STANDARD SERIES

GLI-11:

Gaming Devices

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ABOUT THIS STANDARD

This technical standard has been produced by **Gaming Laboratories International, LLC (GLI)** for the purpose of providing independent certifications under this standard and which comply with the requirements set forth herein.

A supplier is expected to submit equipment with a request that it be certified in accordance with this technical standard. Upon completion of testing, GLI provides a certificate of compliance evidencing the certification of the gaming device to this standard.

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CHAPTER 1: INTRODUCTION TO GAMING DEVICES

1.1 Introduction

1.1.1 ***General Statement***. **Gaming Laboratories International, LLC (GLI)** has been testing gaming devices since 1989. Over the years, GLI has developed numerous technical standards utilized by jurisdictions all over the world. This document, GLI-11, sets forth the technical standards for gaming devices.

1.1.2 ***Document History***. This document is a compilation based upon many standards documents from around the world. Some GLI has written; some were written by industry regulators with input from independent test laboratories and gaming device manufacturers. GLI has taken each of the standards documents, merged the unique rules together, eliminated some rules and updated others, in order to reflect both the change in technology and the purpose of maintaining an objective, factual standard. GLI lists below, and gives credit to, agencies whose documents were reviewed prior to writing this standard. It is the policy of GLI to update this document as often as possible to reflect changes in technology and/or testing methods. This document will be distributed without charge and may be obtained by downloading it from the GLI website at www.gaminglabs.com or by contacting GLI at:

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1.2 Acknowledgment of Other Standards Reviewed

1.2.1 ***General Statement***. This technical standard has been developed by reviewing and using portions of the documents from the organizations listed below. GLI acknowledges the regulators and other industry participants who have assembled these documents and thank them:

a) The Australian Capital Territory Gambling and Racing Commission;
b) The New South Wales Independent Liquor and Gaming Authority;
c) The New Zealand Department of Internal Affairs;
d) The Northern Territory Department of Business;
e) The Queensland Office of Liquor and Gambling Regulation;
f) The South Australian Consumer and Business Services (CBS);
g) The Tasmanian Liquor and Gaming Commission;
h) The Victorian Commission for Gambling and Liquor Regulation;
i) The Western Australian Department of Racing Gaming and Liquor;
j) US Tribal Compacts from Tribal Governments and State Governments including:
    i. Arizona;
    ii. Connecticut;
    iii. Iowa;
    iv. Kansas;
    v. Louisiana;
    vi. Michigan;
    vii. Minnesota;
    viii. Mississippi;
    ix. North Carolina;
    x. North Dakota;
    xi. Oregon; and
    xii. Wisconsin.
k) Colorado Division on Gaming – Limited Gaming Regulations;
l) Illinois Gaming Board – Adopted Rules;
m) Indiana Gaming Commission;

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n) Iowa Racing and Gaming Commission;

o) Louisiana State Police – Riverboat Gaming Division – Gaming Device;

p) Missouri Gaming Commission – Department of Public Safety;

q) Nevada Gaming Commission and Gaming Control Board and Nevada Regulations and Technical Standards Related to Gaming Devices;

r) New Jersey – Regulations on Accounting and Internal Controls;

s) South Dakota Commission on Gaming – Rules and Regulations for Limited Gaming;

t) Various protocol standards from the Gaming Standards Association (GSA); and

u) The "International Technical Standards for EGM" from the International Association of Gaming Regulators (IAGR).

1.3 Purpose of Technical Standard

1.3.1 ***Purpose***. The purpose of this technical standard is as follows:

a) To eliminate subjective criteria in analyzing and certifying gaming device operation.

b) To only test those criteria that impact the credibility and integrity of a gaming device from both the revenue collection and player's perspective.

c) To create a standard that will ensure that gaming devices are fair, secure, and able to be audited and operated correctly.

d) To distinguish between local public policy and independent test laboratory criteria. It is up to each local jurisdiction to set public policy with respect to gaming.

e) To recognize that non-gaming testing (such as electrical testing) should not be incorporated into this standard, but left to appropriate test laboratories that specialize in that type of testing. Except where specifically identified in this standard, testing is not directed at health or safety matters. These matters are the responsibility of the manufacturer, purchaser, and operator of the gaming device.

f) To construct a standard that can be easily revised to allow for new technology.

g) To construct a standard that does not specify any particular design, method, or algorithm. The intent is to allow a wide range of methods to be used to conform to the standard, while at the same time, to encourage new methods to be developed.

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1.3.2 ***No Limitation of Technology***. One should be cautioned that this document must not be read in such a way that limits the use of future technology. This document should not be interpreted that if the technology is not mentioned, then it is not allowed. To the contrary, GLI will review this standard and make changes to incorporate minimum standards for any new and related technology.

1.3.3 ***Adoption and Observance.*** This GLI technical standard can be adopted in whole or in part by any regulatory body that wishes to implement a comprehensive set of requirements for gaming devices.

1.4 Other Documents That May Apply

1.4.1 ***Other Standards***. This standard covers the requirements for gaming devices. The following other GLI technical standards may also apply:

a) GLI-12 Progressive Gaming Devices in Casinos;
b) GLI-13 On-Line Monitoring and Control Systems (MCS) and Validation Systems in Casinos;
c) GLI-16 Cashless Systems in Casinos;
d) GLI-17 Bonusing Systems in Casinos;
e) GLI-18 Promotional Systems in Casinos;
f) GLI-20 Redemption Kiosks;
g) GLI-21 Client-Server Systems;
h) GLI-26 Wireless System Standard;
i) GLI-28 Player User Interface Systems; and
j) GLI-29 Card Shufflers and Dealer Shoes.

NOTE: The entire family of GLI Standards is available free of charge at www.gaminglabs.com.

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1.5 Definition of a Gaming Device

1.5.1 ***General Statement***. At a minimum, a gaming device utilizes an element of chance and/or skill in the determination of prizes, contains some form of activation to initiate the wagering process, and makes use of a suitable methodology for delivery of the determined outcome. The functions of a gaming device may be logically separated into multiple parts or distributed among several physical and/or server components. The terms "gaming device" and "machine" are used interchangeably throughout this document. A "gaming device" does NOT include, for purposes of this standard, electronic equipment used in the conduct of table games. For detailed standards applicable to electronic table games, please reference GLI-24 (Electronic Table Game Systems) and GLI-25 (Dealer Controlled Electronic Table Games).

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CHAPTER 2: GAMING DEVICE / MACHINE REQUIREMENTS

2.1 Introduction to Gaming Device / Machine Requirements

2.1.1 ***Introduction***. This chapter sets forth the technical requirements for the key attributes of a gaming device or machine.

2.2 Machine and Player Safety

2.2.1 ***Physical Hazards and Environmental and Electrical Safety Testing***. Electrical and mechanical parts and design principals of the gaming device shall not subject a player to any physical hazards. The independent test laboratory does not make any findings with regard to Electro-Magnetic Compatibility (EMC) or Radio Frequency Interference (RFI), as that is the responsibility of the manufacturer of the device, or those that purchase the device. Such EMC and RFI testing may be required under separate statute, regulation, law, or act and should be researched accordingly by those parties who manufacture or purchase said device. The independent test laboratory does not test for, is not liable for, nor makes any findings related to these matters. However, during the course of testing, the independent test laboratory may inspect for marks or symbols indicating that a gaming device has undergone product safety or other compliance testing by some other party but that is outside the scope of the requirements defined by this technical standard.

2.3 Environmental Effects on Machine and Gaming Device Integrity

2.3.1 ***Gaming Device Integrity***. The independent test laboratory shall perform certain tests to determine whether or not an Electro-Static Discharge (ESD) impacts the integrity of a gaming device. ESD testing is intended to simulate techniques observed in the field that may be used in an attempt to disrupt the integrity of electronic gaming devices.

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2.3.2 ***ESD Effects***. A gaming device shall comply with the following requirements related to ESD testing:

a) The Random Number Generator (RNG) and random selection process shall be impervious to influences from ESD; and
b) Protection against ESD requires that the gaming device's conductive cabinet be earthed in such a way that static discharge energy shall not permanently damage or permanently impact the normal operation of the electronics or other components within the gaming device. Gaming devices may exhibit temporary disruption when subjected to a significant external ESD with a severity level of 27kV air discharge. The gaming device shall exhibit a capacity to recover and complete any interrupted play without loss or corruption of any control information or critical data following any temporary disruption.

2.4 Machine Identification

2.4.1 ***Identification Badge***. A gaming device shall have an identification badge affixed to the exterior of the device by the manufacturer. The identification badge shall not be removable without leaving evidence of tampering. This badge shall include the following minimum information:

a) The complete name of the manufacturer or some appropriate abbreviation for same;
b) A unique serial number;
c) The gaming device model number; and
d) The date of manufacture.

2.5 Basic Machine Hardware Requirements

2.5.1 ***Gaming Device Control***. A gaming device shall be controlled by one (1) or more microprocessors or the equivalent in such a manner that the game program is completely

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controlled by the microprocessor(s). This does not preclude a game outcome from being derived from a mechanical device as described under the "Random Number Generator (RNG) Requirements" chapter of this standard.

2.5.2 ***Printed Circuit Board (PCB) Identification Requirements***. Identification for any PCB that impacts the integrity of the gaming device shall include the following:

a) Each PCB shall be clearly identifiable by an alphanumeric identification and, when applicable, a revision number. It is recommended that this identification be readily viewable without removal of the PCB from the gaming device; and
b) If track cuts, patch wires, or other circuit alterations are introduced to the PCB, then a new revision number shall be assigned.

2.5.3 ***Switches and Jumpers.*** If the gaming device contains switches and/or jumpers, the following rules shall be met:

a) All hardware switches or jumpers shall be fully documented for evaluation by the independent test laboratory; and
b) Hardware switches and/or jumpers which may alter the jurisdiction-specific configuration settings, paytables, game denomination, or payout percentages shall meet the applicable sections of this document and must be housed within the logic compartment of the gaming device. This includes award changes (with or without progressives), selectable settings, or any other option that would affect the payout percentage.

2.5.4 ***Machine Wiring.*** The gaming device shall be designed so that power and data cables into and out of the device can be routed so that they are not accessible to the general public. Wires and cables that are routed into a logic area shall be securely fastened within the interior of the device using appropriate mechanical fasteners, plugs, sockets, connectors, etc.

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NOTE: The independent test laboratory will make no determination as to whether the gaming device installation conforms to local electrical codes, or to any other electrical testing standards, and practices.

2.5.5 ***Charging Mechanisms.*** A gaming device may support the use of an externally accessible charging mechanism, such as a Universal Serial Bus (USB) charging port, or some other analogous technology (e.g., cables, inductive chargers, etc.). The mechanism may be used to provide external power or charging access for an electronic device such as a smartphone, tablet, etc. If so equipped, the charging mechanism shall:

a) Be appropriately fused and/or electrically-protected; and
b) Not impact the integrity, proper operation, or outcome of the gaming device.

2.5.6 ***Displays and Monitors.*** If a machine is equipped with a display/monitor, the following rules apply:

a) The display/monitor shall fit properly into the machine and the surrounding bezel in a manner that eliminates gaps or voids, resists the entry of objects, and which does not physically obscure or cover any required game display information;
b) The resolution of the configured display/monitor shall be compatible with one or more of the resolutions supported by the gaming device software in a manner that ensures the intended function of the display; and
c) The resolution of the configured display/monitor shall not clip or fail to display any information critical to game play.

NOTE: Please reference section entitled "Touch Screen Displays" for requirements applicable to display devices that support touch screen functionality.

2.5.7 ***Wired Communication Ports.*** Wired communication ports shall be clearly labeled and must be securely housed within the gaming device to prevent unauthorized access to the ports or their associated cable connectors.

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2.6 Machine Electrical Power

2.6.1 ***Power Surges.*** The gaming device shall not be adversely affected, other than resets, by surges or dips of ± 20% of the supply voltage. It is acceptable for the gaming device to reset provided no damage to the equipment or loss or corruption of data is experienced. Upon reset, the game must return to its previous state. It is acceptable for the game to return to a game completion state provided the game history and all credit and accounting meters reflect a completed game.

2.6.2 ***Circuit Protection.*** The power supply used in a gaming device must be appropriately fused or protected by circuit breakers. The amperage rating of all fuses and circuit breakers must be clearly stated on or near the fuse or the breaker.

2.6.3 ***On/Off Switch***. An on/off switch that controls the electrical current supplied to the machine shall be located in a place which is readily accessible within the interior of the gaming device. The on/off positions of the switch shall be clearly labeled.

2.7 Machine Doors

2.7.1 ***Physical Security***. A gaming device shall be robust enough to resist forced entry into any secured doors, areas, or compartments. In the event that extreme force is applied to the cabinet materials causing a potential breach in machine security, evidence of tampering must be conspicuous. "Secured areas" or "secured compartments" shall include the logic area(s), external doors such as the main door or belly door, cash compartment doors such as a drop box door, peripheral device access area(s), and/or other sensitive access areas of the gaming device that can potentially impact game integrity such as top boxes, controllers, etc.

2.7.2 ***External Doors***. The following requirements apply to the gaming device's external doors (e.g., main, belly, top box, etc.):

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a) External doors shall be manufactured of materials that are suitable for allowing only legitimate access to the inside of the gaming device cabinet. Doors and their associated hinges shall be capable of withstanding determined and unauthorized efforts to gain access to the interior of the gaming device and shall leave conspicuous evidence of tampering if such an attempt is made;

b) The seal between the gaming device cabinet and the door of a locked area shall be designed to resist the entry of objects. It shall not be possible to insert an object into the gaming device that disables a door open sensor when the gaming device's door is fully closed, without leaving conspicuous evidence of tampering; and

c) All external doors shall be secure and support the installation of locks.

2.7.3 ***Door Monitoring***. All doors that provide access to secure areas of the gaming device shall be monitored by a door access detection system. The detection system shall register a door as being open when the door is moved from its fully closed and locked position, provided power is supplied to the gaming device. The door access detection system shall monitor access to the following areas:

a) All machine external doors that provide access to a secure area of the gaming device;

b) Logic door(s);

c) Drop box door;

d) Stacker door;

e) Any other currency storage areas that have a door; and

f) Peripheral device access areas.

2.7.4 ***Door Open/Close Interruptions.*** When any one of the above-listed doors are opened, the gaming device shall cease play, enter an error condition, display an appropriate error message, disable credit acceptance, and sound an alarm and/or illuminate the tower light. This error condition shall be communicated to the on-line system when such a compatible system and protocol is supported. When all of the monitored doors are closed, the gaming device shall return to its original state and display an appropriate door close event message, until the next game has started.

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2.8 Machine Logic Area

2.8.1 ***General Statement***. The logic area is a separately locked area of the gaming device which houses electronic components that have the potential to influence the outcome or integrity of the device. There may be more than one (1) such logic area in a gaming device.

2.8.2 ***Electronic Components***. Electronic components that are required to be housed in one (1) or more logic areas shall include:

a) A Central Processing Unit (CPU) or machine microprocessor(s);
b) Any Program Storage Device (PSD) that contains software that may affect the integrity of gaming, including, but not limited to, game accounting, systems communication, execution of game play, game display, game result determination, security, etc.;
c) Any electronics associated with the control logic for door monitoring and/or access detection;
d) Any components that handle critical control program signature computation or verification;
e) Any components that manage encryption/decryption of critical data;
f) Any communication controller electronics, and/or components housing the PSD responsible for communications; and
g) Machine critical NV memory backup devices.

NOTE: Any exceptions to the above logic area requirements and components will be evaluated on a case-by-case basis.

2.8.3 ***Logic Area Access.*** Logic area(s) shall contain an access detection mechanism to detect a logic door open condition, as defined elsewhere in this standard under the sections entitled "Door Monitoring" and "Door Open/Close Interruptions".

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2.9 Machine Program Storage Devices

2.9.1 ***General Statement***. The term Program Storage Device (PSD) is defined to be the physical storage media or electronic device that contains a critical control program or software that affects the integrity of the gaming device. Types of PSDs include, but are not limited to, EPROMs, Compact Flash and CFast cards, optical disks, hard drives, solid state drives, and USB drives. For the purpose of this technical standard, logical partitions defined on a disk drive shall be viewed as separate PSDs. This partial list of PSD types may change as storage technology evolves.

2.9.2 ***PSD Identification***. A PSD shall be clearly labeled with sufficient information to identify the software and revision level of the information stored on the device. It is acceptable for the gaming device to alternatively display this information via an attendant menu. In either case, each PSD shall be uniquely identified by the following information:

a) Manufacturer identification, as appropriate;
b) Program ID number;
c) Version number, if applicable; and
d) Location of installation in the gaming device, if there are multiple locations possible and as applicable.

2.9.3 ***PSD Program Verification***. The gaming device shall perform an integrity check to verify all designated critical control programs contained on the PSD(s) prior to being available for any game play and upon any processor reset. In addition, the following requirements shall apply to this verification mechanism:

a) Gaming devices which have critical control programs residing in one or more EPROMs shall employ a mechanism to verify critical control programs and data. The mechanism shall use, at a minimum, a checksum; however, it is recommended that a Cyclic Redundancy Check (CRC) be used that is at least 16-bit.

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b) For non-EPROM PSDs, the gaming device shall provide a mechanism for the detection of unauthorized or corrupt software elements upon any access, and shall prevent the execution or usage of those elements by the gaming device. The mechanism shall employ a hashing algorithm which produces a message digest output of at least 128 bits.

c) Alterable media shall meet the following rules, (i) and (ii), in addition to the requirements stated in item (b) immediately above:

   i. Employ a mechanism which tests accessible areas of the alterable media for unintended programs or data and tests the structure of the media for integrity. The mechanism shall prevent further play of the gaming device if unexpected data or structural inconsistencies are found.

   ii. Employ a mechanism for keeping a record any time a critical control program component is added, removed, or altered on any alterable media. The record shall contain a minimum of the last ten (10) modifications to the media. Each record shall contain the date and time of the action, identification of the component affected, the reason for the modification, and any pertinent validation information such as the corresponding signatures of the changed components.

d) For all media types, in the event of a failed authentication (i.e., program mismatch or authentication failure), the gaming device shall immediately enter an error/tilt condition, cease operation, display an appropriate error message, disable credit acceptance, and sound an alarm and/or illuminate the tower light. This error condition shall be communicated to the on-line system when such a compatible system and protocol is supported. Additionally, the error condition shall require operator intervention to clear, and shall not clear until the program data authenticates properly following the operator intervention, or the media is replaced or repaired. Any PSD critical control program that fails authentication shall not be loaded into gaming device NV memory.

NOTE: Critical control program verification mechanisms will be evaluated on a case-by-case basis and approved by the regulatory body and the independent test laboratory based on industry-standard security practices.

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2.9.4 ***Independent PSD Verification***. The gaming device shall have the ability to allow for an independent integrity check of the device's PSD from an outside source. This verification is required for all PSDs containing critical control programs that affect the integrity or outcome of the game. The verification shall be accomplished by being authenticated by a third-party application which may be embedded within the game software, by having an interface port for a third-party device to authenticate the media, or by allowing for removal of the media such that it can be verified external to the gaming device. The integrity check must support a means for field verification of the software. The independent test laboratory, prior to device approval, shall evaluate the integrity check method.

2.10 Machine Critical NV Memory

2.10.1 ***Contents of Critical NV Memory.*** Critical Non-Volatile (NV) memory shall be used to store all data elements that are considered vital to the continued operation of the gaming device. These data elements include, but are not limited to:

a) All electronic meters defined in the "Accounting and Metering Requirements" chapter of this standard;
b) Current credits;
c) Machine configuration data (e.g., button panel, top box, communications, progressives, etc.);
d) Game configuration data (e.g., paytable, denomination, etc.);
e) Game history/recall data;
f) Machine state (e.g., machine error conditions, etc.);
g) Game state (e.g., current game play status, progress, etc.); and
h) All machine logs as defined within this technical standard and as applicable based upon supplier implementation (includes "Bill Validator Recall", "Voucher Out", "Identifier", "Machine Non-Wager Purchase", and "Machine Significant Event" logs).

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2.10.2 ***Machine Significant Event Log.*** The last 100 significant events for gaming devices shall be stored with an appropriate timestamp in one or more secure machine logs that are not accessible to the player and which minimally include the following events, as applicable:

a) PSD verification errors or critical NV memory errors, if technically possible to log these events based on the nature and/or severity of the error;
b) Changes made to game configuration which may alter paytables or hold percentages;
c) Power resets;
d) Handpay conditions;
e) Door open errors and door close events;
f) Logic area access events;
g) Coin, token, and hopper errors;
h) Bill validator errors;
i) Hardware errors for integrated player identification components;
j) Low NV battery errors;
k) Reel spin, mechanical device, or smart player interaction device errors, if any of these errors directly impact game outcome; and
l) Printer errors.

2.10.3 ***Machine Non-Wager Purchase Log.*** The last 10 non-wager purchases for gaming devices shall be stored in a secure machine log that is not accessible to the player and which minimally includes the following information:

a) Unique transaction identification number;
b) Date and time of the non-wager purchase;
c) Value of the non-wager purchase in credits and/or local currency; and
d) Type of non-wager purchase.

2.10.4 ***Identifier Log.*** If an identifier triggers an action that alters the gaming device configuration or the outcome of a game, then it shall be recorded in a log file containing the last

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10 identifier-based transactions which shall be maintained by the gaming device or an external system, as applicable. The log file shall contain the following information:

a) A unique transaction identification number;
b) An identification number unique to the player, if known;
c) The date and time of the transaction;
d) The criteria for the use of the identifier (skill level of player, subscriptions, account memberships, player tracking information, skill requirements of the game, etc.); and
e) The type of action taken or alteration made to the game (e.g., game rule change, paytable change, or other configuration change related to game outcome).

2.10.5 ***Critical NV Memory Requirements***. The following are the critical NV memory requirements for gaming devices:

a) The gaming device shall have the ability to retain data for all critical NV memory as defined herein and shall be capable of maintaining the accuracy of all information required for thirty (30) days after power is disconnected from the gaming device;
b) For rechargeable battery types only, if the battery back-up is used as an 'off chip' battery source, it shall re-charge itself within twenty-four (24) hours. The shelf life shall be at least five (5) years;
c) NV memory that uses an off-chip back-up power source to retain its contents when the main power is switched off shall have a detection system which provides a method for software to interpret and act upon a low battery condition before the battery reaches a level where it is no longer capable of maintaining the memory in question. If a low battery condition is identified, the gaming device shall display an appropriate error message and sound an alarm and/or illuminate the tower light. This error condition shall be communicated to the on-line system, when such a compatible system and protocol is supported; and
d) Clearing NV memory shall require access to the locked logic area or other secure method, provided that the method has been accepted by, or can be controlled by, the regulatory body.

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2.10.6 ***Function of Critical NV Memory Reset***. Following the initiation of a critical NV memory reset procedure utilizing a certified NV memory clear method, the critical control program shall execute a routine which initializes critical NV memory to the default state. All memory locations as per the NV memory clear process shall be fully reset in all cases.

2.10.7 ***Configuration Settings***. It shall not be possible to change a configuration setting that causes any obstruction or alteration to the electronic accounting meters without performing an NV memory clear. Any change to the available denominations or paytable configurations shall be performed by a secure means which includes access to the locked logic area, or other secure method inaccessible to a player.

2.11 Monitoring of Critical NV Memory

2.11.1 ***Critical NV Memory Errors***. Critical NV memory storage shall be maintained by a methodology that enables errors to be identified. This methodology may involve signatures, checksums, redundant copies, database error checks, and/or other method(s) approved by the regulatory body.

2.11.2 ***Critical NV Memory Checks***. Comprehensive checks of critical NV memory data elements shall be made following game initiation, but prior to display of game outcome to the player. NV memory that is not critical to gaming device integrity is not required to be checked.

2.11.3 ***Unrecoverable Corruption of Critical NV Memory.*** An unrecoverable corruption of critical NV memory shall result in an error and the gaming device shall immediately cease play and tilt, display an appropriate error message, disable credit acceptance, and sound an alarm and/or illuminate the tower light. The memory error shall not be cleared automatically. Additionally, the critical NV memory error shall cause any communication external to the gaming device to cease. An unrecoverable critical NV memory error shall require a full NV memory clear performed by an authorized person.

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NOTE: This section is not intended to preclude the use of alternate storage media types, such as hard disk drives, for the retention of critical data. Such alternate storage media is still expected to maintain critical data integrity in a manner consistent with the requirements in this section, as applicable to the specific storage technology implemented.

2.12 Player Interaction Devices

2.12.1 ***Touch Screen Displays***. All touch screen displays shall meet the following rules:

a) Touch screen displays shall be accurate, and if required by their design, shall support a calibration method to maintain that accuracy; alternatively, the display hardware may support automatic self-calibration; and

b) If applicable to design, a touch screen display shall be capable of being manually re-calibrated without access to the gaming device cabinet other than opening the main door.

2.12.2 ***Maintenance of Player Interaction Devices.*** A gaming device that incorporates one or more player interaction devices that impact game outcome shall:

a) Monitor any smart player interaction device that supports two-way communications with the gaming device to determine if it is offline or not communicating. Upon detection of an offline condition, the gaming device must tilt unless an alternative interface mechanism is available to the player; and

b) Support a manual test mode accessible to the operator that checks the electrical continuity of the player interaction device and which allows the operator to assess the functional health of the device, as per its intended design.

2.12.3 ***Wireless Player Interaction Devices.*** Communication between a gaming device and any wireless player interaction device, conducted using transmission technologies such as Near Field Communications (NFC), Bluetooth (BT), Wi-Fi, optical, etc., shall:

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a) Utilize secure communication methods to prevent unauthorized access to sensitive data by unintended recipients;
b) Employ a method to detect data corruption; upon detection of corruption, either correct the error, or terminate the communication while providing a suitable error message;
c) Employ a method to prevent unauthorized modification of sensitive data that impacts game outcome or that represents secure player information; and
d) Only be possible with authorized wireless player interaction devices.

2.13 Bill Validators and Stackers

2.13.1 General Statement. For gaming devices that support a bill validator, the requirements defined within this section apply.

2.13.2 Bill Validators. Bill validators shall be constructed in a manner that ensures proper handling of inputs and that protects against vandalism, abuse, or fraudulent activity. In addition, bill validators shall meet the following rules:

a) A bill validator shall be electronically-based and be configured to ensure that it detects the entry of valid bills, coupons, vouchers, or other approved notes as applicable, and provides a method to enable the gaming device software to interpret and act appropriately upon a valid or invalid input;
b) Invalid bills, coupons, vouchers or other approved notes must be rejected and shall be returned to the player;
c) Each valid bill, coupon, voucher or other approved note shall register on the credit meter the actual monetary value in local currency, or the appropriate number of credits received for the denomination being used. If registered directly as credits, the conversion rate shall be clearly stated, or be easily ascertainable from the gaming device;
d) Credits shall only be registered when:
    i. The bill, coupon, voucher or other approved note has passed the point where it is accepted and stacked; and

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ii. The bill validator has sent the "irrevocably stacked" message to the gaming device.

e) Each bill validator shall be designed to prevent the use of cheating methods such as stringing, the insertion of foreign objects, and any other manipulation that may be deemed a cheating technique. Appropriate correlating error conditions shall be generated and the bill validator shall be disabled;

f) A method for detection of counterfeit bills must be implemented. Counterfeit bills shall be rejected with a high degree of accuracy;

g) Acceptance of any bills, vouchers, coupons or other approved notes for crediting to the credit meter shall only be possible when the gaming device is enabled for play. Other states, such as error conditions including door opens, shall cause the disabling of the bill validator system; and

h) Each gaming device and/or bill validator shall have the capability of detecting and displaying the error conditions listed below. The bill validator shall disable itself and provide a suitable error message which shall be communicated to the on-line system, when such a compatible system and protocol is supported. The error(s) shall be cleared by an attendant, or upon initiation of a new play sequence subsequent to the error being cleared.

i. Stacker full; it is recommended that an explicit “stacker full” error message not be utilized since this may promote a security issue; rather, a message such as “Bill Validator Malfunction” or similar is suggested; it is acceptable to flash lights with respect to the bill validator itself;

ii. Bill jams; it is acceptable to flash lights with respect to the bill validator itself;

iii. Bill validator communication failure; it is acceptable to flash lights with respect to the bill validator itself;

iv. Stacker door open; the stacker door is the door immediately prior to accessing the cashbox/stacker assembly; the gaming device shall cease play and sound an alarm and/or illuminate the tower light, provided power is supplied to the device; and

v. Stacker removed; the gaming device shall cease play and sound an alarm and/or illuminate the tower light, provided power is supplied to the device.

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2.13.3 Bill Validator Self-Test. The bill validator shall perform a self-test during each power up. In the event of a self-test failure, the bill validator shall automatically disable itself until the error state has been cleared.

2.13.4 Bill Validator Communications. All bill validators shall communicate to the gaming device using a bi-directional protocol.

2.13.5 Bill Validator Settings. It shall only be possible to conduct preventive maintenance, or perform the following changes or adjustments to bill validators in the field:

a) The selection of desired acceptance for bills, coupons, vouchers, or other approved notes and their limits;
b) Changing of certified critical control program media or downloading of certified software;
c) Adjustment of the bill validator for the tolerance level for accepting bills or notes of varying quality shall not be allowed external to the gaming device. Adjustments of the tolerance level must only be allowed with adequate levels of security in place. This can be accomplished through lock and key, physical switch settings, or other accepted methods approved on a case-by-case basis;
d) Maintenance, adjustment, and repair per approved factory procedures; and
e) Options that set the direction or orientation of acceptance.

2.13.6 Bill Validator Location. If a gaming device is equipped with a bill validator, it shall be located in a secure area of the device but not within the logic area. Only the bill or voucher insertion area shall be accessible to the player.

2.13.7 Power Failures During Bill Validator Acceptance. If a power failure occurs during acceptance of a bill/voucher, the bill validator shall give proper credits or return the bill/voucher. There may be a small window of time where power may fail and credit may not be given due to the timing of validating the bill/voucher. However, in this case, the timing window shall be less than one (1) second.

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2.13.8 Bill Validator Recall. A gaming device that uses a bill validator shall retain in its memory and display the denomination/value for each of the last five (5) items accepted by the bill validator. The bill validator recall log may be combined or maintained separately by item type and shall include a timestamp for each item. If combined, the type of item accepted shall be recorded along with its respective timestamp.

2.13.9 Bill Validator Stacker. Each bill validator shall have a secure stacker and all accepted items shall be deposited into the secure stacker receptacle. The secure stacker and its receptacle must be attached to the gaming device in such a manner so that they cannot be easily removed by physical force and shall meet the following rules:

a) The bill validator device shall have the ability to detect a stacker full condition; and
b) There shall be a separate keyed lock to access the stacker area. This keyed lock shall be separate from the main door. In addition, a separate keyed lock shall be required to remove the bills from the stacker.

2.14 Coin Acceptors, Diverters, and Drop Boxes

2.14.1 Coin Acceptors. Coin acceptors shall be able to detect the entry of valid coins/tokens and provide a method to enable the gaming device software to interpret and act appropriately upon a valid or invalid input. The coin acceptor shall accept or reject the coin/token on the basis of metal composition, mass, composite makeup, or an equivalent method to securely identify a valid coin/token. Coin acceptors shall be constructed in a manner that ensures proper handling of inputs and that protects against vandalism, abuse, or fraudulent activity. In addition, a coin acceptor shall meet the following rules:

a) Each valid coin/token inserted shall register on the credit meter the actual monetary value, or the appropriate number of credits received for the denomination being used. If registered directly as credits, the conversion rate shall be clearly stated, or be easily ascertainable from the gaming device;

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b) The coin acceptor shall be designed to prevent the use of cheating methods including, but not limited to, slugging (counterfeit coins), stringing (coin pullback), the insertion of foreign objects, and any other manipulation that may be deemed a cheating technique. Appropriate, correlating error conditions shall be generated and the coin acceptor shall be disabled;

c) Acceptance of any coins or tokens for crediting to the credit meter shall only be possible when the gaming device is enabled for play. Other states, such as error conditions including door opens, shall cause the disabling of the coin acceptor system;

d) The gaming device shall be capable of handling rapidly-fed coins/tokens or piggy-backed coins/tokens such that occurrences of cheating are eliminated. Coins/tokens traveling too fast that do not register on the player's credit meter shall be returned to the player;

e) The gaming device shall have suitable detectors for determining the direction and the speed of coin/token travel in the acceptor. If a coin/token traveling at too slow of a speed, or improper direction, is detected, the gaming device shall display a suitable error condition for at least thirty (30) seconds or be cleared by an attendant;

f) Coins/tokens deemed invalid by the acceptor shall be rejected to the coin tray and shall not be counted as credits; and

g) If a coin acceptor error condition as listed below is identified, the gaming device shall display an appropriate error message, disable the coin acceptor, and sound an alarm and/or illuminate the tower light. This error condition shall be communicated to the on-line system, when such a compatible system and protocol is supported.

   i. Coin/token-in jam;

   ii. Coin/token return jam;

   iii. Reverse coin-in or token-in (coin or token traveling wrong direction through acceptor); and

   iv. Coin or token too slow / too fast.

NOTE: It is acceptable to report coin/token-in jam, reverse coin-in or token-in, and coin or token too slow / too fast error as a generic coin/token-in error.

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2.14.2 ***Diverter***. For gaming devices that accept coins or tokens, the software shall ensure that the diverter directs coins to the hopper, or to the drop box when the hopper is full. The hopper full detector shall be monitored to determine whether a change in diverter status is required. If the state of the detector changes, the diverter shall operate within ten (10) games, after the state change, without causing a disruption of coin flow, or creating a coin jam. Hopper-less gaming devices shall always divert coins to the drop box.

2.14.3 ***Drop Box***. If the gaming device is equipped to accept coins or tokens, then the following rules shall be met with respect to the drop box:

a) Each gaming device shall contain a separate box to collect and retain all such coins or tokens that are diverted into the drop box;
b) A drop box shall be housed in a locked compartment, separate from any other compartment of the gaming device; and
c) There must be a method to monitor the drop box door to detect access, as defined elsewhere in this standard under the sections entitled "Door Monitoring" and "Door Open/Close Interruptions".

2.15 Integrated Player Identification Components

2.15.1 ***General Statement.*** An integrated player identification component is an electronic device controlled by a machine's critical control program and which supports a means for players to provide identification information. Examples of these integrated components include a card reader, a barcode reader, or a biometric scanner. Note that an integrated player identification component as defined in this section does not include any SMIB-based or non-integrated form of these devices that operate outside the control of the gaming device.

NOTE: Wireless devices that are employed for player identification purposes are expected to also meet the requirements defined in the section entitled "Wireless Player Interaction Devices".

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2.15.2 Integrated Card Readers. Integrated card readers shall be able to detect the use of a valid player card, as applicable, and provide a method to enable the software to interpret and act appropriately upon a valid or invalid input. The card reader shall be electronically-based and be configured to ensure that it only reads valid cards.

2.15.3 Integrated Barcode Readers. Integrated barcode readers shall be able to associate the barcode visible on a card, coupon, voucher, or an allowed electronic device such as a smartphone, as applicable, with data stored in an external database as a means to identify an account association, or for the purpose of redemption. A barcode reader shall provide a method to enable the software to interpret and act appropriately upon a valid or invalid input.

2.15.4 Integrated Biometric Scanners. Integrated biometric scanners shall be able to associate a person's physical characteristics with those recorded within an external database as means to authenticate the identity of a player and for the purpose of account association. A biometric scanner shall provide a method to enable the software to interpret and act appropriately upon a valid or invalid input.

2.15.5 Integrated Player Identification Component Requirements. Integrated player identification components shall meet the following rules:

a) The integrated player identification component hardware shall be secured in a locked enclosure or sealed casing, or located within a locked area of the gaming device outside of the logic area (i.e., an area that requires opening of the main door for access). Only the areas of the component that require physical interaction shall be accessible to the player;

b) Each integrated player identification component shall be designed to prevent manipulation that may impact game integrity. A method for detection of counterfeiting shall be implemented; and

c) Each gaming device shall have the capability of detecting and displaying an error condition related to a malfunction of any integrated player identification component. If a malfunction is identified, the gaming device shall display an appropriate error message, disable the integrated player identification component, and sound an alarm and/or

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illuminate the tower light. For integrated player identification components, it is acceptable to flash lights with respect to the component itself. This error condition shall be communicated to the on-line system, when such a compatible system and protocol is supported.

2.16 Machine Tower Light

2.16.1 ***Tower Light***. The gaming device shall have a light located prominently on its top that automatically illuminates when a player has won an amount or is collecting credits that the device cannot automatically pay, an error condition has occurred , or a 'Call Attendant' request has been initiated by the player. For bar-top style devices, it is permissible for the tower light to be shared among a group of gaming devices, or to be substituted by an audible alarm.

NOTE: The independent test laboratory will make no determination as to tower light color or flash sequence. Furthermore, alternative means such as displayed messages, audible tones, special animation effects, game-to-system communications etc., that may be used to alert appropriate personnel will be considered on a case-by-case basis.

2.17 Machine Payment and Payment Devices

2.17.1 ***Payments by the Gaming Device***. Available credits may be collected from the gaming device by the player pressing a collect or cash out button at any time other than during:

a) A game being played (subject to the applicable rules of the game);
b) Any door open condition;
c) Test/diagnostic mode;
d) A credit meter or win meter increment, unless the entire amount is placed on the meters when the collect button is pressed; or
e) An error condition, provided the error condition prevents a valid cashout which is not supported through some other means.

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2.17.2 ***Cashout Limit Exceeded***. If credits are collected, and the total credit value is greater than or equal to a specific limit, the gaming device shall lock up until the credits have been paid, and the handpay or attendant-paid cancelled credit condition is cleared by the attendant or via a system-based command.

2.17.3 ***Coin Hoppers.*** If coin hoppers are used, they are to be monitored for proper operation by the gaming device critical control program, as per requirements defined under "Hopper Error Conditions". In addition, coin hoppers shall prohibit manipulation by the insertion of a light source or any foreign object, and there shall not be an abnormal payout when exposed to higher levels of Electro-Static Discharge (ESD), or if power is lost at any time during a payout.

NOTE: Activities that result in the payout of a single extra coin (e.g., the removal and re-insertion of the hopper) are not considered an abnormal payout as long as it is accounted for as an extra coin paid.

2.17.4 ***Hopper Location***. If a gaming device is equipped with a hopper, it shall be located in a secure area of the gaming device, but not within the logic area or the drop box.

2.17.5 ***Hopper Error Conditions***. A gaming device that is equipped with a hopper shall have mechanisms to allow critical control program software to interpret and act upon the conditions listed immediately below. If a hopper error condition as listed below is identified, the gaming device shall display an appropriate error message, disable the hopper, and sound an alarm and/or illuminate the tower light. This error condition shall be communicated to the on-line system, when such a compatible system and protocol is supported.

a) Hopper empty or timed out;
b) Hopper jam; and
c) Hopper runaway or extra coin paid out.

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2.17.6 ***Printer Location***. If a gaming device is equipped with a printer, it shall be located within a secure area of the gaming device, but not be housed within the logic area or the drop box.

2.17.7 ***Printer Error Conditions***. A gaming device that is equipped with a printer shall have mechanisms to allow critical control program software to interpret and act upon the conditions listed below. If a printer error condition is identified, the gaming device shall display an appropriate error message and sound an alarm and/or illuminate the tower light. The error condition shall be communicated to the on-line system, when such a compatible system and protocol is supported. Additionally, for the conditions stated immediately below in (b), the printer shall be disabled. Printer error conditions shall include:

a) Out of paper/paper low; it is permissible for the gaming device to not lock up for these conditions, however, there shall be a means for the attendant to be alerted;
b) Printer jam/failure;
c) Printer disconnected; it is permissible for the gaming device to detect this error condition when the game tries to print; and
d) Once a printer error condition has been cleared, any unprinted voucher shall be generated or a suitable handpay shall be processed.

2.18 Machine Vouchers

2.18.1 ***Payment by Voucher***. Payment by voucher as a method of credit redemption is only permissible when:

a) The gaming device is linked to a computerized validation system which allows for the validation of the voucher. Provisions must be made if communication is lost and validation information cannot be sent to the validation system, thereby requiring the manufacturer to support some alternate method of payment; or
b) Utilizing an approved alternative method that includes the ability to identify duplicate vouchers to prevent fraud through the redemption of a voucher that was previously issued by the gaming device.

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2.18.2 <u>Voucher Information</u>. A voucher shall contain the following information at a minimum:

a) Casino name / site identification (for a printed paper voucher, it is permissible for this information to be contained on the ticket stock itself);
b) Machine identification number;
c) Date and time;
d) Alpha value of the voucher in local monetary units;
e) Numeric value of the voucher in local monetary units;
f) Voucher sequence number;
g) Validation number (and which for a printed paper voucher, must appear on the leading edge of the ticket);
h) Bar code or any machine readable code representing the validation number;
i) Indication if the voucher is a "duplicate", assuming duplicate vouchers may be printed by the gaming device;
j) Type of transaction or other method of differentiating voucher types (assuming multiple voucher types are available). Additionally, it is strongly recommended that whenever the voucher type is itself a non-cashable item and/or just a receipt, that the voucher explicitly states that it has "no cash value" or other equivalent wording; and
k) Indication of an expiration period from date of issue, or date the voucher will expire (for a printed paper voucher, it is permissible for this information to be contained on the ticket stock itself).

NOTE: Some of the above-listed information may also be part of the validation number or barcode. Multiple barcodes are allowed and may represent more than just the validation number.

2.18.3 <u>Voucher-Out Log</u>. The gaming device shall have the ability to retain information on the last twenty-five (25) issued vouchers in a voucher-out log. The voucher-out log shall contain the following information for each recorded voucher:

a) Value of credits in local monetary units in numerical form;

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b) Time of day the voucher was issued, in twenty-four (24) hour format showing hours and minutes;
c) Date, in any recognized format, indicating the day, month, and year; and
d) Validation number. The gaming device shall mask all but the last 4 digits of the validation number as displayed in the twenty-five (25) voucher-out log.

2.18.4 ***Online Voucher Issuance***. The gaming device may pay the player by issuing a printed or virtual voucher that contains the information as indicated in the section entitled "Voucher Information" above. Additionally, the gaming device shall support the transmission of the following information to the ticketing system regarding each voucher issued, as required by the communications protocol supported:

a) Value of credits in local monetary units in numerical form;
b) Time of day the voucher was printed in twenty-four (24) hour format showing hours and minutes;
c) Date, in any recognized format, indicating the day, month, and year;
d) Gaming device asset number; and
e) Validation number.

2.18.5 ***Offline Voucher Issuance***. The gaming device shall meet the following minimum set of requirements to support the issuance of offline vouchers after a loss of communication with the validation system has been identified:

a) The gaming device shall not issue more offline vouchers than it has the ability to retain and display in the voucher out log;
b) The gaming device shall not request validation numbers, or values for seeds, keys, etc. used in the issuance of vouchers, until all outstanding offline voucher information has been fully communicated to the voucher validation system;
c) The gaming device shall request a new set of validation numbers, seeds, keys, etc. if the current list has the possibility of being compromised;
d) The values for the seeds, keys, etc. shall never be viewable through any display supported by the gaming device; and

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e) An "offline authentication identifier" shall be included on the voucher. For printed paper vouchers, this identifier must appear on the next line immediately following the leading edge validation number that in no way overwrites, or otherwise compromises, the printing of the validation number on the voucher (not required for vouchers that are non-redeemable at a gaming device). The offline authentication identifier must be derived by a hash, or other secure encryption method of at least 128 bits, that will uniquely identify the voucher, verify that the redeeming system was also the issuing system, and validate the amount of the voucher. For cases where a suitable authentication identifier is not included on the voucher, the gaming device must issue at most one voucher after the communications between the gaming device and the system have been lost.

2.18.6 ***Online Voucher Redemption***. Vouchers may be accepted by a gaming device connected to a ticket validation system provided that no credits are issued to the gaming device prior to confirmation of voucher validity.

2.19 Machine Communication Protocol

2.19.1 ***Integrity of Protocol Communications***. For gaming devices that are designed to support communications with an on-line system, the device shall accurately function as indicated by the communications protocol that is implemented, and as required by the regulatory body, including, but not limited to, protocol-based metering and remote verification of the critical control program, where supported. In addition, the following rules shall be met:

a) With the exception of 'disable' commands, communications shall not negatively impact player interaction on the gaming device, including a player's access to all screen displays; and

b) After a program interruption, any communications to an external device shall not begin until the program resumption routine, including any self-test, is completed successfully.

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2.19.2 ***Protection of Sensitive Information***. The gaming device shall not allow any information contained in communication to or from the online monitoring system that is intended by the communication protocol to be protected, or which is of a sensitive nature, to be viewable through any display mechanism supported by the device. This includes, but is not limited to, validation numbers, secure PINs, player credentials, or secure seeds and keys.

2.19.3 ***Gaming Device Communication***. Any gaming device which is capable of bidirectional communication with internal or external associated equipment, or other equipment, shall utilize a robust communication protocol which ensures that erroneous data or signals do not adversely affect the integrity or operation of the device.

2.20 Machine Connections to the Internet

2.20.1 ***General Statement.*** Gaming devices may be designed to connect to, or otherwise communicate over, servers or networks via the internet.

2.20.2 ***Internet Connections.*** The following requirements shall apply to gaming devices supporting an internet connection or access to a public network:

a) The gaming device shall not be directly connected to the internet / public network; a gaming device shall only be connected to the internet / public network when utilizing a method that securely isolates the gaming device from that external network, for example, through an approved firewall mechanism; and

b) The gaming device shall support adequate network security measures to ensure all data transmitted between the gaming network and the internet / public network is encrypted and utilizes Virtual Private Network (VPN), Secure Socket Layer (SSL), Internet Protocol Security (IPS), or some other accepted methodology approved by the regulatory body for securing data transmissions.

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NOTE: It is recommended that routine field audits be conducted to ensure that production network configurations satisfy these requirements.

2.21 Multi-Player Machine

2.21.1 General Statement. A multi-player machine is a gaming device consisting of multiple player interfaces linked to a shared master console.

2.21.2 Master Console. The master console shall coordinate game play in a manner that is consistent across all player interfaces. The master console shall coordinate game display consistently among the player interfaces and must meet any applicable machine and game requirements contained within this document.

2.21.3 Player Interfaces. The player interfaces support player interaction devices as well as devices for credit acceptance and issuance. The following rules shall apply to each player interface comprising a multi-player machine:

a) Each individual player interface shall be capable of being independently monitored by an online system, when such a compatible system or protocol is supported;
b) Each player interface shall meet the applicable standards outlined throughout this document, including gaming device identification and metering;
c) Each player interface shall be designed such that the actions of, or results obtained by any one player, do not affect the outcome(s) of any other player, unless otherwise denoted by the game rules;
d) In the event of a malfunction of any player interface, which could include, but is not limited to, a loss of communication with the master console, each malfunctioning or non-communicating player interface shall immediately enter into an unplayable mode and must display a suitable tilt message;
e) In the event of a master console malfunction, all player interfaces shall enter into an unplayable mode and must display a suitable tilt message;

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f) There shall be a method provided by a multi-player machine for each player to know when the next game will begin; and

g) All player interfaces shall utilize a compatible version of software and must employ consistent configurations of that software.

2.22 Mechanical Devices Used for Display of Game Outcomes in Machines

2.22.1 ***Mechanical Display Devices***. If the machine has mechanical (or electro-mechanical) devices which are used for displaying game outcomes, the following rules shall be observed:

a) Mechanical devices (e.g., reels or wheels) shall have a sufficiently closed loop of control so as to enable the software to detect malfunctions such as a reel/wheel which is jammed, not spinning freely, or manipulated from its final resting position. This requirement is designed to ensure that if a reel or wheel is not in the position it is supposed to be in, an error condition will be generated. This shall be detected under the following conditions:

   i. A mis-index condition for rotating reels/wheels, that affects the outcome of the game;

   ii. In the final positioning of the reel/wheel, if the position error exceeds one-half of the width of the smallest symbol excluding blanks on the reel/wheel artwork;

b) If the gaming device detects a malfunction related to the operation of any related mechanical display device, it shall tilt and cease game play, provide an appropriate error message (including the specific reel number when applicable), disable credit acceptance, and sound an alarm and/or illuminate the tower light. This error condition shall be communicated to the on-line system, when such a compatible system and protocol is supported, and shall not be cleared automatically;

c) Microprocessor-controlled mechanical reels or wheels shall have a mechanism that ensures the correct mounting of the assembly's artwork, if applicable;

d) Displays shall be constructed in such a way that winning symbol combinations align properly with paylines or other applicable pay indicators;

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e) A display assembly for a mechanical device shall be designed such that it is not obstructed by any other components; and

f) Microprocessor-controlled reels or wheels shall re-spin automatically to the last valid reel/wheel position when game play mode is re-entered, and the reel/wheel positions have been altered (e.g., after the main door is closed, power is restored, test/diagnostic mode is exited, or an error condition is cleared).

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CHAPTER 3: RANDOM NUMBER GENERATOR (RNG) REQUIREMENTS

3.1 Introduction to RNG Requirements

3.1.1 ***Introduction***. This chapter sets forth the technical requirements for a Random Number Generator (RNG). See also related requirements found in "Game Outcome Using a Random Number Generator" section as contained in the "Game Requirements" chapter of this standard.

3.2 General RNG Requirements

3.2.1 ***Source Code Review.*** The independent test laboratory shall review the source code pertaining to any and all core randomness algorithms, scaling algorithms, shuffling algorithms, and other algorithms or functions that play a critical role in the final random outcome selected for use by a game. This review shall include comparison to published references, where applicable, and an examination for sources of bias, errors in implementation, malicious code, code with the potential to corrupt behavior, or undisclosed switches or parameters having a possible influence on randomness and fair play.

3.2.2 ***Statistical Analysis.*** The independent test laboratory shall employ statistical tests to assess the outcomes produced by the RNG, after scaling, shuffling, or other mapping (hereafter referred to as "final outcome output"). The independent test laboratory shall choose appropriate tests on a case-by-case basis, depending on the RNG under review and its usage within the game. The tests shall be selected to assure conformance to intended distribution of values, statistical independence between draws, and, if applicable, statistical independence between multiple values within a single draw. The applied tests shall be evaluated, collectively, at a 99% confidence level. The amount of data tested shall be such that significant deviations from applicable RNG testing criteria can be detected with high frequency. In the case of an RNG intended for variable usage, it is the responsibility of the independent test laboratory to select and

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test a representative set of usages as test cases. Statistical tests may include any one or more of the following:

a) Total Distribution or Chi-square test;
b) Overlaps test;
c) Coupon Collector's test;
d) Runs test;
e) Interplay Correlation test;
f) Serial Correlation test; and
g) Duplicates test.

3.2.3 ***Distribution.*** Each possible RNG selection shall be equally likely to be chosen. Where the game design specifies a non-uniform distribution, the final outcome shall conform to the intended distribution.

a) All scaling, mapping, and shuffling algorithms used shall be entirely free of bias, as verified by source code review. The discard of RNG values is permissible in this context and may be necessary to eliminate bias; and
b) The final outcome output shall be tested against intended distribution using appropriate statistical tests (e.g., Total Distribution test).

3.2.4 ***Independence.*** Knowledge of the numbers chosen in one draw shall not provide information on the numbers that may be chosen in a future draw. If the RNG selects multiple values within the context of a single draw, knowing one or more values shall not provide information on the other values within the draw, unless provided for by the game design.

a) As verified by source code review, the RNG shall not discard or modify selections based on previous selections, except where intended by game design (e.g., without-replacement functionality); and

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b) The final outcome output shall be tested for independence between draws and, as applicable, independence within a draw, using appropriate statistical tests (e.g., Serial or Interplay Correlation tests, and Runs test).

3.2.5 ***Available Outcomes.*** As verified by source code review, the set of possible outcomes produced by the RNG solution (i.e., the RNG period), taken as a whole, shall be sufficiently large to ensure that all outcomes shall be available on every draw with the appropriate likelihood, independent of previously produced outcomes, except where specified by the game design.

3.2.6 ***Unpredictability.*** The state of the RNG must be modified between every game unless a "cryptographic RNG" is implemented, as defined elsewhere within this chapter. If necessary to ensure unpredictability, such modification may be additionally required within a game. Note that hardware devices are considered to modify their state continuously. Possible modifications of RNG state that may satisfy this requirement include, but are not limited to:

a) The discard of an unpredictable number of RNG values (i.e., background cycling). If the number of discarded values is determined by an RNG, it may not be determined by the primary RNG itself, but must instead be determined by a secondary RNG, independent and asynchronous to the primary RNG; and
b) The overwriting (re-seeding) or mixing (entropy injection) of all or a portion of the RNG state by an external event or entropy source. The re-seeding or mixing shall be done in such a way that does not compromise the intended distribution, independence, or availability of prizes. The external event or entropy source shall not be able to be predicted or estimated by a player.

3.3 Software-Based RNG

3.3.1 ***General Statement.*** Software-based RNGs do not use hardware devices and derive their randomness principally and primarily from a computer-based or software-driven algorithm. They do not incorporate hardware randomness in a significant way. The following requirements apply to software-based RNGs.

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3.3.2 ***Seeding.*** The initial state, or seed, of a software-based RNG shall be randomly determined by an uncontrolled and unpredictable event. The manufacturer must ensure that games will not synchronize, even when powered-on or booted simultaneously. The set of available seeds shall be sufficiently large to ensure independence of outcomes.

3.4 Hardware-Based RNG

3.4.1 ***General Statement.*** Hardware-based RNGs derive their randomness from small-scale physical events such as electric circuit feedback, thermal noise, radioactive decay, photon spin, etc. The following requirements apply to hardware-based RNGs.

3.4.2 ***Dynamic Output Monitoring.*** Due to their physical nature, the performance of hardware-based RNGs may deteriorate over time or otherwise malfunction, independent of the gaming device. The failure of a hardware-based RNG could have serious consequences for the intended usage of the RNG. For this reason, if a hardware-based RNG is used, there shall be dynamic monitoring of the output by statistical testing. This monitoring process shall disable game play when malfunction or degradation is detected.

3.5 Mechanical RNG (Physical Randomness Device)

3.5.1 ***General Statement.*** Mechanical RNGs or "physical randomness devices" generate game outcomes mechanically, employing the laws of physics (e.g., wheels, tumblers, blowers, shufflers). The requirements defined within this section apply to mechanical RNGs / physical randomness devices.

NOTE: Devices which faithfully and mechanically create or display a game outcome selected by a computer RNG are not considered physical randomness devices and shall be tested as RNGs, once the faithful reproduction of RNG selected outcome has been assured. Physical randomness devices may incorporate RNGs in secondary roles (e.g., rotation speed). Such secondary RNGs

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need not be evaluated against the RNG requirements contained herein, as they do not directly select the game outcome. Rather, the physical system shall be tested as a whole as described in this section.

NOTE: The approved components of a mechanical RNG cannot be swapped out or replaced with unapproved components, as they are integral to the behavior and performance of the mechanical RNG. The "approved components" in this context include those physical items that produce the random behavior – e.g., balls in a mixer, cards in a shuffler, etc. As one example, a shuffler certified by the independent test laboratory to utilize plastic cards cannot be viewed as an approved equivalent to the same mechanical shuffler using paper cards.

3.5.2 Data Collection Amount. To provide best assurance of random behavior, the independent test laboratory shall collect game outcome data for at least 10,000 game outcomes.

NOTE: Due to feasibility concerns associated with reasonable data collection on some devices, the regulatory body may elect to accept testing results from a smaller collection amount on a case-by-case basis. Equally possible, a larger data collection sample may be required. Regardless, the independent test laboratory will clearly state in the applicable certification, the amount of data used for testing. When less than 10,000 games are used, a statement on the statistical limitations of reduced testing will be clearly denoted within the certification report.

3.5.3 Data Collection Procedures. The data collection shall be accomplished in a fashion reasonably similar to the intended use of the device in the field. In particular, the recommended setup and calibration shall be executed initially, and the device and components (cards, balls, etc.) shall be replaced or serviced during the collection period as recommended by the manufacturer.

3.5.4 Durability. All mechanical pieces shall be constructed of materials to prevent degradation of any component over its intended lifespan.

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NOTE: The independent test laboratory may recommend a stricter replacement schedule than that suggested by the manufacturer of the device to comply with the 'Durability' requirement stated above. In addition, the independent test laboratory may recommend periodic inspection of the device to ensure and maintain its integrity.

3.5.5 ***Tampering.*** The player / game operator shall not have the ability to manipulate or influence the mechanical RNG in a physical manner with respect to the production of game outcomes, except as intended by game design.

3.6 Cryptographic RNG

3.6.1 ***General Statement.*** A cryptographic RNG is one that cannot be feasibly compromised by a skilled attacker with knowledge of the source code. "Cryptographically strong" means that the RNG is resistant to attack or compromise by an intelligent attacker with modern computational resources, and who may have knowledge of the source code of the RNG. The following RNG requirements apply to a cryptographic RNG and are being introduced to this technical standard as optional requirements. At its discretion, a regulatory body may elect to require that RNGs used in the determination of game outcomes be cryptographically strong.

3.6.2 ***RNG Attacks.*** At a minimum, cryptographic RNGs shall be resistant to the following types of attack, all of which serve to replace the general RNG requirements for 'unpredictability':

a) Direct Cryptanalytic Attack: Given a sequence of past values produced by the RNG, it shall be computationally infeasible to predict or estimate future RNG values. This must be ensured through the appropriate use of a recognized cryptographic algorithm (RNG algorithm, hash, cipher, etc.);

NOTE: Because of continuous computational improvements and advances in cryptographic research, compliance to this criterion shall be re-evaluated as required by the regulatory body.

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b) Known Input Attack: It shall be infeasible to computationally determine or reasonably estimate the state of the RNG after initial seeding. In particular, the RNG must not be seeded from a time value alone. The manufacturer must ensure that games will not have the same initial seed, even when powered-on or booted simultaneously. Seeding methods shall not compromise the cryptographic strength of the RNG; and

c) State Compromise Extension Attack: The RNG shall periodically modify its state, through the use of external entropy, limiting the effective duration of any potential exploit by a successful attacker.

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CHAPTER 4: GAME REQUIREMENTS

4.1 Introduction to Game Requirements

4.1.1 ***Introduction***. This chapter sets forth technical requirements for the player interface, rules of play, game fairness, game selection, game outcome, related player displays and artwork, payout percentages and odds, bonus games, game history recall, game modes, common features, games with skill, tournaments, and other game requirements.

NOTE: Please reference the "Games with Skill" section of this technical standard for specific and supplemental requirements for games containing one or more skill elements.

4.2 Player Interface

4.2.1 ***General Statement.*** The player interface is defined as the interface in which the player interacts with the game, including the touch screen(s), button panel(s), or other forms of player interaction devices.

4.2.2 ***Player Interface Rules.*** The player interface shall meet the following requirements:

a) Any resizing or overlay of the player interface screen shall be mapped accurately to reflect the revised display and touch points;
b) All player-selectable touch points or buttons represented on the player interface that impact game play and/or the integrity or outcome of the game shall be clearly labeled according to their function and shall operate in accordance with applicable game rules; and
c) There shall be no hidden or undocumented touch points or buttons anywhere on the player interface that affect game play and/or that impact the integrity or outcome of the game, except as provided for by the game rules.

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4.2.3 ***Simultaneous Inputs***. Simultaneous or sequential activation of various player interaction devices comprising a player interface shall not cause gaming device malfunctions, and must not lead to results that are contrary to a game's design intent.

4.3 General Game Requirements

4.3.1 ***General Statement***. A traditional game cycle consists of all player actions and game activity that occur from wager to wager. Where multiple games are accessible simultaneously, players may play more than one game cycle at a time in separate instances of the gaming window.

4.3.2 ***Game Cycle***. The following requirements apply to a traditional game cycle:

a) Game cycle initiation shall be defined to be:
   i. After the player places a wager or commits a bet; and/or
   ii. After the player presses a "play" button or performs a similar action to initiate a game in accordance with the game rules.

b) The following game elements shall be considered to be part of a single game cycle:
   i. Games that trigger a free game feature and any subsequent free games;
   ii. "Second screen" bonus feature(s);
   iii. Games with player choice (e.g., draw poker or blackjack);
   iv. Games where the rules permit wagering of additional credits (e.g., blackjack insurance, or the second part of a two-part keno game); and
   v. Secondary game features (e.g., double-up/gamble).

c) A game cycle shall be considered complete when the final transfer to the player's credit meter takes place or when all credits wagered are lost.

4.3.3 ***Information to be Displayed***. A player interface shall display the following information whenever credits are available for play, with the exception of when the player is viewing an informational screen such as a menu or help screen:

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a) Current credit balance;

b) Denomination being played;

c) Current bet amount and placement of all active wagers, or sufficient display information to otherwise derive these parameters;

d) Any player wager options that occur prior to game initiation, or during the course of game play;

e) Accurate representation of the last completed game outcome until the next game starts, wager options are modified, or the player cashes out;

f) Amount won for the last completed game until the next game starts, wager options are modified, or the player cashes out; and

g) Any player wager options in effect at the completion of a game until the next game starts, wager options are modified, or the player cashes out.

4.3.4 ***Display for Multi-Wager Games.*** The following requirements shall apply to games where multiple, independent wagers can simultaneously be applied towards advertised awards:

a) Each individual wager placed shall be clearly indicated so that the player is in no doubt as to which wagers have been made and the credits bet per wager;

b) The winning amount for each separate wager, and total winning amount, shall be displayed on the game screen; and

c) Each winning prize obtained shall be displayed to the player in a way that clearly associates the prize to the appropriate wager. Where there are wins associated with multiple wagers, each winning wager may be indicated in turn. In cases where there is a multitude of wager information to convey, a summary screen may suffice. Any exceptions will be reviewed by the independent test laboratory on a case-by-case basis.

4.3.5 ***Display for Line Games***. The following requirements shall apply to display for line games:

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a) For multi-line games, the game shall provide a summary display of the paylines that are available to form winning combinations;

b) Each individual line to be played shall be clearly indicated by the game so that the player is in no doubt as to which lines are being wagered upon. Displaying the number of wagered lines shall be sufficient to meet this requirement;

c) The bet multiplier shall be shown. It is acceptable if this may be easily derived from other displayed information;

d) Winning paylines shall be clearly discernible to the player; and

e) Where there are wins on multiple lines, each winning payline shall be indicated in turn. This requirement would not apply to electro-mechanical reel games unless technology is used which implements the display of winning paylines in a manner similar to those found on video reel games. Additionally, this requirement shall not preclude other intuitive methods of displaying line wins such as the grouping of common win types, nor shall it prohibit a player option to bypass a detailed outcome display of line wins, where supported.

4.4 Game Information and Rules of Play

4.4.1 ***Game Information and Rules of Play.*** The following requirements apply to the game information, artwork, paytables, and help screens including any written, graphical, and auditory information provided to the player by the gaming device:

a) Player interface and player interaction device usage instructions, paytable information, and rules of play shall be complete and unambiguous and shall not be misleading or unfair to the player.

b) If there are multiple player interaction devices able to affect the same player action, then all such options shall be clearly explained to the player.

c) Help screen information shall be accessible by a player without the need for credits on the game or commitment of a wager. This information shall include descriptions of unique game features, extended play, free spins, double-up, autoplay, countdown timers, symbol transformations, community style bonus awards, etc.

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d) Minimum, maximum, and other available wagers shall be stated within, or be able to be deduced from, the artwork, with adequate instruction for any available wager option.

e) Paytable information shall include all possible winning outcomes and combinations, along with their corresponding payouts, for any available modifiers and/or wager options.

f) The artwork shall clearly indicate whether awards are designated in credits, currency, or some other unit.

g) For artwork that contains game instructions explicitly advertising a credit award or merchandise prize, it shall be possible to win the advertised award/prize from a single game, or series of games enabled by an initiating game, when including features, bonuses, or other game options, or the artwork must clearly specify the criteria necessary to win the advertised award/prize.

h) The game shall reflect any change in award value, which may occur during the course of play. This may be accomplished with a digital display in a conspicuous location of the player interface. The game shall clearly state the criteria for which any prize value is modified. This requirement shall not apply to incrementing progressive prize displays.

i) Game instructions that are presented aurally shall also be presented in written form within the artwork.

j) Game instructions shall be rendered in a color that contrasts with the background color to ensure that all instructions are clearly visible/readable.

k) The artwork shall clearly state the rules for payments of prizes. If a specific winning combination is paid where multiple wins are possible, then the payment method shall be described.

   i. The artwork shall clearly communicate the treatment of coinciding game outcomes. For example, whether or not a straight flush is construed as both a flush and a straight, or if 3/4/5 of a kind can be construed as paying all of kind or just the highest. Where a payline may be interpreted to have more than one such winning combination, there must be a statement if only the highest winning combination is paid per line;

   ii. Where the game supports scatters, the artwork shall display a message indicating that scattered wins are added to payline wins, or equivalent, if this is the rule of the game; and

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iii. The artwork shall clearly communicate the treatment of coinciding scattered wins with respect to other possible scattered wins. For example, the artwork must state whether combinations of scattered symbols pay all possible prizes or only the highest prize.

l) Where multiplier instructions are displayed in artwork, it shall be clear what the multiplier does and does not apply to.

m) All game symbols/objects shall be clearly displayed to the player and must not be misleading.

i. Game instructions that specifically correspond to one or more symbols/prizes, shall be clearly associated with those symbols/prizes. For example, this may be achieved with appropriate framing or boxing. Additional wording such as "these symbols" may also be used.

ii. If game instructions refer to a particular symbol, and the written name for the symbol may be mistaken for another symbol, or may imply other characteristics, then the visual display of the instructions shall clearly indicate to which symbol the instruction refers.

iii. Game symbols and objects shall retain their shape throughout all artwork, except while animation is in progress. Any symbol that changes shape or color during an animation process shall not appear in a way that can be misinterpreted to be some other symbol defined in the paytable.

iv. If the function of a symbol changes (e.g., a non-substitute symbol becomes a substitute symbol during a feature), or the symbol's appearance changes, the artwork shall clearly indicate this change of function or appearance and any special conditions that apply to it.

v. If limitations exist with respect to the location and/or appearance of any symbol, the limitation shall be disclosed in the artwork. For example, if a symbol is only available in a bonus game, or on a specific reel strip, then the artwork must disclose this.

n) The artwork shall clearly state which symbols/objects may act as a substitute or wild, and in which winning combinations the substitute or wild may be applied; this description must address any/all phases of game play where a wild or substitute symbol operates.

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o) The artwork shall clearly state which symbols/objects may act as a scatter and in which winning combinations the scatter may be applied.

p) The artwork shall contain textual and/or graphical information to clearly explain the order in which symbols are to appear, in order for a prize to be awarded or a feature to be triggered, including numbers to indicate how many correct symbols/objects each pattern corresponds to.

q) The artwork shall indicate any rules and/or limitations which pertain to how pays are evaluated, including an indication of:

   i. How line wins are evaluated (i.e., left to right, right to left, or both ways);

   ii. How individual symbols are evaluated (i.e., whether pays are awarded on adjacent reels only, or as scatter pays);

r) For games that permit multiple credits to be wagered on selected lines, the artwork shall:

   i. For linear pays, clearly state that the win(s) for each selected line will be multiplied by the bet multiplier, or

   ii. For non-linear pays, convey all possible wagers and their awards;

s) The game shall not advertise 'upcoming wins', for example, "three (3) times pay coming soon", unless the advertisement is accurate and mathematically demonstrable, or unless the player has a direct advertisement of the current progress to that win (e.g., they have 2 of 4 tokens collected that are required to win a prize).

t) The game artwork shall clearly explain to the player any non-wager purchase option and its value in credits or local currency.

u) The artwork shall disclose any restrictive features of game play, such as any play duration limits, maximum win values, etc. which are implemented as an element of game design.

v) It is recommended that a disclaimer stating "Malfunction Voids all Pays" or some equivalent verbiage be clearly displayed on the gaming device.

4.5 Game Fairness

4.5.1 ***Game Fairness.*** The following requirements shall apply to the fairness of the game:

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a) Games that are designed to give a player the perception that they have control over the outcome of the game due to skill or dexterity, when they actually do not (i.e., the game outcome is random and the illusion of skill is for entertainment value only), shall fully disclose this fact within the game help screens;

b) Games shall not include any hidden source code that can be leveraged by a player to circumvent the rules of play and/or the intended behaviors of game design; this requirement shall not preclude reasonably identifiable "discovery features" offered by a game which are intentional from a design perspective, but which may be undocumented or unknown to the player; and

c) The final outcome of each game shall be displayed for a sufficient length of time that permits a player a reasonable opportunity to verify the outcome of the game; this requirement shall not preclude an option for the player to bypass the outcome display.

4.5.2 ***Simulation of Physical Objects.*** Where a game incorporates a graphical representation or simulation of a physical object that is used to determine game outcome, the behaviors portrayed by the simulation must be consistent with the real-world object, unless otherwise denoted by the game rules. This requirement shall not apply to graphical representations or simulations that are utilized for entertainment purposes only. The following shall apply to the simulation:

a) The probability of any event occurring in the simulation that affects the outcome of the game shall be analogous to the properties of the physical object;

b) Where the game simulates multiple physical objects that would normally be expected to be independent of one another based on the rules of the game, each simulation must be independent of any other simulations; and

c) Where the game simulates physical objects that have no memory of previous events, the behavior of the simulated objects must be independent of their previous behavior, so as to be non-adaptive and non-predictable, unless otherwise disclosed to the player.

4.5.3 ***Physics Engine.*** Games may utilize a "physics engine" which is specialized software that approximates or simulates a physical environment, including behaviors such as motion,

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gravity, speed, acceleration, inertia, trajectory, etc. A physics engine shall be designed to maintain consistent play behaviors and game play environment, unless an indication is otherwise provided to the player by the game artwork. A physics engine may utilize the random properties of an RNG to impact game outcome, in which case, the requirements found elsewhere in this standard under "Random Number Generator (RNG) Requirements" chapter shall apply.

NOTE: Implementations of a physics engine in a gaming device will be evaluated on a case-by-case basis by the independent test laboratory.

4.5.4 ***Live Game Correlation***. Unless otherwise denoted in the game artwork, where the gaming device offers a game that is recognizable as a simulation of a live casino game such as poker, blackjack, roulette, etc., the same probabilities associated with the live game shall be evident in the simulated game. For example, the odds of getting any particular number in roulette where there is a single zero (0) and a double zero (00) on the wheel, shall be 1 in 38; the odds of drawing a specific card or cards in poker shall be the same as in the live game.

4.5.5 ***Random Event Probability***. For games that incorporate a random event or an element of chance that affects the outcome, the mathematical probability of any chance event occurring for a paid game shall be constant, unless otherwise denoted by the game artwork.

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4.6 Game Types

4.6.1 ***General Statement***. This section is intended to define a baseline set of requirements for traditional types of games while recognizing that many variants of these same games are still permissible.

4.6.2 ***Card Game Requirements***. The requirements for games depicting cards being drawn from one or more decks are the following:

a) At the start of each game and/or hand, the cards shall be drawn from a randomly-shuffled deck(s). It is acceptable to draw random numbers for replacement cards at the time of the first hand's random number draw, provided that the replacement cards are sequentially used as needed, and so long as any stored RNG values are encrypted using a means approved by the regulatory body;
b) Cards once removed from the deck(s) shall not be returned to the deck(s) except as provided by the rules of the game;
c) The deck(s) shall not be reshuffled except as provided by the rules of the game;
d) The game shall alert the player as to the number of cards in a deck and the number of decks in play;
e) Card faces shall clearly display the card value and the suit; and
f) Jokers and wild cards shall be distinguishable from all other cards.

4.6.3 ***Poker Game Requirements.*** The following requirements apply only to simulations of poker games:

a) The artwork shall provide clear indication of what variant of poker is being played and the rules that apply;
b) Wild card rules shall be clearly explained in the help screens; and
c) Held and non-held cards, including recommended holds where allowed, shall be clearly marked on the screen. The method for changing a selected card state shall be clearly displayed to the player.

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4.6.4 ***<u>Blackjack Game Requirements</u>.*** The following requirements apply only to simulations of blackjack games:

a) Insurance rules shall be clearly explained, if insurance is available;
b) Pair split rules shall be explained to include:
   i. Split aces have only one card dealt to each ace, if this is the game rule;
   ii. Further splits, if available;
   iii. Double-down after splits, if available;
c) Double-down rules shall be clearly explained, including limitations of which totals may allow a double-down to be selected;
d) Any limits on the number of cards that may be drawn by player and/or dealer shall be explained, including winners declared (if any) when the limit is reached (e.g., five under wins);
e) Surrender rules, if any, shall be explained;
f) If pair splits have occurred, the results for each hand shall be shown (e.g., total points, resultant win or loss category, amount won, amount wagered);
g) Special rules, if any, shall be clearly explained; and
h) All player options that are available at any point in time shall be shown in the artwork.

4.6.5 ***<u>Ball Drawing Games</u>***. The requirements for games depicting balls being drawn from a pool are as follows:

a) Simulated balls shall be drawn from a randomly mixed pool consisting of the full set of balls applicable to the game rules;
b) At the start of each game, only the balls applicable to the game are to be depicted. For games with bonus features and additional balls that are selected, they shall be chosen from the original selection unless otherwise allowed for by the game rules;
c) The pool shall not be re-mixed except as provided by the rules of the game depicted; and
d) All balls drawn shall be clearly displayed to the player.

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4.6.6 ***Keno / Bingo / Lottery Game Requirements.*** The following requirements apply, as relevant to the specific game design, for simulations of keno, bingo, or lottery games, where balls are drawn and a player tries to pick in advance which of the balls will be selected:

a) All of the player's selections shall be clearly identified directly on the game screen. Where the game uses multiple player cards, it is acceptable for the player's selections to be accessible by flipping or switching through the cards;
b) The drawn numbers shall be clearly identified on the screen;
c) The game shall highlight numbers drawn which match the player's selections;
d) Special hits, if any, shall be clearly identified;
e) The screen must provide clear indication of how many spots were selected and how many hits were achieved; and
f) Rules for purchase of additional features of the game, if any, must be explained.

4.6.7 ***Roulette Game Requirements.*** The following requirements apply only to simulations of roulette games:

a) The method of selecting individual wagers shall be explained by the game rules;
b) The wager(s) already selected by the player shall be displayed on the screen; and
c) The result of each spin of the roulette wheel shall be clearly shown to the player.

4.6.8 ***Dice Game Requirements.*** The following requirements apply only to simulations of dice games:

a) Each die face shall clearly show the number of spots or other indication of the face value;
b) It must be obvious which is the up face on each die, after the dice are thrown; and
c) The result of each die shall be clearly visible or displayed.

4.6.9 ***Racing Game Requirements.*** The following requirements apply to simulations of racing games:

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a) Each participant in a race shall be unique in appearance;

b) The result of a race shall be clear and not open to misinterpretation by the player;

c) If prizes are to be paid for combinations involving participants other than solely the first place finisher, the order of the participants that can be involved with these prizes shall be clearly shown on the screen (e.g., result 8-4-7); and

d) The rules for any exotic wagering options (e.g.; perfecta, trifecta, quinella, etc.), and the expected payouts, shall be clearly explained in the artwork.

4.7 Game Outcome Using a Random Number Generator (RNG)

4.7.1 RNG and Evaluation of Game Outcome. The evaluation of game outcome using an RNG shall comply with the following rules:

a) Where more than one RNG is used to determine different game outcomes, each RNG shall be separately evaluated; and

b) Where each instance of an RNG is identical, but involves a different implementation within the game, each implementation shall be separately evaluated.

4.7.2 Game Selection Process. Determination of events of chance that result in a monetary award shall not be influenced, affected, or controlled by anything other than the values selected by an approved RNG, in accordance with the following requirements:

a) When making calls to the RNG, the game shall not limit the outcomes available for selection, except as provided for by game design;

b) The game shall not modify or discard outcomes selected by the RNG due to adaptive behavior. Additionally, outcomes shall be used as directed by the rules of the game;

c) After selection of the game outcome, the game shall not display a “near miss” where it makes a variable secondary decision which affects the result shown to the player. For example, if the RNG chooses a losing outcome, the game shall not substitute a different losing outcome to show to the player than that originally selected.

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d) Except as provided for by the rules of the game, events of chance shall be independent and shall not correlate with any other events within the same game, or events within previous games:

i. a game shall not adjust the likelihood of a bonus occurring, based on the history of prizes obtained in previous games;

ii. a game shall not adapt its theoretical return to the player based on past payouts; and

e) Any associated equipment used in conjunction with a gaming device shall not influence or modify the behaviors of the game's RNG and/or random selection process, except as authorized, or intended by design.

4.8 Game Payout Percentages, Odds, and Non-Cash Awards

4.8.1 ***Software Requirements for Percentage Payout***. Each game shall theoretically payout a minimum of seventy-five percent (75%) during the expected lifetime of the game. Progressives, bonus systems, merchandise, etc. shall not be included in the percentage payout if they are external to the game, unless required for operation.

a) Gaming devices that may be affected by player skill shall meet the requirements of this section when using an optimal method of play that provides the greatest return to the player over a period of continuous play.

NOTE: At the discretion of the regulatory agency, the independent test laboratory can apply an alternative approach to return percentage calculations.

b) The minimum percentage requirement of 75% shall be met for all wagering configurations. If a game is continuously played at any single bet level, line configuration, etc. for the life of the game, the 75% requirement must be satisfied.

4.8.2 ***Odds***. The odds of achieving any explicitly advertised award that is based solely upon chance shall occur at least once in every 100 million games. However an allowance shall be made for any advertised award that exceeds this odds requirement, provided that the game artwork prominently displays the actual odds of that award to the player. This rule shall apply to

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all wager categories that can win the advertised award. In the context of odds, an award shall be defined to be a credit prize, a multiplier, entry into a bonus game or feature, etc.

NOTE: Example - given an advertisement for a 100X multiplier, the evaluation shall assess the probability for a player to achieve the 100X multiplier and not an independent review identifying each of the potential values derived by combining the multiplier with every specifically advertised value with which it can multiply.

4.8.3 ***Limitations on Awards.*** Limitations on the prize amounts in lieu of merchandise, annuities, or payment plans shall be clearly explained to the player on the game that is offering such a prize.

4.9 Bonus/Feature Games

4.9.1 ***Bonus/Feature Game Requirements***. Bonus/feature games shall meet the following requirements:

a) A game which offers a bonus/feature game, other than those that occur randomly, shall display to the player sufficient information to indicate the current status towards the triggering of the next bonus/feature game;

b) If a bonus/feature game requires obtaining several achievements towards the activation of a feature, or the awarding of a bonus prize, the number of achievements needed to trigger the feature, or win the bonus prize, shall be indicated, along with the number collected at any point;

c) If a bonus/feature game allows the player to hold one or more reels/cards/symbols for the purpose of a respin or draw, then the held reels/cards/symbols must be clearly indicated and the method for changing holds shall be clearly explained to the player;

d) If a bonus/feature game is triggered after accruing a certain number of events/symbols or combination of events/symbols of a different kind over multiple games, the probability of obtaining like events/symbols shall not deteriorate as the bonus/feature game progresses, unless otherwise disclosed to the player;

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e) The bonus/feature game shall make it clear to the player that they are in a bonus or feature mode; and

f) If a bonus/feature game consists of multiple events or spins, then a counter shall be maintained and displayed to the player to indicate the number of spins initially awarded and the number of spins remaining during bonus play, or alternatively, the number of spins that have been played.

4.9.2 ***Player Selection or Interaction in Bonus/Feature Games***. All gaming devices which offer a bonus/feature game which requires player selection or interaction are prohibited from automatically making selections or initiating games or features, unless the gaming device meets one of the requirements listed below and explains the mechanism for automatic initiation or selection in the artwork:

a) The player is presented with a choice and specifically acknowledges their intent to have the gaming device auto-initiate the bonus/feature game by means of a button press or other player interaction;

b) The bonus/feature game provides only one choice to the player, i.e., press button to spin wheel. In this case, the device may auto-initiate the bonus/feature game after a time out period of at least two (2) minutes; or

c) The bonus/feature game is offered as part of community play that involves two or more players and where the delay of an offered selection or game initiation will directly impact the ability for other players to continue their bonus or extended feature. Prior to automatically making selections or initiating a community bonus or feature the player must be made aware of the time remaining in which they must make their selection or initiate play.

4.9.3 ***Extra Credits Wagered During a Bonus/Feature Game***. If a bonus or feature game requires extra credits to be wagered, and all winnings are accumulated from the base game and the bonus or feature game to a temporary "win" meter, rather than directly to the credit meter, the game shall:

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a) Provide a means where winnings on the temporary meter can be wagered (i.e., add credits to the credit meter) to allow for instances where the player has an insufficient credit meter balance to complete the bonus/feature, or allow the player to add money to the credit meter;

b) Transfer all credits on the temporary win meter to the credit meter upon completion of the bonus or feature game; and

c) Provide the player an opportunity not to participate.

4.10 External Device Bonus Games

4.10.1 External Device Bonus Game Requirements. Gaming device software that is supported by an external bonus device utilizing an independent RNG shall meet the following rules:

a) If the external device is used to display a bonus feature to the player, then the game or device shall display all relevant details of the bonus game including, when applicable, individual line wins, remaining free spins, multiplier values, bonus eligibility, bonus rules, bonus meters, and any other bonus detail not listed;

b) Changes to any configuration settings for the external bonus device shall be performed only by a secure means that is inaccessible to the player;

c) In the case that a bonus feature is offered with a timed eligibility period, changes to configuration settings shall not be allowed while there is time remaining for bonus eligibility, or while a gaming device is within a bonus feature;

d) If communications are lost between the gaming device and the external bonus device, or if the external device malfunctions, the game shall tilt, enter an unplayable state and display a suitable error condition which shall require operator intervention to clear;

e) If an eligible gaming device goes into an unplayable state once a bonus feature has been triggered, the player shall be given an opportunity to complete the bonus feature once the game returns to a playable state, or be awarded a calculated prize equivalent to their participation in the bonus, provided such an equivalent prize calculation is clearly disclosed to the player. Any tilt related to this error condition shall be cleared automatically or by an attendant, as appropriate. All instances of this behavior will be

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reviewed by the independent test laboratory to determine whether or not current technology is able to accommodate this requirement; and

f) The entire bonus game sequence including all bonus feature information shall be recallable in history and/or available through a maintained log for at least the last ten (10) bonus games. The necessary recall information shall be stored in the external bonus device and/or gaming device such that all information needed to completely and accurately reconstruct bonus game play is available. See also related requirements under "Game History Recall" section within this technical standard.

4.11 Double-Up / Gamble Features

4.11.1 Double-Up / Gamble Requirements. The following requirements apply to games which offer some form of a double-up or gamble feature. Such games may use alternative terminology such as "Triple-Up" or "Take-or-Risk" to describe a double-up or gamble feature.

a) All double-up / gamble feature instructions shall be fully disclosed in the game's artwork and must be accessible without committing to the feature;

b) Entry to a double-up / gamble feature shall only occur upon completion of a winning base game;

c) The player shall have a choice as to whether or not they want to participate in the double-up / gamble feature;

d) The double-up or gamble features shall have a theoretical return to the player of one hundred percent (100%);

e) The maximum number of double-ups / gambles available shall be clearly stated, or as a suitable alternative, the prize limit for double-up / gamble shall be disclosed to the player;

f) Only credits won on the primary game shall be available for wagering on a double-up / gamble feature, (i.e., it is not possible to wager any credits from the credit meter on double-up / gamble);

g) When the double-up / gamble feature is discontinued automatically before reaching the maximum number of double-ups / gambles available, the reason shall be clearly stated;

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h) Any game conditions during which the double-up / gamble feature is not available shall be specified;

i) If a double-up / gamble feature offers a choice of multipliers, it must be clear to the player what the range of choices and payouts are; and

j) If the player selects a multiplier for double-up / gamble, it must be clearly stated on the screen which multiplier has been selected.

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4.12 Mystery Awards

4.12.1 ***General Statement***. A mystery award is a prize paid by a gaming device that is not associated with a specific paytable combination.

4.12.2 ***Requirements for Mystery Awards.*** It is acceptable for games to offer a mystery award, however, the game artwork must indicate the minimum and maximum amounts that the player could potentially win. If the minimum amount that could potentially be awarded is zero, then it is not required to be explicitly displayed. If the value of the mystery prize depends on credits wagered, or any other factors, the conditions shall be clearly stated.

4.13 Multiple Games on the Gaming Device

4.13.1 ***General Statement.*** A multi-game is defined as a game which can simultaneously be configured for use with multiple themes and/or multiple paytables.

4.13.2 ***Selection of Game for Display***. The following rules apply to the selection of a specific game within a multi-game:

a) The methodology employed by a player to select a particular game for play on a multi-game gaming device shall be clearly explained to the player on the device;
b) The gaming device shall clearly inform the player of all games available for play;
c) The player shall at all times be made aware of which game has been selected for play and is being played;
d) When multiple games are offered for play, the player shall not be forced to play a game just by selecting a game title, unless the game screen clearly indicates the game selection is unchangeable. If not disclosed, the player shall be able to return to the main menu or game chooser screen prior to committing a wager;
e) It shall not be possible to select or start a new game before the current game cycle is completed and all relevant meters and game history have been updated, including

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features, double-up / gamble, and other options of the game, unless the action to start a new game terminates the current play in an orderly manner. This requirement is not intended to preclude or prohibit game designs that involve the simultaneous play of multiple games on a single gaming device. However, in such a case, metering and applicable limits and lockups shall be enforced against each available game, as it is played, and all other requirements within this chapter shall continue to apply to these multiple game-in-play designs;

f) The set of games or the paytable(s) offered to the player for selection can be changed only by a secure, certified method. This requirement shall not preclude the use of an identifier to alter a game or paytable. The rules outlined in "Configuration Settings" section of this document shall govern the NV memory clear requirements related to these types of changes. However, for games that keep the previous paytable's data in memory, an NV memory clear is not required; and

g) No changes to the set of games, or to the paytable(s) offered to the player for selection, are permitted while there are credits on the player's credit meter, or while a game is in progress. However, specific protocol features are permitted which allow such changes to be made in a controlled fashion, as defined by the protocol. Similarly, identifiers may be used to make such changes, subject to applicable logging and player disclosure requirements defined elsewhere in this standard.

4.14 Game Tokenization and Residual Credits

4.14.1 Tokenization. For gaming devices that support tokenization, the device shall receive monetary value from the credit acceptance device and post to the credit meter the entire amount inserted, and shall display any fractional credits, when applicable. However, it is alternately permissible for the gaming device to automatically issue a voucher that reflects any partial credits, rather than posting them to the credit meter. It is acceptable for the device to store the fractional credits if one of the following conditions is met:

a) The machine displays the current credit meter in local currency; or

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b) The machine informs the player that there are fractional credits stored on the device at an opportune time to avoid the possibility of the player walking away from the gaming device without such knowledge.

4.14.2 ***Credit Meter Display of Residual Credits***. If the current local currency amount is not an even multiple of the denomination for a game, or the credit amount has a fractional value, the credits displayed for that game may be displayed and played as a truncated amount, (i.e., fractional part removed). However, the fractional credit amount shall be made available to the player when the truncated credit balance is zero. The fractional amount is also known as 'residual credit'.

4.14.3 ***Residual Credit Removal.*** A residual credit removal feature is a player-selectable option that allows for the removal of credits left on the machine when there is a credit balance less than that which can be cashed out by the player using an available, configured payment device. If residual credits exist, the manufacturer may provide a residual credit removal feature, or return the gaming device to normal game play (i.e., leave the residual credits on the player's credit meter). The following rules shall apply to a residual credit removal feature when implemented:

a) Residual credits wagered by the residual credit removal play shall be added to the Coin-In meter;
b) If the residual credit removal play is won, the value of the win shall either:
   i. Increment the player's credit meter; or
   ii. Be automatically dispensed, and the value of the credits added to the Coin-Out meter;
c) If the residual credit removal play is lost, all residual credits are to be removed from the credit meter;
d) If the residual credits are cashed out rather than wagered, the gaming device shall update the relevant meters;
e) The residual credit removal play feature shall return at least seventy-five percent (75%) to the player over the life of the game;

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f) The player's current options and/or choices for residual credit removal shall be clearly displayed;

g) If the residual credit removal play offers the player a choice to complete the game, the player shall also be given the option of exiting the residual credit removal feature and returning to the previous game mode; and

h) The last game recall shall either display the residual credit removal play result or contain sufficient information, including metering, to derive the result.

4.15 Game Program Interruption and Resumption

4.15.1 Requirements for Game Interruption and Resumption. After a program interruption, the game software shall recover to the state it was in immediately prior to the interruption occurring. Where no player input is required to complete the game, it is acceptable for the game to return to a game completion state, provided the game history and all credit and accounting meters reflect a completed game.

4.15.2 Default Game Display. The default game display immediately following an NV memory reset shall not correspond to the highest advertised award. The default game display upon entering game play mode from a main menu or game chooser screen, shall not correspond to the highest advertised award. This applies to the base game only and not to any secondary bonus features.

4.16 Taxation Reporting Limits for Games

4.16.1 Game Taxation Lockup Requirements. If the award(s) from a single game cycle is in excess of any jurisdictional limit, including a taxation limit, that is defined/configured on the gaming device, the device shall cease play, display an appropriate message, and require attendant intervention to resolve player payment. It is permissible to provide a mechanism to accrue taxable winnings to a separate meter, however, this meter must not support any direct wagers.

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When the amount on the meter is collected by the player, the gaming device must still lock up as per the defined/configured limit required by the jurisdiction.

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4.17 Alternative Game Modes

4.17.1 ***Test/Diagnostic Mode***. Test/diagnostic mode (sometimes called demonstration or audit mode) allows an attendant to view game play mechanics, perform paytable tests, or execute other auditing and/or diagnostic functions supported by the machine. If test/diagnostic mode is supported, the following rules shall apply:

a) Entry to test/diagnostic mode shall only be possible using a secure means that is not accessible to the player.
b) If the gaming device is in a test/diagnostic mode, any test or diagnostic that incorporates credits entering or leaving the gaming device shall be completed prior to the resumption of normal game play operation.
c) If the device is in a test/diagnostic mode, the gaming device shall clearly indicate that it is in this mode, not normal game play.
d) When exiting from test/diagnostic mode, the game shall return to the original state it was in when the test/diagnostic mode was entered.
e) Any credits on the gaming device that were accrued during the test/diagnostic mode shall be automatically cleared when the mode is exited.

4.17.2 ***Attract Mode.*** This mode enables the gaming device to advertise game play to a potential player. If the gaming device supports an attract mode, the following rules apply:

a) A gaming device shall only enter attract mode when in an idle state and with no credits on the device;
b) Attract mode shall accurately reflect an available configuration for the game; and
c) Attract mode shall terminate automatically when any door is opened, or when any player input or credit acceptance device is activated.

4.17.3 ***Free Play Mode.*** Free play mode allows a player to participate in a game without placing a wager. If the gaming device supports a free play mode of operation, the following requirements apply:

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a) Free play games shall accurately represent the normal operation of a paid game. Games played in free play mode shall not mislead the player about the likelihood of winning any prizes available in the wagered version of the game;
b) Free play shall not be available for player selection when there are credits on the gaming device;
c) Free play mode shall be prominently displayed as such on the gaming device so a player knows at all times if/when this mode is active;
d) Free play mode shall not increment the credit meter;
e) Free play mode shall not increment any accounting meters. Specific meters are permissible for this mode provided the meters clearly indicate as such;
f) Free play mode shall exit automatically when credits are added to the gaming device, or shall be terminated whenever the player opts to exit this mode, or when the free play game(s) are concluded; and
g) When free play mode is exited, the game shall return to its previous state.

4.17.4 ***Autoplay Mode.*** Autoplay mode allows a gaming device to place wagers automatically without player interaction, once a denomination, wager, and other play attributes have been selected by the player. If the gaming device supports an autoplay mode, the following rules apply:

a) Autoplay shall be securely controlled using a jurisdictional program that either allows or disallows the feature, reflective of jurisdictional preference;
b) Autoplay mode may allow the player to choose the individual game wager, the number of autoplays, and/or the total amount to be wagered;
    i. All player-defined thresholds shall remain in effect for the duration of autoplay;
    ii. The gaming device shall display the number of autoplays remaining or the number used, reflective of a player-defined threshold;
    iii. Autoplay mode must end automatically and return to manual game play when player-defined thresholds are reached;

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c) Autoplay mode must offer the player an option to terminate the mode at the completion of a current game cycle, regardless of how many autoplay wagers they initially chose or how many remain; and

d) If player options are supported for autoplay mode, these options must default to the manual mode of game play.

4.18 Game History Recall

4.18.1 ***Number of Last Games Required***. Information on at least the last ten (10) games played on the gaming device shall be retrievable using an external key-switch or other secure method that is not available to the player.

4.18.2 ***Last Play Information Required***. Game recall shall consist of graphical, textual, or video content, or some combination of these options, so long as the full and accurate reconstruction of game outcome is possible. Game recall shall display the following information:

a) Date and time stamp;

b) The denomination played for the game, if a multi-denomination game type;

c) The display associated with the final outcome of the game, either graphically or via a clear text description;

d) The credit meter value at the start of play and/or at the end of play;

e) Any non-wager purchase that occurs during the recorded game;

f) Paytable identification, unless discernible from other screens or attendant menus;

g) Total amount wagered;

h) Total amount won;

i) Total amount collected after the end of a game, unless discernible from other screens or attendant menus;

j) The results of any player choices involved in the game outcome;

k) The results of any intermediate game phases, such as double up / gamble, residual credit removal, or bonus games; and

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l) If a progressive prize was won, an indication that the progressive was awarded.

NOTE: For "Last Play Information" stated above, it is allowable to display values in currency in place of credits.

4.18.3 ***Bonus Game Recall***. The ten (10) game recall shall reflect at least the last 50 events of completed bonus games. If a bonus game consists of 'x number of events,' each with separate outcomes, each of the 'x events', up to 50, shall be displayed with its corresponding outcome, regardless of whether the result was a win or loss.

4.19 Tournament Games

4.19.1 ***General Statement***. A tournament is an organized, measured event that permits a player to engage in competitive play against other players. Tournament play may be in-revenue or out-of-revenue.

4.19.2 ***Gaming Device Hardware for Tournaments.*** Gaming device hardware supporting tournament play shall comply with the "Machine Requirements" as set forth in this technical standard. All gaming devices used in a single tournament shall utilize similar hardware and electronics to ensure each player has the same chance of winning, unless otherwise disclosed.

4.19.3 ***Gaming Device Software for Tournaments***. Each gaming device may be equipped with a certified program, which allows for tournament mode play. All gaming devices used in a single tournament shall utilize similar software and game configuration settings to ensure each player has the same chance of winning, unless otherwise disclosed. If tournament is a configurable option for the gaming device, it shall be enabled by a regulator-approved and controlled method requiring operator intervention. The tournament option shall default to disabled.

4.19.4 ***Gaming Device Displays for Tournaments.*** The following requirements apply to information displays for a gaming device that supports tournament play, and/or information

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regarding a tournament that is otherwise provided to players via external signage, forms, or brochures available at the gaming venue:

a) All conditions players must meet to qualify for entry into the tournament, and advancement through it, shall be disclosed;
b) A message shall be prominently displayed on the gaming device informing the player that it is operating in a tournament mode;
c) For time-based tournaments, a timer shall be displayed to players to indicate the remaining period of play. If a tournament is based on some extended duration of play, or is initiated or concluded based upon the occurrence of a specific event, then this information shall be disclosed to the players;
d) Specific information pertaining to any single tournament shall be displayed to the players, including the available prizes or awards;
e) For tournaments with multiple awards, the distribution of funds based on specific outcomes shall be disclosed; and
f) At the conclusion of the tournament, the player rankings shall be displayed and the winner(s) notified.

4.19.5 ***Out-of-Revenue Tournaments.*** The following requirements apply to a gaming device offering out-of-revenue tournament game play:

a) While enabled for out-of-revenue tournament play, the gaming device shall not accept cash or currency from any source, nor shall the device issue payment; all credit acceptance devices shall be disabled. The gaming device shall utilize tournament-specific credits, points, or chips which shall have no cash value.

NOTE: Vouchers may be generated by the device while in the out-of-revenue tournament mode to serve as evidence of a player's achieved score or rank.

b) A gaming device shall not increment any accounting meters unless they are meters designed exclusively for use with tournament software. Additionally, the gaming device shall not communicate any tournament-related accounting information to the on-line

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system, if applicable, unless the tournament data is stored in separate records in the system.

c) If game history recall is utilized to record the outcome of tournament game play, this shall be clearly indicated within recall and any tournament recall data shall not overwrite any non-tournament game play recorded in game history.

d) The gaming device shall not impact the return percentage for the game, as the "Game Payout Percentages" requirements of this standard are waived for out-of-revenue tournament games.

4.19.6 In-Revenue Tournaments. The following requirements apply gaming devices supporting in-revenue tournament game play:

a) While enabled for in-revenue tournament play, the gaming device shall allow for cash or currency from any source to be present on the gaming device, subject to the rules and related internal controls for conducting the tournament.

b) In-revenue tournament games shall increment the appropriate gaming device electronic meters during play. Additionally, the gaming device shall communicate this accounting information to the on-line system, when such a compatible system and protocol is supported.

c) Game history recall shall be utilized to record the outcome of in-revenue tournament game play, and this shall be clearly indicated within recall. Any tournament recall data shall not overwrite any non-tournament game play recorded in game history.

4.19.7 Remotely-Initiated Tournaments. The following requirements apply to gaming devices which support tournament play that is controlled remotely:

a) The player shall be provided with an option on whether or not to participate. If/when opting in, the player must be able to complete their non-tournament game prior to entering the tournament mode of play, unless the gaming device supports simultaneous tournament and non-tournament modes of play.

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b) If the gaming device is in an error condition or handpay condition, that condition must be cleared prior to entering tournament mode.

c) When exiting tournament mode, the gaming device shall return to the original state it was in prior to entering the tournament mode.

d) Any tournament-specific game meters displayed to the player by the gaming device shall be automatically cleared when the tournament mode is exited.

4.20 Games with Skill

4.20.1 General Statement. A game with skill contains one or more elements in its design which can be leveraged by a player to impact the return percentage. Skill means the human attributes of a player such as knowledge, dexterity, visual recognition, logic, memory, reaction, strength, agility, athleticism, hand-to-eye coordination, numerical and/or lexical ability, or any other ability or expertise relevant to game play.

NOTE: This technical standard is not intended to classify a game as a "skill game" or to serve as a legal basis for game classification within the context of skill. Such classifications will be subject to interpretation by the regulatory body.

4.20.2 Display for Games with Skill. A game with skill shall conform to applicable display requirements found in related sections of this standard for "Game Information and Rules of Play", "Information to be Displayed", and "Game Fairness". In addition, the supplemental requirements defined within this section shall apply to games with skill to ensure player fairness and clarity with respect to player notification.

4.20.3 Disclosure for Games with Skill. Any game with skill where there is a potential for the style or method of play to result in the game falling below the minimum theoretical return of 75%, shall prominently disclose that the outcome is affected by player skill. This disclosure must be prominently displayed on the gaming device prior to committing a wager. This requirement shall not apply to traditional casino games (e.g., poker, blackjack, etc.).

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4.20.4 ***Player Versus Player (PVP) Advantage Feature.*** A game with skill may contain a feature that allows a player or players to gain an advantage over other players, provided that the gaming device:

a) Clearly describes to all players that the feature is available and the advantage it offers;
b) Discloses the method for obtaining the feature, including any required wager; and
c) Provides players with sufficient information to make an informed decision, prior to game play, as to whether or not to compete against another player(s) who may possess such a feature.

4.20.5 ***Virtual Opponent.*** Games with skill may offer a player the opportunity to compete against a virtual opponent provided that the gaming device:

a) Clearly and prominently discloses when a virtual opponent is participating; and
b) Prevents the virtual opponent from utilizing privileged information of the live player upon which a decision is made, unless otherwise disclosed to the player.

4.20.6 ***Outcome for Games with Skill.*** Except as otherwise disclosed to the player, once a game with skill is initiated, no function of the gaming device related to game outcome shall be altered during play. Additionally, in the event that available paytables or rules of play change between games, notice of the change shall be prominently displayed to the player through the game artwork. An example of the latter case might be the use of an identifier to change the paytables available to the player during the course of play.

4.20.7 ***Actual Return Percentage for Games with Skill.*** A game with skill shall support the ability for the regulatory body or operator to securely examine the actual return percentage on-demand, via a direct interface with the metering/accounting of the gaming device, and/or via secure communications with an external system.

4.20.8 ***Odds for Skill-Based Awards.*** Each advertised skill-based award shall be available to

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be achieved by a player. For skill-based awards that incorporate an element of chance, the opportunity to achieve the advertised award shall occur at least once in every 100 million games. However, an allowance shall be made for any such advertised award that exceeds this odds requirement, provided that the game artwork prominently displays the actual odds of that award to the player.

4.20.9 Player Advice Features. A game containing a skill element may support a feature that offers advice, hints, or suggestions to a player. An illustrative example might be a trivia game that provides hints, clues, or other player assistance in making a selection. A game with skill may support player advice features provided that it conforms to the following requirements:

a) The player advice feature shall clearly describe to the player that it is available and what options exist for selection;
b) Any player advice that is offered to the player for purchase shall clearly disclose the cost and benefit;
c) The player advice shall not be misleading or inaccurate, and must reflect the rules of play for the game, while noting that the game rules may change as a function of the advice offered, providing any such changes are disclosed to the player prior to acceptance of the advice;
d) The game design shall prevent access to any "information store" such that data related to the skill element is not readily available through software tampering (for example, a trivia game shall prevent access to an answers database);
e) The player advice feature shall allow the player the option of accepting the advice, and must not force the player to accept the assistance unless it reflects the only possible option for the player to pursue at the time; and
f) The availability and content of player advice shall remain consistent unless otherwise disclosed and must not adapt in a way that disadvantages the player based upon prior game play or game events.

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NOTE: It is recommended that the gaming device support a secure option to enable or disable player advice to accommodate regulatory bodies that may either allow or prohibit this type of feature.

4.20.10 ***Peripheral Devices Used with Games Containing Skill.*** If unique peripherals (e.g., joysticks, game controllers, camera systems, sound systems, motion sensors, image sensors, accelerometers, etc.) are employed by the gaming device to support skill, then the game must provide adequate and clear instruction on their purpose, usage, and effect.

4.20.11 ***Game Recall for Games with Skill.*** Games with skill shall maintain all information necessary to adequately reconstruct the last ten (10) gaming sessions, consistent with recall requirements stated within the section entitled "Last Play Information Required". A "gaming session" is defined as the period of time commencing when a player initiates a game or series of games on a gaming device by committing a wager, and ending at the time of a final game outcome for that game or series of games and coincident with the opportunity for the player to retrieve their credit balance. Some combination of text, logs, video, graphics, screen captures, or other means (e.g., "flight recorder" mechanism) shall be used to reconstruct the game outcome and/or player actions, provided that game history recall is sufficient to reconstruct game play. Additionally, for any game with skill that offers player advice, game recall shall reflect that information.

4.20.12 ***Interruption and Resumption for Games with Skill.*** After a program interruption, a game with skill shall recover to the state it was in before the interruption, unless the game artwork clearly discloses any superseding terms and conditions for game recovery. This disclosure must be available to the player prior to play of the game.

4.21 Persistence Games

4.21.1 ***General Statement.*** A persistence game is associated with a unique attribute (e.g., player ID, game or device ID, etc.) and incorporates a feature that enables progress towards the award

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of game play enhancements and/or bonuses through the achievement of some designated game outcome. These additional offerings become available when the player has achieved specific thresholds defined for game play. Each designated outcome advances the state of the persistence game. Multiple plays of a game are usually necessary to trigger the persistence award. The persistence feature is typically provided through a persistence game controller associated with a single gaming device, bank of devices, or linked system.

4.21.2 Persistence Game Thresholds. A persistence game shall recognize a particular attribute for the purpose of restoring previously-earned thresholds during each subsequent visit to a gaming device. A gaming device participating in a persistence game shall contain in its help screens, a clear description of each persistence game-related feature and/or function, and the requirements for achieving persistence game thresholds, as well as information regarding how the player restores previously-earned thresholds (using a login/password, ticket, etc.). Additionally, players shall be notified each time a persistence game threshold has been achieved.

4.21.3 Play from Save. Play from save is a feature utilized in some persistence game designs where complexity increases, or additional elements are added to the game, as play continues. Additionally, play from save allows the player to save a persistence game at critical points (i.e., save points), typically after some accomplishment or goal has been achieved. The player can resume game play from that point at a later date, and continue on to the next goal. The following requirements apply to play from save:

a) Prizes awarded or made available for reaching a save point shall be clearly defined and displayed to the player prior to placing any wager. If a random type award may be won, the details and all possible payouts shall be displayed to the player;
b) The game shall provide a suitable notification to the player whenever a designated save point is reached during play;
c) If game rules or awards change as different levels are reached during play from save activity, these changes must be clearly displayed to the player; and

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d) If the play from save state is not indefinitely maintained, then the game shall provide an indication to the player of any limitation and/or expiration of saved data that is stored for use in supporting game play at a later period in time.

4.21.4 Loss of Communications or Malfunction. The gaming device shall adhere to the following requirements for a loss of communication or critical controller malfunction during persistence game play:

a) For cases where the persistence game controller stores critical data, a gaming device shall tilt and become unplayable when there is a loss of communication with the persistence game controller, or if there is a critical controller malfunction. The gaming device must inform the player if persistence game play is disabled. For cases where the persistence game controller does not store any critical data and there is a loss of communication or controller malfunction, the gaming device shall continue operation but must still inform the player if persistence game play has been disabled; and

b) A gaming device shall resume the persistence game play from the point of interruption when the communication is restored, or the controller malfunction is cleared; or

c) A gaming device shall allow persistence game play to continue if the controller communicates the award thresholds to the device prior to the communication loss or controller malfunction; the gaming device may continue operating if it is capable of determining the trigger for the persistence award while operating independently. The gaming device shall clearly notify the player when it is operating independently.

4.22 Community Bonus Games

4.22.1 General Statement. Gaming devices may support community bonus games where a bank of machines is connected to a controller that allows players to collaborate and/or compete for a shared prize.

4.22.2 Community Bonus Game Controller Error. When an error occurs that impacts the integrity of play on the community bonus game controller, all participating gaming devices shall

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be disabled, or alternatively, the gaming device shall provide the players the option of waiting for the error to be cleared, or to forego the community bonus by providing another non-community bonus game for play that affords a comparable return percentage. A clear and unambiguous error or tilt message that explains the stoppage of game play and error handling shall be displayed on each of the interconnected gaming devices and/or any overhead or shared display, as applicable to the implementation.

4.22.3 ***Loss of Communications.*** The gaming device shall adhere to the following requirements for a loss of communications during community bonus game play:

a) A gaming device connected to a community bonus game controller shall tilt and become unplayable when there is a loss of communication between the gaming device and the controller. The gaming device must inform the player if community bonus game play is disabled; and

b) A gaming device shall resume the community bonus game play from the point of interruption when the communications have been restored; or

c) A gaming device shall allow community bonus game play to continue if the controller communicates the award to the gaming device prior to the communication loss. The gaming device may continue operating if it is capable of functioning independently. The gaming device shall clearly notify the player when it is operating independently.

4.22.4 ***Community Bonus Event Recall.*** Outcomes for at least the last ten (10) community bonus events shall be recallable in game history and/or available through a maintained recall log. The necessary recall information shall be stored in the gaming device and/or in the community bonus controller. See also related requirements found under the "Game History Recall" section within this technical standard.

4.23 Virtual Event Wagering

4.23.1 ***General Statement.*** Virtual event wagering allows for the placement of wagers on simulations of sporting events, contests, and races whose results are based solely on the output of

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an approved Random Number Generator (RNG). Nothing in this section should be interpreted as being applicable to live event wagering.

4.23.2 Randomization and Virtual Events. The RNG utilized in virtual event wagering shall comply with applicable requirements as found within the "Random Number Generator (RNG) Requirements" chapter and "Game Outcome Using a Random Number Generator" section of this technical standard. Additionally, the following rules apply specific to virtual event wagering:

a) It shall not be possible to ascertain the outcome of the virtual event prior to its commencement; and
b) Subsequent to the commencement of a virtual event, no subsequent actions or decisions shall be made that change the behavior of any of the elements of chance within the virtual event, other than player decisions.

4.23.3 Virtual Event Display. A virtual event game shall conform to applicable display requirements of this standard as found in the sections entitled "Game Information and Rules of Play", "Information to be Displayed", and "Game Fairness". In addition, the following display requirements apply:

a) The player shall be able to view information on all available events and wager types prior to placing a wager. Wagering types may include parlay bets. The description of each wager type shall include all available betting options for that wager type.
b) Statistical data that is made available to the player pertaining to the virtual event shall not misrepresent the capabilities of any virtual participant. This does not prevent the use of an element of chance or randomness from impacting performance of the virtual participant during the virtual event game.
c) For scheduled virtual events, a countdown of the time remaining to place a wager in that event shall be displayed to the player. It shall not be possible to place wagers on the event once this time has passed, however, this requirement does not prohibit the implementation of in-play wagers.

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d) If a wager involves combining events (i.e., parlay bets), such combinations shall be clearly explained to the player.

e) There shall be a clear indication provided to the player that a wager has been accepted by the gaming device.

f) A confirmation containing details of the actual wager accepted shall be provided to the player.

g) The artwork shall clearly explain whether the odds/payouts are locked-in at the time of the wager, or if the odds/payouts may change dynamically prior to the commencement of the virtual event.

h) The rules available to the player must clearly state the means by which a winning wager is determined and shall clearly state the handling of an award in any case where a tie is possible.

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CHAPTER 5: ACCOUNTING AND METERING REQUIREMENTS

5.1 Accounting and Metering

5.1.1 ***Introduction.*** This chapter sets forth the various metering and accounting requirements for gaming devices.

5.2 Credit Meter

5.2.1 ***Credit Meter Units and Display***. At a minimum, a credit meter shall be visible to the player at any time a wager may be placed, at any time a cashout is allowed, or at any time the meter is actively being incremented or decremented. Additionally, the credit meter shall conform to the following requirements:

a) The credit meter shall be displayed in credits or local currency format, and shall at all times it is shown, indicate all credits or local currency value available for the player to wager or cashout, with the exception of when the player is viewing an informational screen such as a menu or help screen item;

b) If the game's credit meter allows for toggling between credits and currency, this functionality shall be easily understood by the player; the credit meter shall clearly indicate whether credits or currency are being displayed;

c) The credit meter shall be displayed to the player unless a tilt condition or malfunction exists that impacts its proper display; and

d) Any player-selectable option to hide the display of the credit meter must be securely configurable on the gaming device and default to disabled.

5.2.2 ***Credit Meter Incrementation***. The value of every prize at the end of a game shall be added to the player's credit meter, except for handpays or merchandise.

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5.2.3 ***Credit Meter Decrementation***. Credits wagered or committed at any point at the start of, or within the course of, play shall be immediately subtracted from the player's credit meter.

5.2.4 ***Credit Meter for Progressives.*** Progressive awards may be added to the credit meter if either:

a) The credit meter is maintained in the local currency amount format;
b) The progressive meter is incremented in whole credit amounts; or
c) The progressive prize in local currency amount format is converted properly to credits upon transfer to the player's credit meter in a manner that does not mislead the player.

5.3 Collect Meter

5.3.1 ***Collect Meter***. There shall be a collect meter which will show the number of credits or cash collected by the player upon a cashout**.** This meter may include handpays. The collect meter must adhere to the following requirements:

a) The collect meter shall be displayed to the player upon a cashout event unless a tilt condition or malfunction exists, or unless the player opts to view an informational screen such as a menu or help screen item; and
b) The number of credits or cash collected shall be subtracted from the player's credit meter and added to the collect meter.

5.4 Electronic Accounting and Occurrence Meters

5.4.1 ***Electronic Accounting Meters***. Electronic accounting meters shall be at least ten (10) digits in length. These meters shall be maintained in credit units equal to the denomination, or in local currency. If the meter is being used in dollars and cents format, eight (8) digits must be

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used for the dollar amount and two (2) digits used for the cents amount. Devices configured for multi-denomination play shall display the units in local currency. The meter must automatically roll over to zero once its maximum logical value has been reached. Meters shall be labeled so they can be clearly understood in accordance with their function. The required electronic accounting meters are as follows:

a) Credits Bet (Coin In). The gaming device must have a meter that accumulates the total value of all wagers, whether the wagered amount results from the insertion of coins, tokens, currency, deduction from a credit meter or any other means. This meter shall:
   i. Not include subsequent wagers of intermediate winnings accumulated during game play such as those acquired from "double up" games; and
   ii. For chance-based slot machine paytables with a difference in theoretical payback percentage which exceeds 4 percent between wager categories, the gaming device shall maintain and display coin in meters and the associated theoretical payback percentage, for each wager category with a different theoretical payback percentage, and calculate and display a weighted average theoretical payback percentage for that paytable. (*NOTE: Wager categories, as used above, do not apply to keno games or games with skill.*)

b) Credits Won (Coin Out). The gaming device must have a meter that accumulates the total value of all credits directly paid by the device as a result of winning wagers, whether the payout is made from the hopper, to a credit meter or by any other means. This meter will not record credits awarded as the result of an external bonusing system or a progressive payout;

c) Coin Drop. The gaming device must have a meter that accumulates the total value of coins or tokens diverted to the drop box;

d) Attendant Paid Jackpots. The gaming device must have a meter that accumulates the total value of credits paid by an attendant resulting from a single game cycle, the amount of which is not capable of being paid by the gaming device itself. This meter will not record credits awarded as the result of an external bonusing system or a progressive payout. This meter is only to include awards resulting from specifically identified amounts listed in the manufacturer's par sheet. Awards which are keyed to the credit

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meter shall not increment this meter, but shall instead increment the Coin Out or Credits Won meter;

e) Attendant Paid Cancelled Credits. The gaming device must have a meter that accumulates the total value paid by an attendant or by system-based command and which results from a player initiated cash-out that exceeds the physical or configured capability of the device to make the proper payout amount;

f) Physical Coin In. The gaming device must have a meter that accumulates the total value of coins or tokens inserted into the device;

g) Physical Coin Out. The gaming device must have a meter that accumulates the value of all coins or tokens physically paid by the device;

h) Bill In. The gaming device must have a meter that accumulates the total value of currency accepted;

i) Ticket-In or Voucher In. The gaming device must have a meter that accumulates the total value of all wagering vouchers accepted by the device;

j) Ticket-Out or Voucher Out. The gaming device must have a meter that accumulates the total value of all wagering vouchers issued by the device;

k) Electronic Funds Transfer In (EFT In). The gaming device must have a meter that accumulates the total value of cashable credits electronically transferred from a financial institution to the gaming device through a cashless wagering system;

l) Cashless Account Transfer In (Wagering Account Transfer In or WAT In). The gaming device must have a meter that accumulates the total value of cashable credits electronically transferred to the gaming device from a wagering account by means of an external connection between the device and a cashless wagering system;

m) Cashless Account Transfer Out (Wagering Account Transfer Out or WAT Out). The gaming device must have a meter that accumulates the total value of cashable credits electronically transferred from the gaming device to a wagering account by means of an external connection between the device and a cashless wagering system;

n) Non-Cashable Electronic Promotion In (NCEP In). The gaming device must have a meter that accumulates the total value of non-cashable credits electronically transferred to the gaming device from a promotional account by means of an external connection between the device and a cashless wagering system;

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o) Cashable Electronic Promotion In (CEP In). The gaming device must have a meter that accumulates the total value of cashable credits electronically transferred to the gaming device from a promotional account by means of an external connection between the device and a cashless wagering system;

p) Non-Cashable Electronic Promotion Out (NCEP Out). The gaming device must have a meter that accumulates the total value of non-cashable credits electronically transferred from the gaming device to a promotional account by means of an external connection between the device and a cashless wagering system;

q) Cashable Electronic Promotion Out (CEP Out). The gaming device must have a meter that accumulates the total value of cashable credits electronically transferred from the gaming device to a promotional account by means of an external connection between the device and a cashless wagering system;

r) Cashable Promotional Credit Wagered. If supported by function, the gaming device must have a meter that accumulates the total value of promotional cashable credits which are wagered. This includes credits that are transferred to the machine electronically or through the acceptance of coupon or voucher;

s) Coupon Promotion In. The gaming device must have a meter that accumulates the total value of all gaming device promotional coupons accepted by the device;

t) Coupon Promotion Out. The gaming device must have a meter that accumulates the total value of all gaming device promotional coupons issued by the device;

u) Machine Paid External Bonus Payout. The gaming device must have a meter that accumulates the total value of additional amounts awarded as a result of an external bonusing system and paid by the device;

v) Attendant Paid External Bonus Payout. The gaming device must have a meter that accumulates the total value of amounts awarded as a result of an external bonusing system paid by an attendant. Bonus payouts which are keyed to the credit meter, shall not increment this meter, but instead shall be metered to Machine Paid External Bonus Payout;

w) Machine Paid Progressive Payout. The gaming device must have a meter that accumulates the total value of credits paid as a result of progressive awards paid directly

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by the device. This meter does not include awards paid as a result of an external bonusing system;

x) Attendant Paid Progressive Payout. The gaming device must have a meter that accumulates the total value of credits paid by an attendant as a result of progressive awards that are not capable of being paid by the device itself. Progressive payouts which are keyed to the credit meter shall not increment this meter, but shall instead be metered to Machine Paid Progressive Payout. This meter shall not include awards paid as a result of an external bonusing system;

y) Non-Wager Purchase. The gaming device that makes use of a non-wager purchase must have a meter that accumulates all credits deducted from the credit meter paid for such purchase. A non-wager purchase is a purchase made by the player that debits the credit meter and which is used for entertainment purposes only and does not influence the outcome of the game; and

z) Other Meters. A gaming device that allows for additions to, or deductions from, the credit meter, that would not otherwise be metered under any of the above electronic accounting meters, must maintain sufficient meters to properly reconcile all such transactions.

NOTE: Any accounting meter that is not supported by the functionality of the gaming device, is not required to be implemented by the supplier.

5.4.2 Electronic Occurrence Meters. Occurrence meters shall be at least eight (8) digits in length however, are not required to automatically roll over. Meters shall be labeled so they can be clearly understood in accordance with their function. The required electronic occurrence meters are as follows:

a) Games Played. The gaming device must have meters that accumulates the number of games played:

i. Since power reset;

ii. Since external door close; and

iii. Since game initialization (NV memory clear);

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b) External Doors. The machine must have meters that accumulate the number of times any external door that allows access to the locked logic area or currency compartment (e.g., main or belly door, drop box door, currency area with an external door, etc.) was opened since the last NV memory clear, provided power is supplied to the device.

c) Stacker Door. The gaming device must have a meter that accumulates the number of times the stacker door has been opened since the last NV memory clear provided power is supplied to the device;

d) Progressive Occurrence. There must be a meter that accumulates the number of times each progressive is awarded. This rule requires that the controller, whether internal to the gaming device itself, or external, shall support this occurrence meter for each progressive level offered;

e) Bill Denomination. The gaming device must have a specific occurrence meter for each denomination of currency accepted by the bill validator; and

f) Vouchers/Coupons Accepted. The gaming device must have a specific occurrence meter that records the number of all other notes not including bills, such as wagering vouchers and coupons, accepted by the bill validator.

NOTE: Any occurrence meter that is not supported by the functionality of the gaming device, is not required to be implemented by the supplier.

5.5 Paytable-Specific Meters

5.5.1 Paytable-Specific Meters. In addition to the electronic accounting meters required above, each individual game available for play shall have the paytable-specific meters 'Credits Bet' and 'Credits Won' in either credits or local currency. Even if a double-up or gamble game is lost, the win amount and the credits bet amount for the primary game shall be recorded in the paytable-specific meters. Additionally, it is recommended that the game support paytable-specific meters for "Number of Games Played".

NOTE: Primary game is defined to be the base game and includes amounts won from free spins, bonus games, etc. before the double up game or gamble game is played.

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5.6 Double Up or Gamble Meters

5.6.1 ***Double-Up / Gamble Meters.*** For each type of double-up or gamble feature offered, there shall be sufficient meters to determine the feature's actual return percentage, which shall increment accurately every time a double-up or gamble play concludes, including:

a) Double-up / gamble amount wagered;
b) Double-up / gamble amount won;
c) Double-up / gamble games played; and
d) Double-up / gamble games won.

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GLOSSARY OF KEY TERMS

Advertised Award – A term describing a prize that can be awarded by a gaming device and which is explicitly advertised to the player in the game artwork.

Alarm – An audible alert provided by a gaming device that can be heard in a typical operating environment and which is intended to notify responsible personnel to various error conditions that may exist for the device.

Alterable Media – Physical storage media for control programs that can be altered or modified when installed and operating in-circuit within the gaming device. From a practical standpoint, media that is rendered read-only or unalterable by a hardware or software means when installed and operating is not considered alterable media.

Alternative Game Mode – Any mode of a gaming device other than the normal mode of game play. This includes modes such as attract, test/diagnostic, autoplay, idle, and free play.

Artwork – The graphics, thematic art, helpscreens, and other textual information that is shown to a player by way of a game's payglass and/or video display(s).

Attendant Paid Jackpot - Credit value paid by an attendant resulting from a single game cycle, the amount of which is not capable of being paid automatically by the gaming device itself.

Attendant Paid Cancelled Credits - Credit value paid by an attendant resulting from a player initiated cash-out that exceeds the physical or configured capability of the device.

Attract Mode - Visual and/or audible options intended to attract players when the machine is in the idle mode (i.e., no active credits or gameplay).

Autoplay Mode – A player-selectable mode of a gaming device that allows a player to place wagers automatically without any manual interaction, once a denomination, wager, and other play attributes have been selected for game play.

Background Cycling (for RNG) – A process whereby an RNG continues to generate random numbers at a programmed rate during periods where its output is not actively being used to produce game outcomes.

Barcode – An optical machine-readable representation of data. A good example is a barcode found on printed vouchers.

Barcode Reader – A device that is capable of reading or interpreting a barcode. This may extend to some smartphones or other electronic devices that can execute an application to read a barcode.

Bill In - The total value of all currency accepted by a gaming device bill validator.

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Bill Validator – A peripheral component used on a gaming device that is capable of accepting paper currency, tickets, and other approved notes in exchange for credits on the credit meter.

Bluetooth - A low power, short-range wireless communications protocol utilized for the interconnection of cellular phones, computers, and other electronic devices, including gaming devices. Bluetooth connections typically operate over distances of 10 meters or less and rely upon short-wavelength radio waves to transmit data over the air.

Card Reader –A gaming device peripheral that reads data embedded on a magnetic strip, or stored in an integrated circuit chip, for the purpose of player identification.

Cashless Account Transfer In/Out - Cashable credits electronically transferred to/from the gaming device from a wagering account by means of an external connection between the device and a cashless wagering system.

Cashable Promotional Credit Wagered - The total value of promotional cashable credits which are wagered.

Cashable Electronic Promotion - Cashable credits electronically transferred to/from a gaming device from/to a promotional account.

CFast, *CompactFast* - A variant of a Compact Flash based on a serial ATA interface rather than the parallel ATA used by CF Cards.

CF Card, *Compact Flash* - A small removable mass storage device that relies on flash memory technology. A CF card is a storage technology that does not require a battery to retain data indefinitely.

Coin Acceptor – A gaming device peripheral that accepts coins or tokens in exchange for credits. The coin-in assembly receives, verifies, counts and appropriately routes coins deposited into the machine.

Coin Drop - Total coins or tokens diverted to the drop box.

Collect Meter - A meter which shows the number of credits or cash collected by a player upon cashout.

Community Bonus – A type of bonus play where a bank of machines is connected to a controller that allows players to collaborate and/or compete for a shared prize.

Coupon – A printed or virtual wagering instrument that is used primarily for promotional purposes and which can be redeemed for restricted or unrestricted credits.

CPU, *Central Processing Unit* – An electronic component of a gaming device, more commonly called the processor, which consists of a control unit and arithmetic logic unit and which is located on a circuit board housed within the secure logic area of the gaming device. The CPU performs arithmetic and logic functions and decodes and executes game program instructions.

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CRC, *Cyclic Redundancy Check* – A software algorithm used to verify the accuracy of data during its transmission, storage, or retrieval. The algorithm is used to validate or check the data for possible corruption or unauthorized changes.

Credit Meter - A meter which maintains the credits or cash available to the player for the commitment of a wager.

Critical Control Program – A software program that controls gaming device behaviors relative to any applicable technical standard and/or regulatory requirement.

Critical Non-Volatile (NV) Memory – Memory used to store all data that is considered vital to the continued operation of the gaming device including, but not limited to, data elements such as electronic accounting and metering, current credits, configuration data, game recall, significant events, last normal game and machine state, paytable information, etc.

Cryptographic RNG - An RNG which is resistant to attack or compromise by an intelligent attacker with modern computational resources, and who has knowledge of the source code of the RNG and/or its algorithm. Cryptographic RNGs cannot be feasibly 'broken' to predict future values.

Direct Cryptanalytic Attack - An RNG attack whereby the attacker, given a sequence of past values produced by an RNG, is able to predict or estimate future RNG values.

Direction Detector - A device which can determine the direction and speed of coin/token travel in a coin acceptor.

Diverter - The portion of the coin-in assembly that channels coins to either the hopper or the drop box.

Double-Up (aka "Gamble") – An extended game play feature available to a player to double or risk current winnings.

Drop Box – A secure container housed within a gaming device cabinet that collects coins when the hopper is full or when the diverter directs coins to it.

EFT, *Electronic Funds Transfer; ECT, Electronic Credits Transfer* - EFT (or ECT) is a system by which currency can be electronically transferred to or from a gaming device in the form of credits. EFT requires some form of communication between the gaming device and a host system.

Electronic Accounting Meter (aka "Software Meter" / "Soft Meter") – An accounting meter that is implemented in the main program software of a gaming device.

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EMC, *Electromagnetic Compatibility* - The principal in which any electronic or electrical appliance should be able to operate without causing, or being affected by, electromagnetic interference.

EMI, *Electromagnetic Interference* - Any electromagnetic disturbance that interrupts, obstructs, or otherwise degrades or limits the effective performance of electronics and electrical equipment.

EPROM, *Erasable Programmable Read-Only Memory* - A memory chip that holds its content without power and can be erased using ultraviolet light, or reprogrammed external to the gaming device using a special tool.

ESD, *Electro-Static Discharge* - The release of static electricity when two objects come into contact. It is the sudden flow of electricity between two electrically charged objects caused by contact, an electrical short, or a dielectric breakdown.

Firewall – A component of a computer system or network that is designed to block unauthorized access or traffic while still permitting outward communication.

Firmware - Programs stored permanently in read-only memory (ROM).

Flight Recorder – A term used to describe game recall functionality that records various player physical actions and correlates them in time to other game inputs such as touch screen activations, button presses, etc. in order to more fully reconstruct the outcome of game play. When used in conjunction with a game containing a physical skill element, such functionality may be especially useful for recording/documenting aspects of game history specific to a player's physicality, dexterity, motions, or gestures.

Free Play Mode – A gaming device mode that allows a player to participate in a game without placing any wager, principally for the purpose of learning or understanding game play mechanics.

Gamble Feature - see "Double-Up".

Game Cycle - A game cycle is defined as "wager to wager". The cycle is the period from an initial wager to the point of the final transfer to the player's credit meter, or when all credits wagered are lost.

Game with Skill - A wagered game in which the skill of the player, rather than pure chance, is a factor in affecting the outcome of the game as determined over a period of continuous play. A game with skill contains one or more elements of skill in its design which can be leveraged by a player to impact the return percentage.

Gaming Device (aka, machine, terminal) – An electronic or electro-mechanical device that at a minimum will utilize an element of chance, skill, or strategy, or some combination of these elements in the determination of prizes, contain some form of activation to initiate the selection process, and makes use of a suitable methodology for delivery of the determined outcome.

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Gaming Session – The period of time commencing when a player initiates a game or series of games on a gaming device by committing a wager and ending at the time of a final game outcome for that game or series of games and coincident with the opportunity for the player to retrieve their credit balance.

Hardware-Based RNG – An RNG that derives its randomness from small-scale physical events such as electric circuit feedback, thermal noise, radioactive decay, photon spin, etc.

Hash Algorithm - A function that converts a data string into a numeric string output of fixed length.

Hopper - An electromechanical assembly inside the machine that receives, holds and dispenses coins. When the hopper is full, coins are diverted to the drop box.

Identifier - Any specific and verifiable fact concerning a player or group of players which is based upon objective criteria relating to the player or group of players and which may be utilized to affect some prescribed change to a game or gaming device configuration.

Idle Mode – A gaming device mode that exists when the machine is not being played and no credits exist on the credit meter.

In-Play Wager – A wager that is placed while a virtual event is in-progress or actually taking place.

Integrated Player Identification Component – An integrated player identification component is an electronic device controlled by a machine's critical control program which provides a means for players to enter their secure identification information. Examples include a card reader, a barcode reader, or a biometric scanner.

Jumper – A removable connector (plug, wire, etc.) that electrically joins together or short-circuits two separate physical connections.

Known Input Attack - An RNG attack whereby the attacker is able to compromise an RNG by determining or estimating the state of the RNG after initial seeding.

Logic Area / Logic Box - A separately locked area of a gaming device which houses electronic components that have the potential to influence the outcome or integrity of the device. This area contains the main processor board and other critical components. It is a sealed, secured box or enclosure within the machine that houses the critical control program(s) for the device.

Mapping - The process by which a value is associated to a symbol or object that is usable and applicable to the current game (e.g.: the value 51 might be mapped to an ace of spades).

Mechanical RNG (aka "Physical Randomness Device") – An RNG that generates outcomes mechanically, employing the laws of physics. Gaming device implementations include, but are not limited to, mechanical wheels, tumblers, blowers, shufflers, etc.

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MI, *Magnetic Interference* - Any magnetic disturbance that interrupts, obstructs, or otherwise degrades or limits the effective performance of electronics and electrical equipment.

Microprocessor - A component that incorporates the functions of a computer's central processing unit (CPU) on a single integrated circuit (IC), or at most a few integrated circuits.

Multi-Game - A game which can simultaneously be configured for use with multiple themes and/or multiple paytables.

Multi-Player Machine – A multi-player machine is a gaming device consisting of multiple player interfaces linked to a shared master console. The master console coordinates game play and supports a consistent game display among the player interfaces. The player interfaces contain player interaction devices and payment devices.

Multi-Wager Game – A game where multiple, independent wagers can simultaneously be applied towards advertised awards.

Mystery Award - A prize paid by a gaming device that is not associated with a specific paytable combination.

Non-Cashable Electronic Promotion In - Non-cashable credits electronically transferred to the gaming device from a promotional account.

Near Miss - Showing a top award winning combination above or below an active payline.

NFC, *Near Field Communication* - A short-range wireless connectivity standard that uses magnetic field induction to enable communication between devices when they are touched together, or brought within a few centimeters of each other.

Non-EPROM – Any Program Storage Device which is not a physical EPROM.

Non-Wager Purchase – A purchase made by the player that debits the credit meter and which is used for entertainment purposes only. A non-wager purchase does not influence the outcome of the game. An example might be the purchase of an artistic attribute of a game.

Parlay Bet – A single bet that links together two or more individual wagers and which is dependent on all of those wagers winning together.

Player Interaction Device – An internal or external device that connects to a machine and that registers various types of player inputs allowing the player to interact with the machine. Several examples include touch screens, button panels, joysticks, handheld controllers, camera systems, etc. The player interaction device may be hard-wired or wireless. A “smart” player interaction device supports two-way communications with the gaming device. For the purpose of this technical standard, a traditional electromechanical button panel is excluded from this definition unless it is used to affect the outcome for a game.

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Paytable (aka, "variation") - A term used to describe the mathematical behavior of a game based upon the data from the manufacturer's PAR sheet, inclusive of the return percentage, and reflective of all possible payouts/awards.

PCB, *Printed Circuit Board* - A hardware component of a computer or other electronic device, consisting of a flat piece of a non-conductive, rigid material to which Integrated Circuits (ICs) and other electronic components such as capacitors, resistors, etc. are mounted. Electrical connections are made between the ICs and components using a copper sheet that is laminated into the overall board assembly.

Perfecta – aka Exacta – A bet in which the bettor picks the first and second place finishers in a race in the correct order.

Peripheral – An internal or external device connected to a machine that supports credit acceptance, credit issuance, player interaction, or other specialized function(s).

Persistence Game - A game that is associated with a unique attribute (e.g., player ID, game or device ID, etc.) and incorporates a feature that enables progress towards the award of game play enhancements and/or bonuses through the achievement of some designated game outcome.

Physical Coin In / Out- The total value of coins or tokens inserted into or paid out by the gaming device.

Physics Engine - Specialized software that approximates the laws of physics, including behaviors such as motion, gravity, speed, acceleration, mass, etc. for a game's elements or objects. The physics engine is utilized to place game elements/objects into the context of the physical world when rendering computer graphics or video simulations.

PIN, *Personal Identification Number* - A numerical code associated with an individual and which allows secure access to a domain, account, network, system, etc.

Play from Save - A feature utilized in some persistence game designs where complexity increases, or additional elements are added to the game, as play continues. A player is able to save their progress and resume from the saved point of game play.

Player Credentials – Sensitive information regarding a player and which may include items such as full name, date of birth, place of birth, social security number, address, phone number, medical or employment history, or other personal information as defined by the regulatory body.

Printer – A gaming device peripheral that prints tickets, coupons, vouchers, or receipts.

Program Storage Device *(PSD)* - The physical storage media or electronic device that contains critical control programs or executable software that operates the gaming device. Types of PSDs include, but are not limited to, EPROMs, Compact Flash and CFast cards, optical disks, hard drives, solid state drives, and USB drives.

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Progressive System- A system that takes contributions from one or more gaming devices and applies it to an incrementing award. When the proper condition or trigger occurs, the award is paid to a player.

Protocol - A set of rules and conventions that specifies information exchange between devices, through a network or other media.

Quinella – A bet in which the first two places in a race must be predicted, but not necessarily in the finishing order.

Residual Credit Removal - A residual credit removal feature is a player-selectable option that allows for the removal of credits left on the machine when there is a credit balance less than that which can be cashed out by the player using an available, configured payment device. For a gaming device with a hopper, a residual credit equates to a value less than the dispensed coin or token.

RFI, *Radio Frequency Interference* - Electromagnetic radiation which is emitted by electrical circuits carrying rapidly changing signals, as a by-product of their normal operation, and which causes unwanted signals (interference or noise) to be induced in other circuits.

RNG, *Random Number Generator* - A computational or physical device, algorithm, or system designed to produce numbers in a manner indistinguishable from random selection.

RNG State - The RNG state is defined by one or more variables in computer memory and represents a specific point within the cycle of the RNG. RNG state may be modified by replacing one or more of these variables with new values, or otherwise mixing the values with new data.

ROM, *Read Only Memory* – The electronic component used for storage of non-volatile information in a gaming device. The term includes Programmable ROM (PROM) and Erasable Programmable ROM (EPROM).

RTP, *Return to Player* - A ratio of the 'total amount won' to the 'total amount wagered' by a player. Such a return may be "theoretical" (based on mathematical calculations or simulations) or "actual" (based on the metering supported by a fielded gaming device).

Scaling Algorithm - An algorithm or method by which the numbers selected by an RNG are scaled or mapped from a greater range to a lesser range for use in the game.

Scaling Bias - A scaling algorithm is said to have bias if each value in the target range is not selected with equal frequency when mapping all possible values in the original range.

Secure Areas or Secure Compartments – Sensitive areas of a gaming device such as the logic area, external doors such as the main door or belly door, cash compartments such as a drop box, peripheral device access areas, and other areas for devices that can potentially impact game integrity such as top boxes, controllers, etc.

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Seeding / Seed - Seeding is the initialization of the state variables of an RNG. The source value or values used for initialization is the seed.

Sensitive Information – Includes information such as validation numbers, PINs, player credentials, passwords, secure seeds and keys, and other data that must be handled in a secure manner.

Significant Events - Conditions such as power resets, hand pays, door openings/closings, coin/token errors, bill validator errors, card reader errors, hopper errors, critical program or memory error, mechanical device errors, and any of the "error conditions" documented within this standard.

SMIB (aka Slot Machine Interface Board) – A circuit board that interfaces the gaming device with an external system, supporting protocol conversion between the machine and the system.

Software RNG – An RNG that derives its randomness from a computer-based or software-driven algorithm.

Source Code – A text listing of commands to be compiled or assembled into an executable computer program.

Stacker – An electromechanical bill validator component that loads bill, notes, coupons, or tickets into a locked container for secure storage within the gaming device.

State Compromise Extension Attack - A category of attacks in which an attacker compromises a single state of the RNG and penetrates past or future outputs of the RNG using this information. Usually this attack is executed using the seed state or a vulnerable state in which insufficient entropy is available.

Surrender – An option available in some card games where the player can forfeit half of their wager rather than play out their active hand of cards. There are two types of surrender: early and late. These terms refer to whether or not a dealer checks to see if she/he has a blackjack (when an Ace or 10 is showing) before the player makes the surrender decision.

Test/Diagnostic Mode (aka "Audit" or "Demo" mode) – A secure mode of a gaming device that allows an attendant or operator to view game play mechanics, perform paytable tests, or execute other auditing and/or diagnostic functions supported by the machine, or that permits secure access to various audit menus that display information related to configuration settings, performance, recall, logs, or accounting and metering information.

Ticket and/or Voucher In/Out - The total value of all gaming device vouchers accepted or paid out by the device.

Tilt – An error in gaming device operation that halts or suspends play and/or that generates some intelligent fault message.

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Tokenization - When the unit of wager is equal to the denomination of the game, then the tokenization ratio is 1:1. With tokenization, a game with a denomination of one U.S. quarter and a tokenization ratio of 1:5 would provide a player with five credits per quarter.

Touch Screen – A video display device that also acts as a player input device by using electrical touch point locations on the display screen.

Tournament - A tournament is an organized, measured event that permits a player to engage in competitive play against other players. An out-of-revenue tournament involves only non-wagered play using tournament credits or points that have no cash value. In contrast, an in-revenue tournament allows for wagered play in conjunction with the operation of the tournament.

Tower Light – A light located on the top of a gaming device that illuminates automatically in response to various machine error conditions, or which may be illuminated by a player for summoning an attendant or other service personnel.

Trifecta – A racing bet in which a bettor wins by selecting the first three finishers of a race in the correct order of finish.

USB, ***Universal Serial Bus*** - An industry standard interface that defines the cables, connectors and communications protocols used for connection, communication, and power supply between computers and electronic devices. Often used to reference the type of port or a flash type storage device using this interface technology.

Virtual Event Wagering – A form of betting that allows for the placement of wagers on sports, contests, and matches whose results are determined solely by an approved Random Number Generator (RNG).

Virtual Opponent – Term used to describe a computer-based player that participates in a game with skill and effectively mimics the actions of a live player.

Virtual Participant – The athlete or other entity that competes in a virtual event.

Voucher - A printed or virtual ticket issued by a gaming device which can be redeemed for cash or used to subsequently establish credits on a device. A virtual voucher is an electronic token exchanged between a player's mobile device and the gaming device which is used for credit insertion and redemption.

Wager - Any commitment of credits or money by the player which has an impact on game outcome.

Wager Category – A term used to describe different bet options/levels available to the player in regards to the commitment of credits or money which could have an impact on game outcome.

WAT, *Wagering Account Transfer* - See Cashless Account Transfer In/Out.

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Wi-Fi - The standard wireless local area network (WLAN) technology for connecting computers and electronic devices to each other and/or to the internet.

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