDs **264***a* and **264***b* are mobile devices: according to this example the EUD **264***a* is a tablet device and the EUD **264***b* is a smart phone. In this implementation, the EUD **264***c* is a laptop computer that is located within a residence **266** at the time depicted in FIG. **2**C. Accordingly, in this example the hardware of EUDs is not specifically configured for online gaming, although each EUD is configured with software for online gaming. For example, each EUD may be configured with a web browser. Other implementations may include other types of EUD, some of which may be specifically configured for online gaming.

**[0077]** In this example, a gaming data center **276** includes various devices that are configured to provide online wagering games via the networks **417**. The gaming data center **276** is capable of communication with the networks **417** via the gateway **272**. In this example, switches **278** and routers **280** are configured to provide network connectivity for devices of the gaming data center **276**, including storage devices **282***a*, servers **284***a* and one or more workstations **270***a*. The servers **284***a* may, for example, be configured to provide access to a library of games for online game play. In some examples, code for executing at least some of the games may initially be stored on one or more of the storage devices **282***a*. The code may be subsequently loaded onto a server **284***a* after selection by a player via an EUD and communication of that selection from the EUD via the networks **417**. The server **284***a* onto which code for the selected game has been loaded may provide the game according to selections made by a player and indicated via the player's EUD. In other examples, code for executing at least some of the games may initially be stored on one or more of the servers **284***a*. Although only one gaming data center **276** is shown in FIG. **2**C, some implementations may include multiple gaming data centers **276**.

**[0078]** In this example, a financial institution data center **270** is also configured for communication via the networks **417**. Here, the financial institution data center **270** includes servers **284***b*, storage devices **282***b*, and one or more workstations **286***b*. According to this example, the financial institution data center **270** is configured to maintain financial

accounts, such as checking accounts, savings accounts, loan accounts, etc. In some implementations one or more of the authorized users **274***a*-**274***c* may maintain at least one financial account with the financial institution that is serviced via the financial institution data center **270**.

**[0079]** According to some implementations, the gaming data center **276** may be configured to provide online wagering games in which money may be won or lost. According to some such implementations, one or more of the servers **284***a* may be configured to monitor player credit balances, which may be expressed in game credits, in currency units, or in any other appropriate manner. In some implementations, the server(s) **284***a* may be configured to obtain financial credits from and/or provide financial credits to one or more financial institutions, according to a player's "cash in" selections, wagering game results and a player's "cash out" instructions. According to some such implementations, the server(s) **284***a* may be configured to electronically credit or debit the account of a player that is maintained by a financial institution, e.g., an account that is maintained via the financial institution data center **270**. The server(s) **284***a* may, in some examples, be configured to maintain an audit record of such transactions.

**[0080]** In some alternative implementations, the gaming data center **276** may be configured to provide online wagering games for which credits may not be exchanged for cash or the equivalent. In some such examples, players may purchase game credits for online game play, but may not "cash out" for monetary credit after a gaming session. Moreover, although the financial institution data center **270** and the gaming data center **276** include their own servers and storage devices in this example, in some examples the financial institution data center **270** and/or the gaming data center **276** may use offsite "cloud-based" servers and/or storage devices. In some alternative examples, the financial institution data center **270** and/or the gaming data center **276** may rely entirely on cloud-based servers.

**[0081]** One or more types of devices in the gaming data center **276** (or elsewhere) may be capable of executing middleware, e.g., for data management and/or device communication. Authentication information, player tracking information, etc., including but not limited to information obtained by EUDs **264** and/or other information regarding authorized users of EUDs **264** (including but not limited to the authorized users **274***a*-**274***c*), may be stored on storage devices **282** and/or servers **284**. Other game-related information and/or software, such as information and/or software relating to leaderboards, players currently playing a game, game themes, game-related promotions, game competitions, etc., also may be stored on storage devices **282** and/or servers **284**. In some implementations, some such game-related software may be available as "apps" and may be downloadable (e.g., from the gaming data center **276**) by authorized users.

**[0082]** In some examples, authorized users and/or entities (such as representatives of gaming regulatory authorities) may obtain gaming-related information via the gaming data center **276**. One or more other devices (such EUDs **264** or devices of the gaming data center **276**) may act as intermediaries for such data feeds. Such devices may, for example, be capable of applying data filtering algorithms, executing data summary and/or analysis software, etc. In some implementations, data filtering, summary and/or analysis software may be available as "apps" and downloadable by authorized users.

**[0083]** FIG. **3** illustrates, in block diagram form, an implementation of a game processing architecture **300** that implements a game processing pipeline for the play of a game in accordance with various implementations described herein. As shown in FIG. **3**, the gaming processing pipeline starts with having a UI system **302** receive one or more player inputs for the game instance. Based on the player input(s), the UI system **302** generates and sends one or more RNG calls to a game processing backend system **314**. Game processing backend system **314** then processes the RNG calls with RNG engine **316** to generate one or more RNG outcomes. The RNG outcomes are then sent to the RNG conversion engine **320** to generate one or more game outcomes for the UI system **302** to display to a player. The game processing architecture **300** can implement the game processing pipeline using a gaming device, such as gaming devices **104**A-**104**X and **200** shown in FIGS. **1** and **2**, respectively. Alternatively, portions of the gaming processing architecture **300** can implement the game processing pipeline using a gaming device and one or more remote gaming devices, such as central determination gaming system server **106** shown in FIG. **1**.

**[0084]** The UI system **302** includes one or more UIs that a player can interact with. The UI system **302** could include one or more game play UIs **304**, one or more bonus game play UIs **308**, and one or more multiplayer UIs **312**, where each UI type includes one or more mechanical UIs and/or graphical UIs (GUIs). In other words, game play UI **304**, bonus game play UI **308**, and the multiplayer UI **312** may utilize a variety of UI elements, such as mechanical UI elements (e.g., physical "spin" button or mechanical reels) and/or GUI elements (e.g., virtual reels shown on a video display or a virtual button deck) to receive player inputs and/or present game play to a player. Using FIG. **3** as an example, the different UI elements are shown as game play UI elements **306**A-**306**N and bonus game play UI elements **310**A-**310**N.

**[0085]** The game play UI **304** represents a UI that a player typically interfaces with for a base game. During a game instance of a base game, the game play UI elements **306**A-**306**N (e.g., GUI elements depicting one or more virtual reels) are shown and/or made available to a user. In a subsequent game instance, the UI system **302** could transition out of the base game to one or more bonus games. The bonus game play UI **308** represents a UI that utilizes bonus game play UI elements **310**A-**310**N for a player to interact with and/or view during a bonus game. In one or more implementations, at least some of the game play UI elements **306**A-**306**N are similar to the bonus game play UI elements **310**A-**310**N. In other implementations, the game play UI element **306**A-**306**N can differ from the bonus game play UI elements **310**A-**310**N.

**[0086]** FIG. **3** also illustrates that UI system **302** could include a multiplayer UI **312** purposed for game play that differs or is separate from the typical base game. For example, multiplayer UI **312** could be set up to receive player inputs and/or presents game play information relating to a tournament mode. When a gaming device transitions from a primary game mode that presents the base game to a tournament mode, a single gaming device is linked and synchronized to other gaming devices to generate a tourna-

ment outcome. For example, multiple RNG engines **316** corresponding to each gaming device could be collectively linked to determine a tournament outcome. To enhance a player's gaming experience, tournament mode can modify and synchronize sound, music, reel spin speed, and/or other operations of the gaming devices according to the tournament game play. After tournament game play ends, operators can switch back the gaming device from tournament mode to a primary game mode to present the base game. Although FIG. **3** does not explicitly depict that multiplayer UI **312** includes UI elements, multiplayer UI **312** could also include one or more multiplayer UI elements.

**[0087]** Based on the player inputs, the UI system **302** could generate RNG calls to a game processing backend system **314**. As an example, the UI system **302** could use one or more application programming interfaces (APIs) to generate the RNG calls. To process the RNG calls, the RNG engine **316** could utilize gaming RNG **318** and/or non-gaming RNGs **319**A-**319**N. Gaming RNG **318** could correspond to RNG **212** or hardware RNG **244** shown in FIG. **2**A. As previously discussed with reference to FIG. **2**A, gaming RNG **318** often performs specialized and non-generic operations that comply with regulatory and/or game requirements. For example, because of regulation requirements, gaming RNG **318** could correspond to RNG **212** by being a cryptographic RNG or pseudorandom number generator (PRNG) (e.g., Fortuna PRNG) that securely produces random numbers for one or more game features. To securely generate random numbers, gaming RNG **318** could collect random data from various sources of entropy, such as from an operating system (OS) and/or a hardware RNG (e.g., hardware RNG **244** shown in FIG. **2**A). Alternatively, non-gaming RNGs **319**A-**319**N may not be cryptographically secure and/or be computationally less expensive. Non-gaming RNGs **319**A-**319**N can, thus, be used to generate outcomes for non-gaming purposes. As an example, non-gaming RNGs **319**A-**319**N can generate random numbers for generating random messages that appear on the gaming device.

**[0088]** The RNG conversion engine **320** processes each RNG outcome from RNG engine **316** and converts the RNG outcome to a UI outcome that is feedback to the UI system **302**. With reference to FIG. **2**A, RNG conversion engine **320** corresponds to RNG conversion engine **210** used for game play. As previously described, RNG conversion engine **320** translates the RNG outcome from the RNG **212** to a game outcome presented to a player. RNG conversion engine **320** utilizes one or more lookup tables **322**A-**322**N to regulate a prize payout amount for each RNG outcome and how often the gaming device pays out the derived prize payout amounts. In one example, the RNG conversion engine **320** could utilize one lookup table to map the RNG outcome to a game outcome displayed to a player and a second lookup table as a pay table for determining the prize payout amount for each game outcome. In this example, the mapping between the RNG outcome and the game outcome controls the frequency in hitting certain prize payout amounts. Different lookup tables could be utilized depending on the different game modes, for example, a base game versus a bonus game.

**[0089]** After generating the UI outcome, the game processing backend system **314** sends the UI outcome to the UI system **302**. Examples of UI outcomes are symbols to display on a video reel or reel stops for a mechanical reel. In one example, if the UI outcome is for a base game, the UI system **302** updates one or more game play UI elements **306**A-**306**N, such as symbols, for the game play UI **304**. In another example, if the UI outcome is for a bonus game, the UI system could update one or more bonus game play UI elements **310**A-**310**N (e.g., symbols) for the bonus game play UI **308**. In response to updating the appropriate UI, the player may subsequently provide additional player inputs to initiate a subsequent game instance that progresses through the game processing pipeline.

**[0090]** Turning now to FIG. **4**, a computing environment **400** is illustrated in which an electronic gaming system is provided that uses historical randomly drawn sports betting outcomes. FIG. **4** includes various electronic components and elements including an electronic gaming machine (EGM) or computer system **401** that is used, alone or in combination with other EGMs or computer systems, to perform associated tasks. The EGM/computer system **401** may be substantially any type of gaming machine or computer system, including a local computer system, a smartphone, a tablet, a personal computer, or a distributed (e.g., cloud) computer system. The EGM/computer system **401** may include at least one processor **402** and at least some system memory **403**. The EGM/computer system **401** includes program modules for performing a variety of different functions. The program modules may be hardware-based, software-based, or may include a combination of hardware and software. Each program module uses computing hardware and/or software to perform specified functions, including those described herein below.

**[0091]** In some cases, the communications module **404** may be configured to communicate with other EGMs or computer systems. The communications module **404** may include substantially any wired or wireless communication means that can receive and/or transmit data to or from other computer systems. These communication means may include, for example, hardware radios such as a hardware-based receiver **405**, a hardware-based transmitter **406**, or a combined hardware-based transceiver capable of both receiving and transmitting data. The radios may be WIFI radios, cellular radios, Bluetooth radios, global positioning system (GPS) radios, or other types of radios. The communications module **404** is configured to interact with databases, mobile computing devices (such as mobile phones or tablets), embedded computing systems, or other types of EGMs/computing systems.

**[0092]** The EGM/computer system **401** may further include a display device **407** and a game controller **408**. The game controller **408** may be configured to communicate with the display device **407** to present an electronic betting game **412**. The display device **407** may present the electronic betting game **412** and may allow interaction with the betting game via a user interface. The player of the game (e.g., **419**) may interact with the display device **407** directly (e.g., via touchscreen) or may interact with the betting game via inputs (e.g., **421**) provided through another device (e.g., a smartphone **420** or gamepad or other input device). The game controller **408** may include at least one processor and at least one memory (which may be in addition to or in lieu of processor **402** and memory **403**). The game controller **408** may perform a variety of tasks when generating and presenting the electronic betting game **412**. These tasks may involve other hardware and/or software modules within the EGM/computer system **401**.

**[0093]** For example, the EGM/computer system **401** may include a compiling module **409**. The compiling module **409** may be configured to compile historical sporting occurrences **423** that are stored in database **422** (or in other local or remote databases). The historical sporting occurrences **423** may be computer-selected, randomly drawn occurrences that are tied to historical sporting events **424** (e.g., hits, strikes, or balls randomly drawn from a historical baseball game). The compiling module **409** of EGM/computer system **401** may compile these historical sporting occurrences into one or more winning patterns **410** for an electronic betting game **412**. The winning patterns **410** may include matching rows, columns, or diagonal squares in a grid, matching random patterns of squares in a grid, or matching other predetermined patterns in a given layout. Each predefined winning pattern **410** may include a calculated odds of occurring (e.g., odds value **411**) and may be conformed to a specific distribution of odds. That distribution of odds may be designed to enforce a specified range of possible winning outcomes within the electronic betting game **412**.

**[0094]** After the compiling process is complete, the ticket generating module **413** may generate a betting ticket **414** that includes a pattern of identifiers **415** (e.g., numerical values for each box in a grid). Within the pattern of identifiers **415**, a value may be associated with each identifier, where the value is determined randomly based on at least one of the accessed historical sporting occurrences. Thus, for example, each box in a grid may be filled with a randomly selected historical sporting occurrence (e.g., hit, ball, strike, football pass completion, basketball steal, etc.) based on the stored historical events **424**. In some cases, all of the grid values may be drawn from a single sport, while in other cases, the grid values may be randomly drawn from multiple different sports.

**[0095]** The match determining module **416** may then analyze the user's betting ticket **414** to determine whether the user's ticket has at least partially matched one of the winning patterns **410** specified in the electronic betting game **412**. In a grid-based scenario, for instance, the user's betting ticket **414** may include values that match at least some of the randomly selected values or that the user's ticket matches a specific winning pattern of values. If the user's ticket has been determined to be winning, the presentation module **425** may then cause display, on the display device **407**, of an indication **418** that the user's betting ticket **414** has at least partially matched at least one of the winning patterns **410**. The prizing may be commensurate to the number of overlapping values in the user's betting ticket and the predetermined winning patterns **410**. This process flow is described further below with regard FIG. **5**.

**[0096]** FIG. **5** is a flow diagram of an exemplary computer-implemented method **500** for wagering using historical randomly drawn sport betting outcomes. The steps shown in FIG. **5** may be performed by any suitable computer-executable code and/or EGM/computing system, including the systems illustrated in FIG. **1-4**. In one example, each of the steps shown in FIG. **5** may represent an algorithm whose structure includes and/or is represented by multiple sub-steps, examples of which will be provided in greater detail below.

**[0097]** Method **500** of FIG. **5** includes, at **510**, a step for accessing multiple historical sporting occurrences **423** that are stored in a database **422**, where the historical sporting occurrences are tied to different historical sporting events **424** and are selected from a group of potential historical sporting occurrences **423** that occurred in those past sporting events. At step **520**, method **500** includes compiling the accessed historical sporting occurrences **423** into multiple winning patterns **410** for an electronic betting game **412**. The winning patterns **410** may each include a calculated odds value **411** of occurring, and the winning patterns **410** may be conformed to a specified distribution of odds that is designed to enforce a defined range of possible winning outcomes within the electronic betting game **412**.

**[0098]** Method **500** next includes, at step **530**, generating a betting ticket **414** that includes a pattern of identifiers **415**. A value associated with each identifier may be determined randomly based on at least one of the accessed historical sporting occurrences **423**. At step **540**, the method includes determining that the user's betting ticket **414** has at least partially matched the winning patterns **410** specified in the electronic betting game **412**. Then, at step **550**, method **500** may include causing display, on a display device **407**, of an indication **418** that the user's betting ticket **414** has at least partially matched at least one of the winning patterns **410** specified in the electronic betting game **412**.

**[0099]** FIG. **6** provides an embodiment of a computing environment **600** in which method **500** may operate. As noted above, the embodiments described herein may provide an electronic gaming system that uses historical micro-betting sports data to generate random outcomes. The random outcomes may be based on historical sporting events, historical sporting statistics, historical sporting overall outcomes, or substantially any sport-related, in-game event or occurrence on which a bet or micro bet could be placed. The central determination server **603** of FIG. **6** may be configured to generate these random outcomes. The central determination server **603** may take the corpus of past sporting events (overall outcomes and/or in-game events **602** stored in database **601**) and generate new, randomly drawn sporting outcomes. At least in some cases, the sporting outcomes may be drawn based on a specific set of odds for each past occurrence reoccurring in a gaming simulation. Users may place bets on a simulated game or race outcome or on simulated in-game events that are randomly generated using historical sports data.

**[0100]** The random outcome generation may be managed at the central determination server **603**. At least in some cases, the random outcome generation may be managed solely at the central determination server **603** and not at the wagering terminal **607**. In such embodiments, the random outcome generation engine may be part of central determination server **603** or may lie on the server side. Gaming establishments may use a customer facing UI **604** and/or a pay table UI/API **605** to upload a specific pay table (or set of pay tables) and/or a specific set of odds that they would like to use in their betting terminals **607**. Once the user's betting ticket has been compared to the random outcomes generated by the central determination server **603** and after matches have been identified, the pay table uploaded by the gaming establishment may be used to determine an appropriate prize amount for the user. At least in some cases, the historical sports betting terminal **607** may provide other features specified by the gaming establishment through a customer management system **606**.

**[0101]** In this manner, the central determination server **603** may be implemented to process users' incoming wagers.

This, it should be noted, is unlike traditional Class Ill gaming devices, which are self-contained and do not need a central server. Class II gaming devices, as well as the embodiments herein, may implement a server to communicate with the database, perform a random draw (e.g., a bingo draw), and then send results out to various EGMs. In the embodiments herein, the central server **603** may act as a random outcome generator by drawing randomly selected sports occurrences **602** from the past. Random number generation may then be used to pick sporting events (e.g., baseball pitches or basketball shots or football passes) and place the randomly selected sporting events in a grid. If the user's chosen outcomes match the randomly selected sporting outcomes, the user will be at least a partial winner (in games where partial prizes are available for matching at least some of the winning pattern). In this manner, a user playing an electronic betting game may play against randomly generated sporting outcomes as opposed to playing against other players, as would occur in a traditional Class II game.

**[0102]** In at least some embodiments herein, historical sports betting may be an individual wager against a wagering line. The random outcome generation described above may account for multiple different micro bets, on different sporting occurrences, and even on different games or different sports. The embodiments herein may use micro betting data to provide enough variability to provide a random outcome generator for use in a slot machine. These random outcomes may then be visually represented as reels on a slot game or in another designated manner within an electronic betting game.

**[0103]** In some embodiments, the central determination server **603** may implement a mathematical model that uses baseball pitching data and corresponding algorithms to generate random sporting outcomes. In this specific example involving baseball, one of three outcomes may be logged for each pitch: a strike, a ball, or "in-play." At least in some cases, the patterns described in FIGS. **7**A-**7**D may be designed to only look at strikes, as balls and in-play occurrences are much rarer (these, however, may be used in other embodiments). Strikes are, statistically, more common than balls or in-play outcomes in baseball. If the player had an option of choosing between strikes, balls, and in-play pitches when making their selections, they would be less likely to want to play a ball or in-play. Accordingly, the systems herein, at least in some cases, may generate winning patterns for the electronic betting game based on strikes.

**[0104]** In some embodiments, the player of the electronic betting game may initiate a randomized spin. This spin, in turn, may trigger the generation of simulated sporting occurrences, including potentially strike, ball, or in-play occurrences, that are based on past sporting data. In some cases, a single spin or wager may be applied to all (e.g., 25) randomly selected historic pitch results. Randomly drawn sporting outcomes (e.g., baseball pitches in this case (strike/ball/in-play)), may be used to populate a pattern grid (e.g., **701** of FIG. **7**A). In some cases, the systems herein may determine a win or a loss by assigning outcomes to a set of prioritized patterns shown in FIGS. **7**B, **7**C, and **7**D. Still further, at least in some cases, the embodiments herein may allow the player to select strike, ball, or in-play on each of the **25** pitches individually, with the option of bulk-selecting if desired.

**[0105]** In some embodiments, the winning patterns may be displayed on at least a portion of a display screen on the EGM (e.g., **401** of FIG. **4**). In such cases, the winning pattern may be shown on the display in the form of an alignment of symbols on the screen (e.g., alignment of patterns in a grid or alignment of spinning reels). For example, FIG. **7**A illustrates a "Players Outcome" **701** and a "Pitch Outcome Placement Order" **702**. The Pitch Outcome Placement Order indicates the order in which randomly selected historical sporting occurrences will be placed in the grid (in this case, positions 1-25). The Player's Outcome indicates grid positions where the user matched a randomly selected occurrence (hashed squares with a circle), and grid positions where no match occurred (blank squares).

**[0106]** At least in some cases, the game controller that is running the electronic betting game may be configured to display multiple different data points or bet-related items on a display or user interface. In FIG. **7**B, the game controller may display a user's grid of outcomes **703** and a sports grid or sports score card. The sports score card (e.g., "Example Hit Pattern Win Mapping" **703**) may represent a winning outcome that would pay out at a specified amount. The "Outcome" number represents the overall rating or ranking for the outcome. Thus, in the examples shown in FIGS. **7**B-**7**D, Outcomes #1, #2, and #3 may each provide different winning outcomes that pay out at different levels based on how many of the user's hits overlap with the winning patterns.

**[0107]** In the embodiment shown in FIG. **7**B, the example winning hit patterns **703** and **704** show that the majority of possible squares 1-25 were matched, resulting in win priorities of 1 and 2, respectively. Other example hit patterns (e.g., **705**, **706**, and **707**) have win priorities of 3, 4, and 5, and are all tied to prizing outcome #2. This indicates that example hit patterns **705**, **706**, and **707** are equally probable to occur. Still further, example hit patterns **708**, **709**, and **710** all result in prizing outcome #3, and are associated with priority rankings 6, 7, and 8. Other hit patterns may have even fewer matched grid spaces and may be associated with lower prizing outcomes. In some embodiments, as few as one or two matching squares may be needed to have a winning (or partially winning) ticket. If the user has matched at least a portion of their betting ticket, and their ticket is fully or partially winning, the user's credit meter inside the electronic betting game may be increased to show the user's winnings.

**[0108]** In order to generate the Player's Outcome grid **701** that is then later compared against the winning pattern (e.g., **703**), the game controller may receive a wager from a user within the electronic betting game and generate a betting ticket that includes a pattern of identifiers. The value of each identifier may be determined randomly based on the accessed historical sporting occurrences. The game controller may then determine that the user's betting ticket has at least partially matched at least one of the winning patterns specified in the electronic betting game and may cause display, on the display device, of an indication that the user's betting ticket has at least partially matched at least one of the winning patterns specified in the electronic betting game.

**[0109]** In different embodiments, the term "at least partially matched" may have different meanings. For example, one logical or mathematical approach may state that winning patterns are at least partially matched when the winning pattern's spots are a subset of the user's betting ticket pattern's spots. Or, in other cases, a different logical or mathematical approach may state that winning patterns are

at least partially matched when the user's betting ticket pattern's spots are a superset of the winning pattern's spots. Examples of at least partial matches are shown in FIGS. **7**B-**7**D.

**[0110]** If the user's board at least partially matches the winning pattern, the game controller may initiate a payout to the user for a certain prize amount. The prize amount may be associated with the (at least partially) matched winning patterns in the electronic betting game. In some cases, the group of potential historical sporting occurrences may be fixed and may be closed to further sporting occurrences (i.e., new games that are played in a sporting season). In other cases, the group of potential historical sporting occurrences may be open to receiving new, historical sporting occurrences based on new sporting events that become historical upon completion. In such cases, the new historical sporting occurrences may be compiled into different winning patterns. In some embodiments, the new historical sporting occurrences may be compiled into the different winning patterns in a manner that maintains a specific calculated odds value of occurring (e.g., as reflected in the "Win Priority" shown in FIGS. **7**B-**7**D).

**[0111]** In some examples, at least one of the winning patterns may be based on a combination of sporting occurrences from a combination of sporting events for different types of sports. For example, a winning pattern may be based on sporting occurrences from baseball games, basketball games, and football games (or other sporting events). In such cases, compiling the accessed historical sporting occurrences into the winning patterns in the electronic betting game may include compiling sporting occurrences from the multiple different sports into the various winning patterns in the electronic betting game. At least in some cases, different winning patterns may be generated for such combinations of sporting events, while single-sport winning patterns may each have their own winning pattern. In some cases, the historical sporting occurrences may be implemented by the game controller as a random outcome generator for populating the user's betting ticket. For example, winning patterns may be chosen ahead of time for single-sport boards or multi-sport boards. The user's game board pattern may be chosen randomly based on historical sports occurrences. Then, matches may be paid out according to how well the user's game board pattern matched the predetermined winning patterns.

**[0112]** Additionally or alternatively, the wager received from the user within the electronic betting game may include two (or more) different types of historical sporting occurrences, and each of the two or more different types of historical sporting occurrences may include a different number of winning patterns. Thus, the user's wager may include selections for football passes, basketball steals, baseball strikes, or selections for other historical sporting occurrences. In this manner, game grids may have values populated with historical sporting occurrences from a wide variety of sports. In other cases, the game grids may have values populated with historical sporting occurrences from a single sport. As noted above with regard to FIG. **6**, the game controller may access the various sporting occurrences in a database via an application programming interface (API) designed to control communication and data access with the database. This API may provide access to the historical events of the various sports used to populate the game grid.

**[0113]** In some embodiments, once the system has determined that a prize is to be awarded, the game controller may initiate a settlement payout to the user via a different API that controls communication and data access with an electronic payment system. The payment may include tokens, credits, or other value transferred between a gaming establishment and the user. The game controller may interface with the electronic payment system using the identified API.

**[0114]** In addition to the above-described electronic gaming machine, corresponding computer-implemented method may also be provided. The method may include accessing a plurality of historical sporting occurrences that are stored in a database, where the historical sporting occurrences are tied to at least one historical sporting event and are selected from a group of potential historical sporting occurrences that occurred in the past, compiling the accessed historical sporting occurrences into a plurality of winning patterns for an electronic betting game, where the winning patterns each include a calculated odds value of occurring, and where the winning patterns are conformed to a specified distribution of odds that is designed to enforce a defined range of possible winning outcomes within the electronic betting game, generating a betting ticket that includes a pattern of identifiers, wherein a value associated with each identifier is determined randomly based on at least one of the accessed historical sporting occurrences, determining that the user's betting ticket has at least partially matched at least one of the winning patterns specified in the electronic betting game, and causing display, on the display device, of an indication that the user's betting ticket has at least partially matched at least one of the winning patterns specified in the electronic betting game.

**[0115]** Still further, a corresponding non-transitory computer-readable medium may be provided that includes one or more computer-executable instructions that, when executed by at least one processor of a computing device, cause the computing device to: access a plurality of historical sporting occurrences that are stored in a database, where the historical sporting occurrences are tied to at least one historical sporting event and are selected from a group of potential historical sporting occurrences that occurred in the past, compile the accessed historical sporting occurrences into a plurality of winning patterns for an electronic betting game, where the winning patterns each include a calculated odds value of occurring, and where the winning patterns are conformed to a specified distribution of odds that is designed to enforce a defined range of possible winning outcomes within the electronic betting game, generate a betting ticket that includes a pattern of identifiers, where a value associated with each identifier is determined randomly based on at least one of the accessed historical sporting occurrences, determine that the user's betting ticket has at least partially matched at least one of the winning patterns specified in the electronic betting game, and cause display, on the display device, of an indication that the user's betting ticket has at least partially matched at least one of the winning patterns specified in the electronic betting game.

**[0116]** The process parameters and sequence of the steps described and/or illustrated herein are given by way of example only and can be varied as desired. For example, while the steps illustrated and/or described herein may be shown or discussed in a particular order, these steps do not necessarily need to be performed in the order illustrated or discussed. The various exemplary methods described and/or

illustrated herein may also omit one or more of the steps described or illustrated herein or include additional steps in addition to those disclosed.

**[0117]** The preceding description has been provided to enable others skilled in the art to best utilize various aspects of the exemplary embodiments disclosed herein. This exemplary description is not intended to be exhaustive or to be limited to any precise form disclosed. Many modifications and variations are possible without departing from the spirit and scope of the present disclosure. The embodiments disclosed herein should be considered in all respects illustrative and not restrictive. Reference should be made to any claims appended hereto and their equivalents in determining the scope of the present disclosure.

**[0118]** Unless otherwise noted, the terms "connected to" and "coupled to" (and their derivatives), as used in the specification and/or claims, are to be construed as permitting both direct and indirect (i.e., via other elements or components) connection. In addition, the terms "a" or "an," as used in the specification and/or claims, are to be construed as meaning "at least one of." Finally, for ease of use, the terms "including" and "having" (and their derivatives), as used in the specification and/or claims, are interchangeable with and have the same meaning as the word "comprising."

We claim:

**1**. An electronic gaming machine comprising:

a display device; and

a game controller in communication with the display device, the game controller including at least one processor and at least one memory, wherein the game controller is configured to:

access a plurality of historical sporting occurrences that are stored in a database, wherein the historical sporting occurrences are tied to at least one historical sporting event and are selected from a group of potential historical sporting occurrences that occurred in the past;

compile the accessed historical sporting occurrences into a plurality of winning patterns for an electronic betting game, wherein the winning patterns each include a calculated odds value of occurring, and wherein the winning patterns are conformed to a specified distribution of odds that is designed to enforce a defined range of possible winning outcomes within the electronic betting game;

generate a betting ticket that includes a pattern of identifiers, wherein a value associated with each identifier is determined randomly based on at least one of the accessed historical sporting occurrences;

determine that the betting ticket has at least partially matched at least one of the winning patterns specified in the electronic betting game; and

cause display, on the display device, of an indication that the betting ticket has at least partially matched at least one of the winning patterns specified in the electronic betting game.

**2**. The electronic gaming machine of claim **1**, wherein the game controller is further configured to initiate a settlement payout to the user based on a prize amount associated with the at least partially matched winning patterns in the electronic betting game.

**3**. The electronic gaming machine of claim **1**, wherein a selection by the user randomly populates a grid, as part of the betting ticket, with values for each identifier in the grid.

**4**. The electronic gaming machine of claim **3**, wherein the historical sporting occurrences comprise pitches made in baseball games, and wherein the values for the identifiers in the grid are randomly populated with pitching outcomes including at least one of strike, ball, or in-play.

**5**. The electronic gaming machine of claim **1**, wherein the group of potential historical sporting occurrences is closed to further sporting occurrences.

**6**. The electronic gaming machine of claim **1**, wherein the group of potential historical sporting occurrences is open to receiving new, historical sporting occurrences based on new, historical sporting events.

**7**. The electronic gaming machine of claim **6**, wherein the new historical sporting occurrences are compiled into the plurality of winning patterns in a manner that maintains the calculated odds value of occurring.

**8**. The electronic gaming machine of claim **1**, wherein at least one of the winning patterns is based on a combination of sporting occurrences from a combination of sporting events for different types of sports.

**9**. The electronic gaming machine of claim **1**, wherein compiling the accessed historical sporting occurrences into the plurality of winning patterns in the electronic betting game includes compiling sporting occurrences from a plurality of different sports into the plurality of winning patterns in the electronic betting game.

**10**. The electronic gaming machine of claim **1**, wherein different winning patterns are generated for each of a plurality of different types of historical sporting occurrences.

**11**. The electronic gaming machine of claim **10**, further comprising receiving a selection from the user as input to the game controller that includes two different types of historical sporting occurrences, and wherein each of the two different types of historical sporting occurrences includes a different number of winning patterns.

**12**. The electronic gaming machine of claim **1**, wherein the game controller accesses the plurality of sporting occurrences in the database via an application programming interface (API) designed to control communication and data access with the database.

**13**. The electronic gaming machine of claim **1**, wherein the game controller initiates a settlement payout to the user via an API that controls communication and data access with an electronic payment system.

**14**. The electronic gaming machine of claim **1**, wherein the historical sporting occurrences are implemented by the game controller as a random outcome generator for populating the betting ticket.

**15**. A computer-implemented method comprising:

accessing a plurality of historical sporting occurrences that are stored in a database, wherein the historical sporting occurrences are tied to at least one historical sporting event and are selected from a group of potential historical sporting occurrences that occurred in the past;

compiling, via a game controller, the accessed historical sporting occurrences into a plurality of winning patterns for an electronic betting game, wherein the winning patterns each include a calculated odds value of occurring, and wherein the winning patterns are conformed to a specified distribution of odds that is designed to enforce a defined range of possible winning outcomes within the electronic betting game;

generating a betting ticket that includes a pattern of identifiers, wherein a value associated with each identifier is determined randomly based on at least one of the accessed historical sporting occurrences;

determining that the betting ticket has at least partially matched at least one of the winning patterns specified in the electronic betting game; and

causing display, on a display device, of an indication that the betting ticket has at least partially matched at least one of the winning patterns specified in the electronic betting game.

**16**. The computer-implemented method of claim **15**, wherein the game controller is further configured to initiate a settlement payout to the user based on a prize amount associated with the at least partially matched winning patterns in the electronic betting game.

**17**. The computer-implemented method of claim **15**, wherein a selection by the user randomly populates a grid, as part of the betting ticket, with values for each identifier in the grid.

**18**. The computer-implemented method of claim **15**, wherein the group of potential historical sporting occurrences is open to receiving new, historical sporting occurrences based on new, historical sporting events.

**19**. The computer-implemented method of claim **18**, wherein the new historical sporting occurrences are compiled into the plurality of winning patterns in a manner that maintains the calculated odds value of occurring.

**20**. A non-transitory computer-readable medium comprising one or more computer-executable instructions that, when executed by at least one processor of a computing device, cause the computing device to:

access a plurality of historical sporting occurrences that are stored in a database, wherein the historical sporting occurrences are tied to at least one historical sporting event and are selected from a group of potential historical sporting occurrences that occurred in the past;

compile the accessed historical sporting occurrences into a plurality of winning patterns for an electronic betting game, wherein the winning patterns each include a calculated odds value of occurring, and wherein the winning patterns are conformed to a specified distribution of odds that is designed to enforce a defined range of possible winning outcomes within the electronic betting game;

generate a betting ticket that includes a pattern of identifiers, wherein a value associated with each identifier is determined randomly based on at least one of the accessed historical sporting occurrences;

determine that the betting ticket has at least partially matched at least one of the winning patterns specified in the electronic betting game; and

cause display, on the display device, of an indication that the betting ticket has at least partially matched at least one of the winning patterns specified in the electronic betting game.

* * * * *