Certified Tester
Specialist Syllabus

Foundation Level

Gambling Industry Tester

Version 2019

International Software Testing Qualifications Board

Gambling Industry Tester Specialist Task Force:
Gary Mogyorodi (Chair)
Linda Lemieux (Vice Chair)
Filipe Nuno Carlos
Amanda Logue
Francisca Cano Ortiz
Paul Weymouth

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0. Introduction to this Syllabus

0.1 Purpose of this Document

This syllabus forms the qualification of the Gambling Industry Tester Specialist at the Foundation Level.

The ISTQB® provides this syllabus as follows:

1. To National Boards, to translate into their local language and to accredit training providers. National Boards may adapt the syllabus to their particular language needs and modify the references to adapt to their local publications.
2. To Exam Boards, to derive examination questions in their local language adapted to the learning objectives for each syllabus.
3. To training providers, to produce courseware and determine appropriate teaching methods.
4. To certification candidates, to prepare for the exam as part of a training course or independently.
5. To the international software and systems engineering community, to advance the profession of software and systems testing, and as a basis for books and articles.

The ISTQB® may allow other entities to use this syllabus for other purposes, provided they seek and obtain prior written permission.

0.2 The Certified Foundation Level Gambling Industry Tester Specialist

The Foundation Level qualification is aimed at anyone in software testing who wishes to broaden their knowledge of the Gambling Industry, anyone who wishes to start a specialist career in the Gambling Industry, or anyone involved in casino and lottery software testing. The qualification is also aimed at roles such as test analysts, test engineers, test consultants, test managers, user acceptance testers, product managers, and software developers. The Gambling Industry Tester Specialist qualification is also appropriate for anyone who wants a basic understanding of casino and lottery software testing, such as project managers, quality managers, software development managers, business analysts, information technology (IT) directors and management consultants in the casino and/or lottery industry.

The Syllabus considers the following principal aspects of the Gambling Industry Tester Specialist:

- Understanding the key concepts in the Gambling Industry
- Understanding the Gambling Industry Ecosystems
- Understanding the different test types common to the Gambling Industry

0.3 Business Outcomes

This section lists the Business Outcomes expected of a candidate who has achieved the Foundation Level Gambling Industry Tester Specialist certification.

GTFL-01 Promote efficient and effective communication by using a common vocabulary inside the gambling industry
GTFL-02 Understand specific quality attributes that require testing within the gambling industry
GTFL-03 Understand typical test practices by describing the standard software development and testing methodologies within the gambling industry
GTFL-04 Understand gambling hardware and software certification which is the main difference between the gambling industry and other industries
GTFL-05 Use established techniques for designing tests aligned with gambling specific needs
GTFL-06 Appreciate the importance of jurisdictions and regulatory bodies in the gambling industry

0.4 Examinable Learning Objectives

The Learning Objectives support the Business Outcomes and are used to create the examination for achieving the Foundation Level Gambling Industry Tester Specialist Certification. Learning objectives are allocated to a cognitive level of knowledge (K-Level).

A K-level, or Cognitive level, is used to classify learning objectives according to the revised taxonomy from Bloom [Anderson 2001]. ISTQB® uses this taxonomy to design its syllabi examinations.

This syllabus considers two different K-levels (K1 to K2):

K-Level	Keyword	Description
1	Remember	The candidate should remember or recognize a term or a concept
2	Understand	The candidate should select an explanation for a statement related to the question topic

In general, all parts of this syllabus are examinable at a K1 level. That is, the candidate will recognize, remember and recall a term or concept. The learning objective at the K2 level is shown at the beginning of the pertinent chapter.

0.5 Recommended Training Times

A minimum training time has been defined for each learning objective in this syllabus. The total time for each chapter is indicated in the chapter heading.

Training providers should note that other ISTQB® syllabi apply a “standard time” approach which allocates fixed times according to the K-Level. The module subject syllabus does not strictly apply this scheme. As a result, training providers are given a more flexible and realistic indication of minimum training times for each learning objective.

0.6 Entry Requirements

The Foundation Level Core certificate shall be obtained before taking the Foundation Level Gambling Industry Tester Specialist certification exam.

0.7 Sources of Information

Terms used in the syllabus are defined in the ISTQB®’s Glossary of Terms used in Software Testing. There is also a Glossary of Gambling Industry Domain-Specific Terms in the Appendices of this document.

0.8 National Certification Board Exclusions

The National Board listed below, which participates in the ISTQB®, will not introduce and certify the Gambling Industry Tester Specialist.

This National Board does not participate in any activity of the ISTQB® with regards to this certification.

Japan Software Testing Qualifications Board

1. Introduction to the Gambling Industry – 215 mins.

Keywords

Audio testing, compliance testing, independent test lab (ITL), math testing, multiplayer testing, player perspective testing

Learning Objectives for Introduction to the Gambling Industry

1.1 Objectives and Overview

GTFL-1.1.1 (K1) Recognize the objectives of the gambling syllabus (5 mins)
GTFL-1.1.2 (K2) Summarize the specific skills for gambling industry testing, not present in other testing areas (15 mins)

1.2 Gambling Activities and Artefacts

GTFL-1.2.1 (K1) Recognize the objectives of gambling (5 mins)

1.3 Types of Gambling

GTFL-1.3.1 (K2) Explain casino games (15 mins)
GTFL-1.3.2 (K2) Explain lottery systems (15 mins)
GTFL-1.3.3 (K2) Explain race and sports wagering (15 mins)
GTFL-1.3.4 (K2) Explain online and mobile gambling (15 mins)

1.4 Key Concepts in the Gambling Industry

GTFL-1.4.1 (K2) Explain progressive jackpots (15 mins)
GTFL-1.4.2 (K2) Explain random number generators (15 mins)
GTFL-1.4.3 (K2) Explain the win selection process (15 mins)
GTFL-1.4.4 (K2) Explain player privacy and geolocation (15 mins)
GTFL-1.4.5 (K2) Explain regulatory commissions, jurisdictions and associations (15 mins)

1.5 Gambling Industry Metrics

GTFL-1.5.1 (K2) Explain first pass percentage (15 mins)
GTFL-1.5.2 (K2) Explain escape compliance defects (15 mins)

1.6 Gambling Software Development Lifecycle

GTFL-1.6.1 (K2) Summarize the gambling software development lifecycle (15 mins)
GTFL-1.6.2 (K1) Recognize the role of the independent test lab (ITL) (5 mins)

GTFL-1.6.3 (K1) Recognize the role of regulatory commissions (5 mins)

1.1 Objectives and Overview

1.1.1 Understand the objective of this syllabus

Being a gambling industry tester means that you must understand both testing in general, and the unique set of skills for the gambling industry ecosystem. This ecosystem is filled with proprietary, complex, multifaceted gambling software, hardware, platforms, firmware and operating systems. The objective of this syllabus is to provide Certified Tester Foundation Level graduates with the specific knowledge that is required for a career in gambling industry testing.

1.1.2 Why the gambling industry requires a specialist syllabus

Some of the specific testing for the gambling industry, not present in other testing areas, include the following:

1. **Gambling industry ecosystem** – The unique hardware, firmware and operating systems that are proprietary to the gambling industry.
2. **Gambling industry compliance testing** – There are over 440 different certification boards worldwide for gambling industry games. These boards have rules that games in the gambling industry must comply with. These rules impact hardware, software, platform, operating systems, visual and auditory functionality, mathematics, and return to player (RTP) calculations. One gambling industry game can be played in multiple gambling jurisdictions and needs to comply with the laws of each location.
3. **Fun factor or player perspective testing** – This is something unique to gambling industry games, since they are an entertainment product. Not only are casino games supposed to work intuitively and provide the player pleasure, they must also be fun to play. This requires a unique insight into game design, with experience and information about the user group and what that group enjoys.
4. **Math testing** – Testing the multitude of pay tables, permutations, Random Number Generator (RNG) results and RTP computations. This type of testing requires the tester to understand what triggers different types of payout behavior and to understand financial return to the player and how these triggers can be treated by different parameters. Understanding math testing is critical to succeed in this field.

5. **Audio testing** – Creating sound or playing media is common in software. However, gambling industry game music must engage the user in the game and enhance the game play. Not only should the audio play without stuttering or missing elements, it should also add to the game play. This requires extensive audio skills and specific understanding of game audio.
6. **Multiplayer testing** – This type of testing is performed when many players are simultaneously interacting with casino games, with computer-controlled opponents, with game servers, and with each other. Typical ISTQB® risk-based testing is followed to ensure against using unlimited amounts of time testing different scenarios. Understanding multiplayer game design, and how to test it efficiently, is required knowledge for this type of testing.
7. **Interoperability Testing** is common in all software that communicates with other software, systems and/or components. Casino/Video Lottery games have a unique aspect in that they must implement interoperability using gambling industry open protocol standards or proprietary protocols as per the specifications of the central server deployed in the jurisdiction to which the game is deployed.

1.2 Gambling Activities and Artifacts

Background

To understand gambling industry testing and its ecosystem specificities requires a review of the business model, activities, and artifacts as they pertain to the gambling industry.

1.2.1 What is gambling?

Gambling can be defined as follows:

- The wagering of money or something of value, also called stakes, on an event
- Where the outcome of the event is unknown
- And where the whole intent is winning additional money, material goods or trips

What is a gambling machine? A gambling machine is a machine that enables the wagering of money or something of value. Examples of gambling machines are: electronic or mechanical slot machines, a roulette table or even a computer for online gambling.

1.3 Types of Gambling

1.3.1 Casino games

There are three categories of casino games: table games, electronic gaming machines (EGMs) and random number ticket games.

Examples of table games are roulette, blackjack, baccarat or poker, which typically are not tested unless they are an electronic table game version of these games.

The second group are EGMs, typically known as video lottery terminals (VLTs) or slot machines. These are usually played by one player at a time and do not require the involvement of casino employees to play. These games need to be tested, i.e., the game software, the machines, the operating systems, and platforms that they are based on.

VLTs and slot machines are both gambling machines that allow players to bet on the outcome of a game. Physically, VLTs and slot machines are very similar in nature. The main difference between a VLT and a slot machine is that VLTs are gambling machines that are operated by government lotteries while slot machines are gambling machines operated by private organizations such as casinos.

Both VLTs and slot machines are regulated and require licenses to be operated within their jurisdictions. Many countries around the world offer legalized VLT or slot play. For example:

- In the United States, a 1988 federal law established three classes of games for Native American casinos, with different regulatory schemes for each. Each state government follows variations of these classes to define their regulations.
- In Canada, the provincial or territorial governments are responsible for regulating gambling operations. All provinces offer the ability to play, each with their own regulations.
- In Australia, the laws regulating the use of gambling machines are the responsibility of the state governments.

Other terms by which a VLT and slot machine are referred to are: EGM, Video Gambling Terminal, Video Gambling Device, Video Slot Machines and Interactive Video Terminal.

The third casino game category is random number ticket games such as Keno and simulated racing. These games are based on the selection of random numbers, either from a computerized RNG or from other gambling equipment.

1.3.2 Lottery systems

A lottery is a form of gambling that involves selling numbered tickets and giving prizes to holders of winning tickets. The prize can be a fixed amount of cash or goods, but more commonly, the prize fund is a fixed percentage of the revenues from the tickets sold.

There are typically two forms of lottery products sold: traditional lottery tickets and instant tickets.

Traditional lottery tickets are numbered tickets that are sold for regularly scheduled draws, most often weekly. On the draw date, random numbers are drawn either using a ball drop machine or electronically. Most lotteries that have moved to electronic draws still have ball drop machines as a backup in case of failures with the software solution. Once the numbers are drawn from the ball drop machine, they are entered into the lottery central management system (CMS).

The chances of winning a lottery jackpot can vary widely depending on the lottery design, and are determined by several factors, including:

- The count of possible numbers
- The count of winning numbers drawn
- Whether or not the order is significant
- Whether drawn numbers are returned for the possibility of further drawing

Instant tickets are numbered tickets from a pre-determined finite pool of outcomes. The most common form of instant tickets is the scratch card. Scratch cards are typically made of paper, with the outcome printed and hidden by an opaque substance that needs to be scratched off, hence the name of these tickets. The cards usually present the information in the form of a game, such as Tic-Tac-Toe, Bingo, Crossword or some other puzzle, to help add entertainment value. A variation of the scratch card is the break-open (also know as pull-tab) ticket in which, instead of scratching off an opaque substance to reveal the outcome, the player opens a perforated cardboard cover which is hiding the outcome. Since outcomes of scratch and break-open tickets are pre-determined, the cards do not need to be scratched or opened to be validated.

A barcode on the ticket can be scanned by the lottery CMS to determine if it is a winner or not. The scratching or breaking open is there for entertainment value to the player only.

The chances of winning on a scratch card are typically much higher than on a traditional lottery, but prize amounts are typically much smaller. The probability of winning on a scratch card can be calculated using the odds found on the back of the scratch ticket.

When it comes to lottery operations, it is critical that all parties are confident with the process. For everyone involved, including players, to feel confident, those running the lottery operations must acquire and uphold a secure environment that is documented and accessible. To address this, the Security Control Standard was put in place by the World Lottery Association and lottery organizations are audited against this standard on a regular basis.

1.3.3 Race and sports wagering

Race and sports wagering is also called sports betting. It is the activity of predicting sports results and placing a wager on the outcome. Although most sports betting wagers are placed against amateur and professional level sports, sports betting is sometimes extended to non-athletic events such as reality show contests and political elections, or sometimes to non-human athletics such as horse racing and greyhound racing.

Sports betting can be performed at the sports betting outlet in a casino, with bookmakers (also know as a sportsbook) or online through a computer or mobile device. The types of sports bets include:

- Moneyline Bet
- Spread Betting
- Proposition Bet
- Over / Under Bet
- Parlay
- Progressive Parlay
- Future Wager

Moneyline bets (also known as win bets) are bets in sports wagering. It is one of the most popular wagers that can be placed and is easy to understand. It is used in almost every sport a player can bet on and is a wager on who the player thinks is going to win a match, game or other event. It does not have a spread or handicap (explained below). It should be noted that the predicted winner, i.e., the competitor expected to win, pays lower odds than does an underdog.

Spread betting is defined as wagers that are made against the spread. The spread is a number assigned by the bookmaker which handicaps one team and favors another. This type of betting is similar to the Moneyline win, in that the player is choosing which team he/she thinks will win, but there is a significant difference. A point spread is created to effectively make the two teams equal favorites in terms of betting. This means the player either backs the favorite to win by at least the size of the spread, or the player backs the underdog to win or lose by no more than the size of the spread. For example, the odds for this week's National Football League games are posted and the point spread in the Washington Redskins versus Dallas Cowboys game looks like this: Dallas -4.5 Washington +4.5. The favorite team is associated with a minus (-) value, so Dallas is favored by 4.5 points in this game. Consequently, the underdog is shown with a plus (+) value, which means Washington are 4.5-point underdogs. A wager on Dallas would be made if a player believe Dallas can win the game by 5 points or more. So, if Dallas wins the game 20-14, then the team not only wins by 6 points but also covers the 4.5-point spread as the favorite. However, if Dallas wins the game 20-17, then they win by 3 points and have NOT covered the 4.5 points, but Washington has because they stayed within the spread.

Proposition bets (also known as Props or Specials) are wagers made on events that are not related to the final outcome. Example events are: who will win the first round of a boxing match or which team will score first in a match.

Over/Under bets (also known as Totals) are wagers made on whether an outcome will be under or over an estimated outcome set by the bookmaker. For example, how many three-point shots will LeBron James make tonight?

- Over 2.5
- Under 2.5

In this example, notice how the Prop takes the form of a traditional game total wager. This is a simple wager to understand – if the person making the wager thinks that LeBron James can make three or more three-point shots tonight, bet on the over. If the player making the wager thinks LeBron can not do that, take the under.
There are specific odds for both the over and under bet. Payments depend on the odds at the time the bet is made.

Parlays (also known as accumulators) involve multiple bets and rewards a successful player with a large payout. These types of bets are hard to predict because they involve making more than one selection as part of a single wager. For example, the player might place a single wager on what team will win the next five football matches. If the player successfully wagers, the payout is substantially higher than if the player had wagered on each game separately. The downside is that the player would lose his/her complete wager if the team he/she selected lost any one of the five games. Based on the number of selections, the parlay can receive a unique name. For example, "Double" when it contains two games, or "Treble" when it is composed of three games.

Progressive Parlays are similar to parlays in that they involve making more than one selection as part of a single wager. However, they differ from a Parlay in that a player will be rewarded even if some of the bets lose. If all bets are won, the player will be awarded the full payout which is not as large as a regular parlay but will receive a reduced payout if some of the selections within the parlay lose.

Future Wagers (also known as Outright wagers) are wagers placed on future events. Although all sports wagers are on future events, with a future bet, there is a long-term horizon measured in weeks or months. Future wagers usually are made before the season starts. Winning bets will not pay off until the end of the season. For example, the player might make a futures wager on a team winning the National Hockey League (NHL) Stanley Cup. The wager must be placed before the regular NHL season begins and the payoff will not be made until after the Stanley Cup playoffs end.

1.3.4 Online and mobile gambling

Online gambling includes all areas of gambling offered via Internet, mobile, wireless in-venue, and interactive-TV channels. The online gambling space contains all the different types of gambling that have been discussed thus far, i.e., slot games, table games, lottery, and sports betting

Online gambling has become one of the most popular and lucrative businesses present on the internet. Legalization of online gambling varies based on the type of online gambling product and the jurisdictions in which they are offered. For example, purchasing traditional lotto tickets through online websites is legal in many jurisdictions. However, not all jurisdictions have legalized casino style gambling such as poker or slot games through online gambling websites.

Mobile gambling is online gambling on a mobile device such as a tablet or smart phone. There are two types of mobile gambling. The first is the online gambling at casino websites that can be accessed through a mobile device either through a website or through a mobile app. The second is in-venue mobile gambling which allows on premise casinos to add mobile technology and content to their existing offerings. Products are accessible to players on the gambling machines on the casino floor and on mobile devices inside the casino.

For the online and mobile gambling ecosystem, the player needs to be able to access the casino's online gambling products. This can be done in two ways:

- Browser-based
- Downloadable application

If the player chooses to play through a browser-based casino website, the games are available through the player's browser while on the online casino's website.

If the player chooses to play through a downloadable application, he/she must first install the online casino's software to his/her computer or mobile device. This option usually offers better graphics, sound and game play than the browser-based option. Then, in order to play at the online casino, the player must have a means of transferring money to and from the online casino. This can be accomplished by an electronic wallet (also known as a digital wallet), such as PayPal. When performing mobile in-venue gambling, some casinos have internal electronic wallets as part of the casino management system which are often associated to a player's account. In this scenario, the player would deposit funds into or withdraw funds from the casino's electronic wallet solution at the cashier booth.

To ensure online or mobile gambling is performed only where it is legal, geolocation, micro-technology and triangulation are used to confirm the location of the player. Geolocation is the estimation of the real-world geographic location of an object, i.e., the computer or mobile device a player is using to play online gambling. Micro-location technology is used for in-venue mobile gambling. This technology works by using the casino's existing WIFI network or Bluetooth beacons to give accuracy of a player's location to within a few feet. For out-of-venue online gambling, some jurisdictions have decided on mobile phone triangulation to confirm the location of players. This triangulation method determines which cellular towers are closest to the player's mobile phone and ensures that the player is in the right geographical location. Mobile phone triangulation technology is accurate to within a mile of where the client resides. Other jurisdictions have decided to use Wi-Fi to verify geolocation for out-of-venue online gambling. This geolocation technology is accurate to within a few feet of the user's residence.

Individuals looking to circumvent restricting online gambling to specific locations use technical measures such as proxy servers to try to bypass restrictions imposed by geolocation software. Some online gambling sites can detect the use of proxies and anonymizers and block their access to the online gambling systems.

1.4 Key Concepts in the Gambling Industry

1.4.1 Progressive jackpots

A progressive jackpot is a prize or payout which increases each time the game is played but the jackpot is not won. A small percentage of each wager placed by a player on the game contributes to the jackpot award amount. The game that the progressive jackpot is attached to can be any type of game (e.g., mechanical reels, poker, etc.).

When the progressive jackpot is won, the jackpot for the next play is reset to a predetermined value, and resumes increasing under the same conditions. The progressive jackpot win is often associated with the highest winning combination on the gambling machine in which it is being played. In order to win the progressive jackpot, in most games, the player needs to have placed a maximum bet as the wager for the play.

Progressive jackpots are available both on VLTs and slot machines. There are three types of progressive jackpots:

- Standalone progressive
- Local area linked progressive
- Multi-site linked progressive

A standalone progressive has a jackpot on the individual EGM. Only bets placed on that specific EGM increment the jackpot.

Local area linked progressives are games within a venue that are linked together to contribute to a common progressive jackpot. This type of jackpot is usually found in a casino. This type of network can include as few as a dozen EMGs and as many as hundreds of these.

Multi-site (also known as Wide Area) linked progressives link gambling machines from multiple venues to participate in the progressive jackpot. Due to jurisdictional rules being different, Multi-site linked progressives usually only link machines within the same jurisdiction, often across casinos operated by the same organization. However, some examples of multi-jurisdiction progressive jackpots exist. For example, in July 2006, the Multi-State Lottery Association in the U.S. introduced the first multi-jurisdictional progressive jackpot called Ca$hola. This progressive jackpot linked

EGMs at nine lottery run casinos; three in Delaware, two in Rhode Island, and four in West Virginia. This linked progressive was replaced in 2011 by the Megahits jackpot and now includes two additional states: Ohio and Maryland.

A linked progressive jackpot solution adds some additional devices to VLT and slot machine ecosystems:

- A progressive jackpot display or sign
- A progressive jackpot controller
- A progressive jackpot server

The progressive jackpot display or sign is used to display the current amount of the progressive jackpot.

The progressive jackpot controller is used by the venue to manage the progressive jackpot. The jackpot controller links the games contributing to the progressive jackpot and communicates the jackpot value to the progressive jackpot display.

The progressive jackpot server is used to manage multiple jackpot controllers and different progressive jackpot games that may exist across a venue. It will also monitor and collect all progressive related data to allow for analytics and auditing of progressive jackpots.

1.4.2 Random Number Generator (RNG)

The Random Number Generator is a computational or physical device designed to generate a sequence of numbers that lack any pattern, so they are random, or they appear unrelated. RNGs are used in gambling, statistical sampling, computer simulations and other areas where producing an unpredictable result is desirable. Any machine-base gambling involves an RNG.

The RNG is a vital part of all gambling machine operations. Where unpredictability is essential, such as in security applications, hardware generators are generally preferred over pseudo-random algorithms.

The RNG is certified by either an ITL or by the jurisdiction's regulatory board.

1.4.3 The win selection process

The selection process or the “did I win?” process is another key concept of the gambling industry. All gambling machines such as EGMs use some type of win selection process to determine and display the outcome of the game. This means if the player pulls a lever or presses a button, something happens on the screen and then there's an outcome that says “Yeah! I’ve won!” or” No, I've lost!”.

What is also important about the selection process is that it can be performed on the EGM itself or on a server. In some cases, the whole process from “spin the wheel”, “get a response”, “you won or lost” is done on a standalone EGM.

The technology being used and the specific jurisdictional rules of where the game is being played will influence the selection process and whether it is performed on the EGM or on the servers.
This selection process will involve the following:

1. Start of spin
2. A raw random number is generated by the RNG
3. The raw random number is scaled to a usable number
4. The number is mapped to a game element (e.g., is it a star? is it a 7? is it Wheel of Fortune?)
5. There is an evaluation of the outcome of the results of that random number generation
6. The prize is awarded to the player with that outcome. Either credits are taken away from the player in the case of a loss or credits are given because of a win.
7. There is a display of the outcome to the player
8. The prize is paid, if applicable
9. End of spin

1.4.4 Player privacy and geolocation

Privacy laws in most jurisdictions mandate that any player’s information being tracked, whether for responsible gambling or player loyalty program purposes, adheres to the storage and use of personal information regulations set forth by those laws. An example of testing player privacy is verifying that the solution makes the player information available to only those that should have access, and that any such information is encrypted when being transferred between devices and systems.
Some responsible gambling and player loyalty programs require knowing where the player is located. Testing this function consists of ensuring the geolocation functions

accurately restrict play based on the rules mandated by the location from which the player is playing.

1.4.5 Regulatory commissions, jurisdictions and associations

Compliance testing is also called jurisdictional testing. Each jurisdiction has its own rules, regulations, guidelines (also known as regulatory or jurisdictional specifications or rules) that must be tested. This testing is usually performed by an ITL.

In the United States, there are over four hundred regulators and jurisdictions. Canada has at least one per province. South America has at least one jurisdiction per country that has legalized gambling. Europe, Asia and Africa also usually have one jurisdiction per country. Germany has lottery companies by province. Australia has at least one per state. Within these jurisdictions, there is usually an organization that is responsible for issuing licenses and regulating the licensee or the people who have the licenses. These organizations are typically known as licensing authorities.

Every jurisdiction controls the potential manufactures who need a license to operate in that jurisdiction. Manufactures cannot legally operate in any jurisdiction where they do not have a license. If a product fails compliance testing, it must be fixed and returned to the ITL for certification testing until it passes 100% of the mandatory certification tests. The product can be returned many times before it passes the compliance tests.

Before gambling products are ready for compliance testing, the full range of gambling QA testing must occur. Please refer to section 2.1.1 for more details. Some examples of test types and test techniques that are done for the gambling industry includes exploratory testing, functional testing, regression testing, pre-compliance testing, system integration testing, performance testing, penetration testing and failover testing.

1.5 Gambling Industry Metrics

Background

Gambling industry testing uses many of the ISTQB® Foundation Level common test metrics. However, there are a few that are specific to the gambling industry.

1.5.1 First pass percentage

First pass percentage identifies the percentage of games that receive certification from the ITL on the first submission of the product.

The importance of receiving a first pass for a gambling product is related to both product cost and its time-to-market. If the product does not receive a first pass, there are extra costs for additional development, testing and product certification. A gambling product that does not receive a first pass is delayed from entering the market until it is certified.

1.5.2 Escape compliance defects

These metrics measure data relating to escaped defects that do not comply with the jurisdictional rules or regulations and are found by the ITL or in the field.

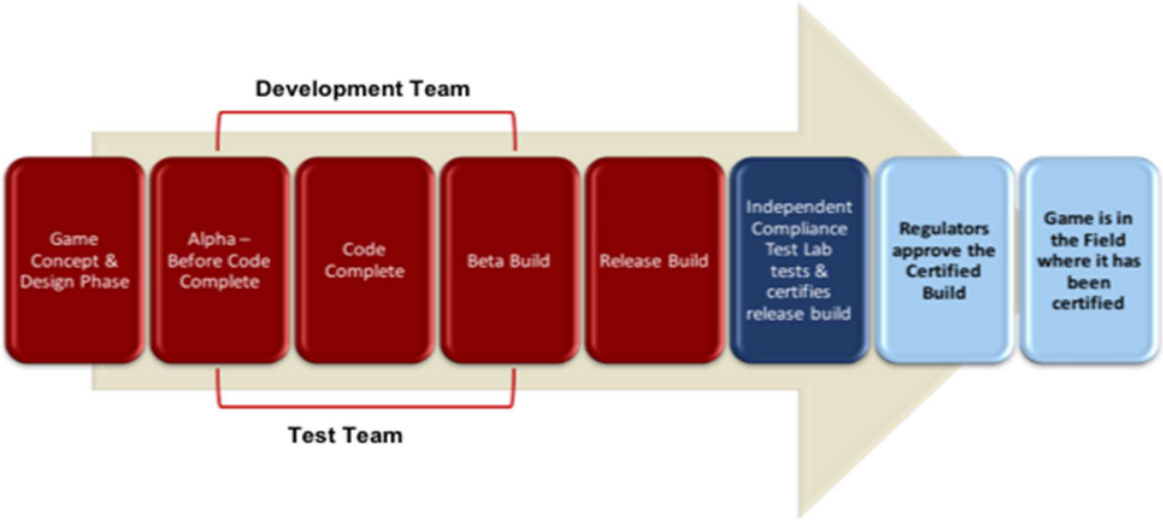
The **resubmittal factor** is the number of times a game must be resubmitted to the ITL to pass certification testing. For example, if on average each game is resubmitted 4.5 times to achieve certification, the resubmittal factor would be equal to 4.5.

The **number of revocations** tracks how many games have been pulled from the field per time period, due to escaped compliance defects. For example, if two games have been removed from the field in a year, that would mean two revocations for the year. If a jurisdiction asks for a game to be removed due to an escaped compliance defect the manufacturer has a limited amount of time to remove the game.

These two metrics are important because having escaped defects in a jurisdiction can impact a manufacturer's right to be in that jurisdiction, negatively impacting their brand, making them lose revenue if the EGM and table games is not working on the casino floor. There are a fixed number of EGMs and table games in any casino. Manufacturers fight for floor space amongst themselves, so a revocation might also mean that a manufacturer loses that floor space to a competitor.

1.6 Gambling Software Development Lifecycle

1.6.1 The gambling software development lifecycle overview



The Gambling Software Development Lifecycle follows the ISTQB® sequential development model.

Game Concept and Design is the first phase of the gambling software development lifecycle. It starts with a game idea that is storyboarded and is reviewed. Game and sound designers, artists, video, and gambling experts, software architects and game developers, and gambling jurisdictional experts create a game prototype. The prototype is then scrutinized for innovation and playability by the targeted audience focus group. This group may be comprised of internal (IT-professionals), external (non-employees, sometimes non-IT professionals), or a mix of both resources. The Game Concept and Design phase is an iterative process. The Game Concept and Design phases' ultimate deliverables are documents which become the blueprint for the development team, artists, mathematicians, and sound designers. The Game Concept and Design documents include the following:

- Game Concept
- Game and Technical Design

The Alpha phase, not to be confused with alpha testing, is next. During this phase, game play functionality is developed and implemented, math functionality is completed, video and audio components are partially finished, and the game contains the major features. Black-box testing, especially functional, usability testing, exploratory testing, regression testing, math testing, and RTP testing occur.

The Code Complete phase is next. All features, audio, video and math components are finalized. At this phase, code is no longer added to the game, unless a change is needed to fix defects. Standard ISTQB® foundation level black-and white-box testing are typically performed at this phase. The emphasis is on test automation, testing for memory leaks, confirmation testing, and regression testing.

The Beta Build phase, not to be confused with Beta Testing, continues until no failures occur that prevent the game from being certified. Pre-certification testing is performed by the internal gambling quality assurance test team to assess the game versus the requirements of each jurisdiction. This phase is not a formal certification test cycle. It is a precursor to the ITL certification testing. Any defects discovered at this time will be corrected and the new builds are tested, and regression tests are performed.

The Release Build phase is the one that is sent to the ITLs to ensure that the game complies with the requirements of each required jurisdiction. This build receives the final certification signoff, which allows the game to be sent to casinos or be made available online. If the game fails this certification, it is sent back to the game developer and the process starts over.

1.6.2 The role of the independent test lab (ITL)

Once the pre-certification phase is completed by the machine manufacturer, the game is ready to be certified by an ITL (also known as the Authorized Test Facility). If this is a game that will be played in North America and in Australia, it must be tested for all applicable jurisdictions which means approximately 450 jurisdictions for these two parts of the world.

Once the ITL has tested the game for all applicable jurisdictions, if it fails in any of the jurisdictions, the game is returned to the machine manufacturer or game developer who make the changes in the game or in the EGM and return it for another ITL certification test.

The only way to be an accredited ITL is to be accepted by each gambling regulatory commission. This is a lengthy and costly process and thus there are only a few ITLs who can certify games world-wide. A few of the jurisdictions have government-based certification test labs that play the role of the ITL.

1.6.3 The role of regulatory commissions

Once the ITL has certified a game, the regulatory commission allows the game to be played in all casinos in their jurisdiction. However, the regulatory commission will revoke or pull a game from all its casinos if a major field issue arises. A major field issue is usually a defect that stops the game from playing, provides erroneous payouts or deviates from any of the rules of engagement that are required for certification. The machine manufacturer will have to immediately remove that game from every installation in the jurisdiction.

There are also minor field issues that will force the machine manufacturer to modify a game that is in the field, within a given timeframe. In this case the game must be certified again at an ITL and approved by the regulatory commission.

2. The Gambling Industry Ecosystems - 90 mins.

Learning Objectives for Gambling Industry Ecosystem

2.1 Testing Phases within the Gambling Software Development Lifecycle

GTFL-2.1.1 (K2) Classify different test types for the gambling quality assurance testing phase (15 mins)
GTFL-2.1.2 (K2) Explain compliance testing (15 mins)

2.2 The Gambling Ecosystems

GTFL-2.2.1 (K2) Explain the gambling industry ecosystem (15 mins)
GTFL-2.2.2 (K2) Explain video lottery terminals and their ecosystem (15 mins)
GTFL-2.2.3 (K2) Explain slot machines and their ecosystem (15 mins)
GTFL-2.2.4 (K2) Explain lottery and its ecosystem (15 mins)

2.1 Testing phases within the Gambling Software Development Lifecycle

2.1.1 Test types during the gambling quality assurance phase

Compliance testing is a very involved process. There are lengthy submission forms to be filled and ITL compliance fees are often much higher than gambling quality assurance testing fees. Therefore, prior to submitting a product to an ITL, a machine manufacturer should ensure the quality of the product being submitted by performing gambling quality assurance testing.

Gambling quality assurance testing activities align with the ISTQB® fundamental test process. The following test activities are performed to ensure the product is tested for quality:

- Test planning
- Test monitoring and control
- Test analysis
- Test design
- Test implementation
- Test execution
- Test completion

Gambling quality assurance testing is an iterative process with development. Defects are logged and then the product is returned to development to fix the logged defects. Once the logged defects are fixed, the product comes back to gambling quality assurance for further testing. This cycle continues until the product reaches the quality levels desired, as defined by the gambling quality assurance testing exit criteria.

The test types performed during gambling quality assurance testing include, but are not limited to:

- Localization testing – testing to determine that all screens have proper language translations and any other localization items such as date/time or numbering formats are done correctly
- Functional testing – testing to determine that all functions work as designed and intended
- Performance testing – testing to determine that response time is acceptable
- Memory leak testing – testing to determine no performance issues arise due to lack of proper memory management by the software
- Installability testing – testing to determine that the product can be easily installed by the casino operator without any issues
- Portability testing – testing to determine that the product can be installed on all platforms it needs to run on
- System integration testing – testing to determine that the product can integrate with systems/components, different versions of an application interface or able to communicate to a system
- Operational testing – testing to determine that the product can function and be operated in a production environment, including reliability, security, recovery and failover testing
- Pre-compliance testing – testing to determine that all the regulations and standards are met prior to submitting the product to the ITL. This helps ensure a minimal number of submissions of the product to compliance testing
- Customer acceptance testing – Prior to submitting to compliance testing, some products are submitted to the client (i.e., lottery or casino) for customer acceptance testing to ensure all features function as the client expected

2.1.2 Compliance testing

Compliance testing occurs when a machine manufacturer wants to enter a jurisdiction with a new or modified product, be it a game, platform, hardware or system. Based on the jurisdiction, the machine manufacturer needs to submit the product with a request for certification to either an ITL or government-based compliance test lab. In some jurisdictions, it goes through both.

The formal submission documents fully detail what is being submitted and what certifications are being requested for the product.

Once the product has passed compliance testing, the test lab will provide a certificate of compliance evidencing the certification of the rules and regulations that were to be met.

Once the regulatory commission has seen proof of the required certifications, it will allow the product to be installed in the gambling establishments in their jurisdictions.

When performing compliance testing, ISTQB® standard test plans are created and specific compliance checklists are used. These may include, but are not limited to:

- Jurisdictional specifications – usually defined by a governing body such as the federal, state and/or provincial government
- ITL defined standards – defined by an ITL in the gambling industry
- Other gambling related standards – some jurisdictions require other standards be adhered to. For example, some jurisdictions may require that gambling machines and systems in a jurisdiction are Game to System (G2S) protocol compliant (see Section 3.5.1). The G2S compliance checklist is defined by the Gambling Standards Association, the association that has defined the G2S protocol.

Many areas of the compliance testing will be the same as those performed in gambling quality assurance testing, but they are tested against the jurisdictional specifications and not the game specifications.
Some of the areas that are covered during compliance testing include:

- Rules of play – testing to determine that the rules meet the jurisdictional specifications
- RNG, Payout Percentages, odds and non-cash awards – testing to determine that the payout percentage is within the range regulated in that jurisdiction
- Bonus games – testing to determine that the game meets bonus regulations
- Electronic metering – testing to determine that all meters required to be monitored within that jurisdiction are being reported
- Game history – testing to determine that the game history tracks, at a minimum, the number of games required by the jurisdiction
- Power-up and power-down – testing to determine that the power up and down functionality works as per the jurisdictional specifications
- Setup and Configuration – testing to determine that only configurations that are permitted within the jurisdiction can be enabled

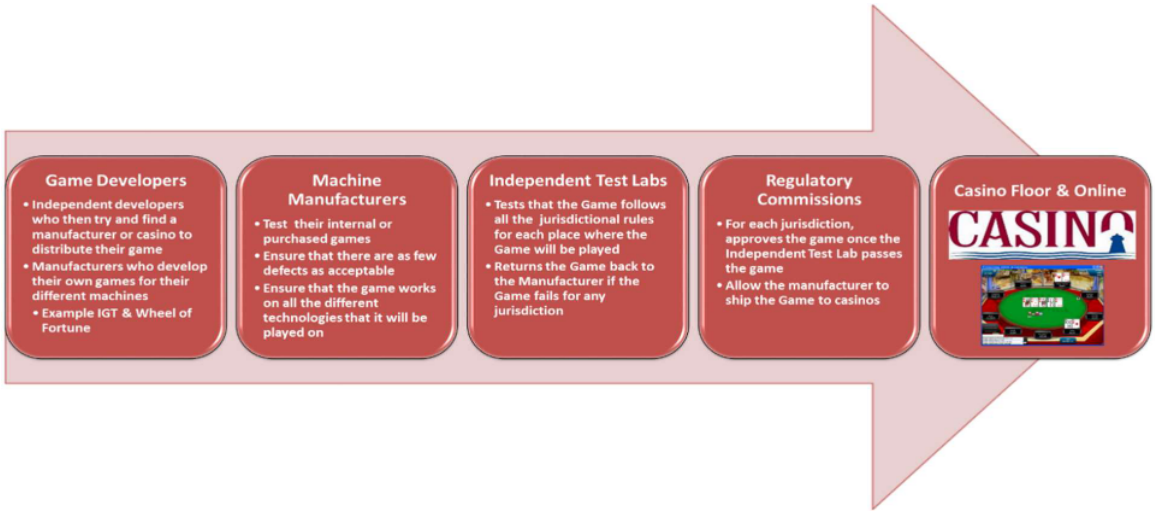
2.2 The Gambling Ecosystem

2.2.1 The gambling industry ecosystem overview

The gambling industry ecosystem is composed of the following organizations:

- **Game Developers** – develop casino games not specific to a gambling machine model. These games are usually distributed by a manufacturer or casino
- **Machine Manufacturers** – make and sell the hardware, platforms, operating systems and games, developed in house or sub-contracted
- **Independent Test Labs** – test and certify that the game software, hardware, firmware, platform and operating system follow all the jurisdictional rules for each location where the game will be played
- **Regulatory Commissions** – approve every game played in their jurisdiction after the ITL certifies that the game meets the commission's jurisdictional specifications

The regulatory commission licenses the machine manufacturer to deploy the game in casinos or on online gambling sites in that specific jurisdiction. A game may be shipped to a casino before licensing; however, it cannot be deployed. The game must be licensed by the regulatory commission before it is deployed into the jurisdiction.
Should any major defects be found in the casino, the regulatory commission can force the machine manufacturer to pull their game out of all casinos or demand that the online sites remove access to the game in that jurisdiction.



2.2.2 Video lottery terminals and their ecosystem

As indicated by the name, VLTs always have a video display for the game. VLTs either have standalone or server-based outcome architectures. In the standalone model, each VLT contains an RNG from which game outcomes are generated. In the server-based outcome architecture, VLTs obtain their outcomes from the server. This architecture has two possible models: the RNG model or the pre-determined finite pool model. In the server-based RNG model, the server generates the outcome it will provide to the VLT using an RNG located in the host. In the pre-determined finite pool model, the server obtains the outcome from a database of pre-determined outcomes. This model is similar to instant tickets and is often referred to as electronic instant tickets.

The types of games typically found on a VLT are: mechanical reel games, poker games and keno games. Most VLTs are multi-game machines, meaning multiple games are available for a player to choose from through a screen menu.

VLTs are frequently operated in a distributed environment over a Wide Area Network. For example, a few VLTs deployed in bars and/or pubs are connected to a central server through a Wide Area Network connection.

The VLT ecosystem is comprised of:

- The EGM
- The site controller and/or bank controller
- The systems/servers used for monitoring and/or managing functionality

The EGMs are the machines on which the players choose to play the games. Each machine communicates to a site controller and/or bank controller and one or more central servers through a communication interface board using an electronic communication language referred to as a protocol. When VLTs are installed in a distributed environment, each retail location has a site controller to which the VLTs at that location are connected. The site controller serves multiple functions:

- Communicates and monitors VLTs to ensure they are online
- Records game play transactions, cash-in/cash-out transactions and security exceptions
- May act as a protocol converter by translating the protocol implemented on the VLT to the protocol understood by the central server
- Provide retailers with the ability to:

- Register players for player tracking cards
- Validate and pay out cash tickets

When VLTs are installed in a venue environment (i.e., a non-distributed environment), they are connected to a bank controller which functions like a site controller minus the retailer functions. A bank controller can support connection of several hundred VLTs, whereas one site controller typically supports fewer than 100 connected VLTs.

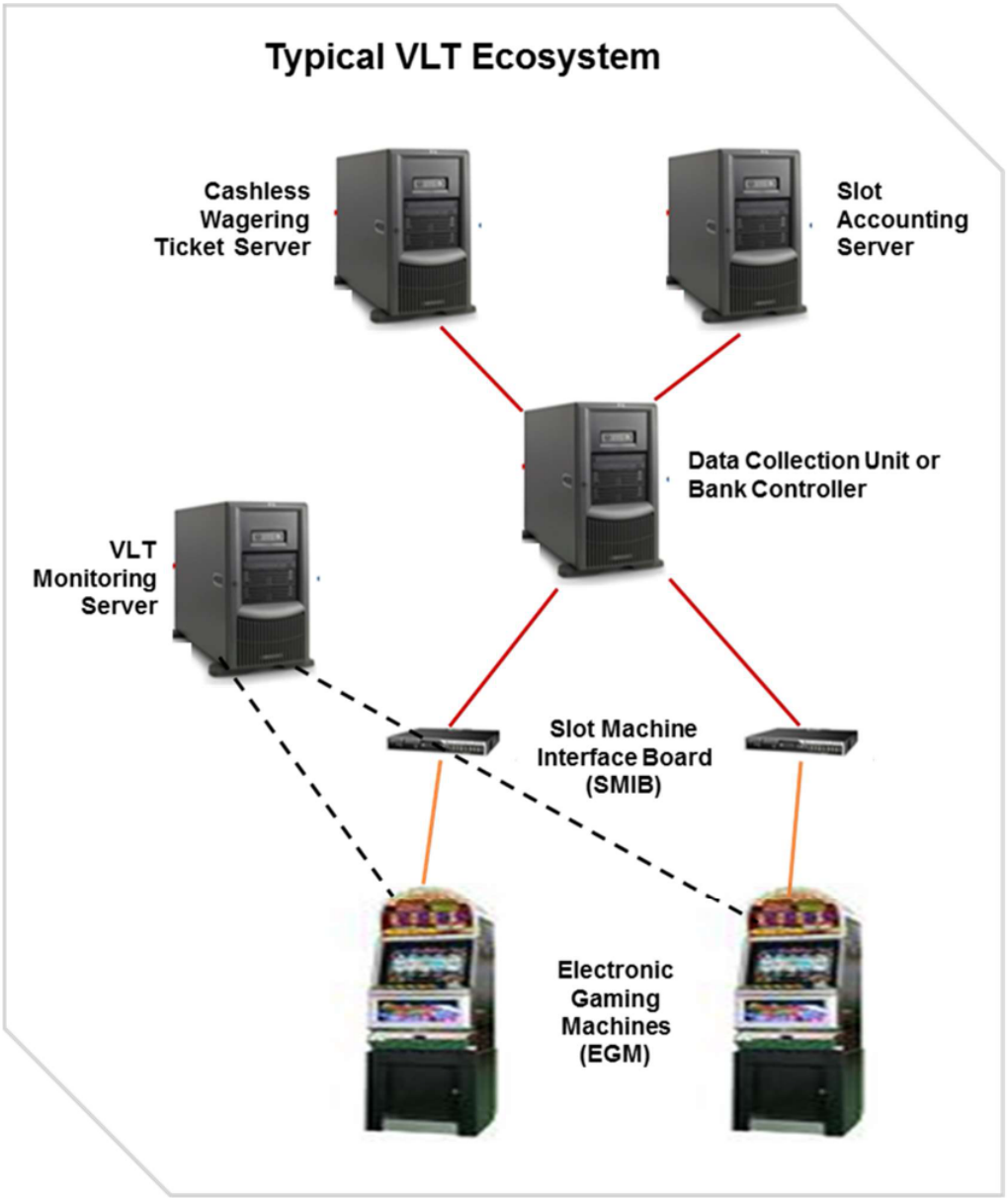
The VLTs and bank controllers and/or site controllers are connected to various central servers based on the functionality offered by a jurisdiction. At a minimum, VLTs installed in a venue environment include the following:

- A casino accounting system, which is responsible for monitoring the amounts wagered and paid on each VLT
- A VLT CMS, which provides the ability to monitor game play, track, record and report security exceptions at the VLT and/or site controller, and monitor network availability in order to ensure continuous VLT operations in the event of communication loss

Other central servers may include additional features, not limited to:

- A cashless wagering server, which allows for cashless transactions either through ticket-in/ticket-out (TITO) functionality or through electronic funds transfer (EFT)
- A distributed game content management server, which controls the selection, scheduling, distribution and auditing of VLT software to VLTs at remote retail sites
- A player services server, which supports player loyalty, player rewards and responsible gambling functionality
- A progressive server, which manages progressive game play
- A business intelligence server, which provides data warehousing and business analytics

The other servers available are based on the functionality offered in the jurisdiction.



2.2.3 Slot machines and their ecosystem

Slot machines may have a video display or mechanical reels which have actual physical reels that spin.

Slot machines outcome architectures come from the Indian Gambling Regulatory Act, a 1988 U.S. Federal law that establishes the jurisdictional framework that governs Indian Gambling in the U.S. This law provides definitions for Class I, Class II and Class III architectures. Class I relates to traditional Indian gambling and will not be discussed further in the context of casino gambling. Class II and Class III define the two outcome architectures used by slot machines. Class II (also know as electronic bingo) is defined in the Act as "the game of chance commonly known as bingo whether or not electronic, computer or other technological aids are used". Class III (also known as traditional slot machines) has a broad definition in the Act. It states "all forms of games that are neither Class I nor Class II. Games commonly played at casinos, such as slot machines and table games, e.g., blackjack, craps, roulette, etc. fall in the Class III category.

The types of games typically found on a slot machine are: mechanical reel games, bingo games, poker games and keno games. Many slot machines are single-game machines, meaning only one game is available for play on the gambling machine.

Slot machines are typically operated in a venue environment such as a casino.

Slot machines (also known as Vegas style slot machines) are:

- Casino gambling machines with mechanical reels or a video display
- Machines that have an RNG that is local to that machine

Machines usually include a currency input device, such as a coin acceptor or a note acceptor, and a currency output device, such as a coin hopper

The slot machine ecosystem is comprised of:

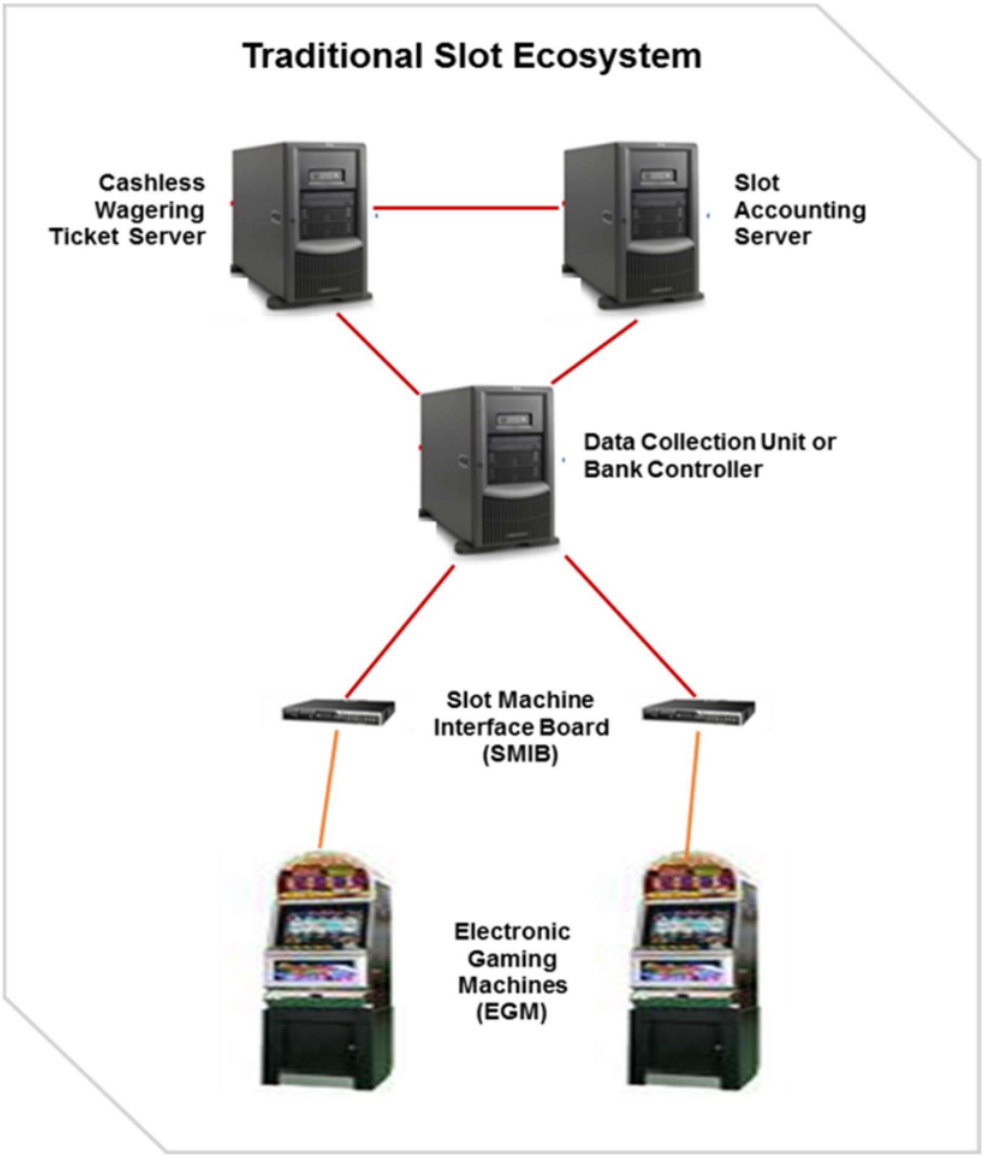
- The slot machines
- A slot machine interface board (SMIB)
- A data collection unit or bank controller
- Central servers

Each slot machine contains an SMIB that is linked to the data collection unit or bank controller. Historically, an SMIB was a small board that was put into every mechanical or electro-mechanical machines. These early SMIBs connected to a wiring harness that would detect when a mechanical meter was incremented, or a mechanical door switch was opened. As time passed, these SMIBs evolved and now communicate electronically with the gambling machine and are often responsible for implementing the protocol that is used to communicate with the data collection unit or bank controllers and the remote central servers. The SMIBs, at a minimum, capture:

- The amounts wagered by the player
- The amounts paid out to the player
- And if the player is using a player card, any player data tracked by the casino

Data collection units or bank controllers, as suggested by the name, are used to collect and store the data obtained from the SMIBs.

The data collected by the data collection unit or bank controller is communicated to the servers to update the data needed for the functionality provided by the servers.



Bingo machines (also know as electronic bingo machines), are:

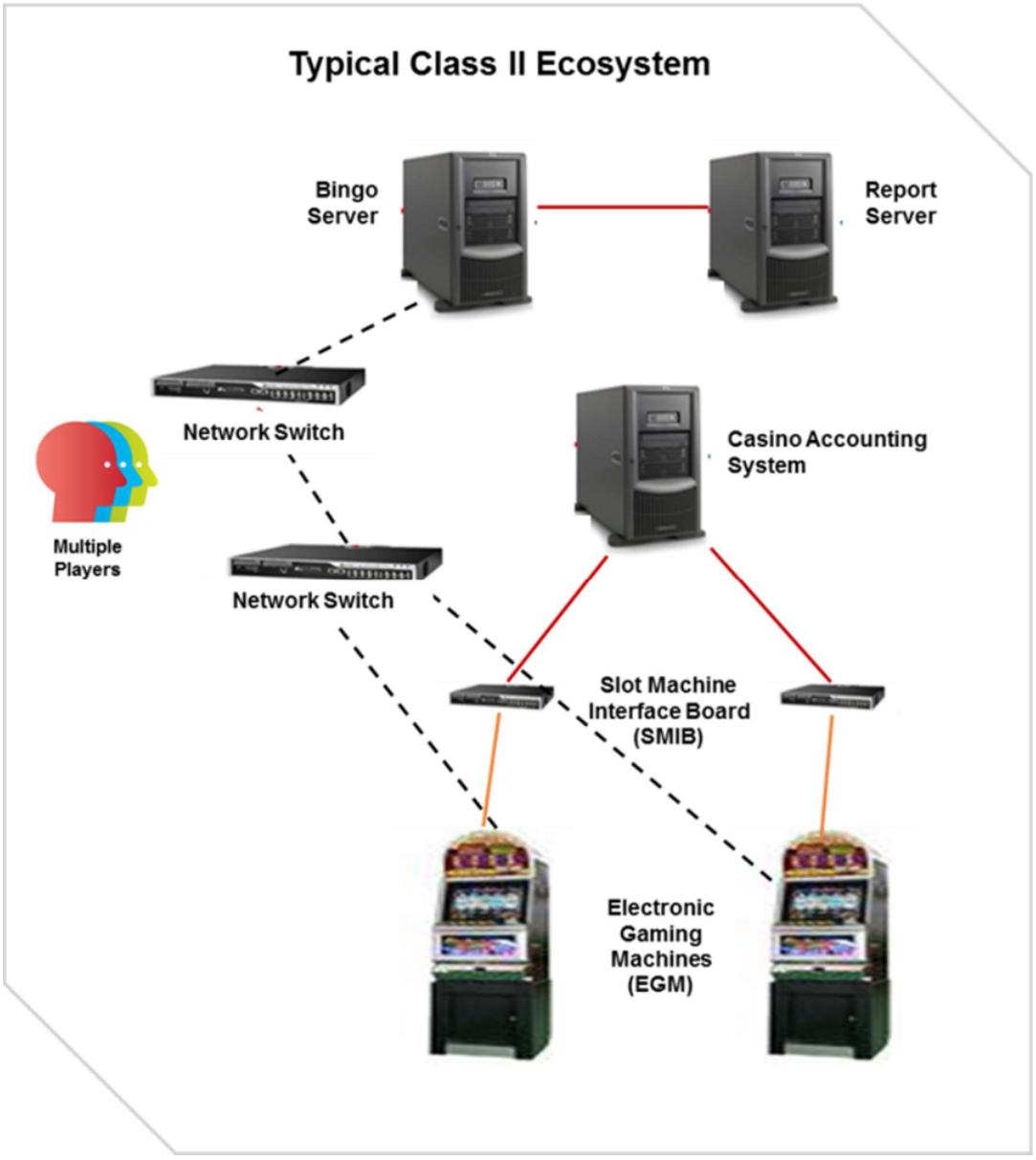
- Machines that look and feel like slot games but are actually a game of electronic bingo
- Machines on which the outcomes are obtained from a centralized bingo server
- Machines that offer cashless input methods such as TITO or EFT. These gambling machines do not have currency input/output devices
- Machines on which the games:
    - Are played exclusively against other players rather than against the house or against a player acting as a bank
    - Are based on multiple players playing for a common prize
    - Continue until there is a winner

Each bingo machine contains an SMIB that is linked to the bingo server and other servers. The SMIBs, at a minimum, capture:

- The amounts wagered by the player
- The outcome obtained from the server and the corresponding results
- The amount paid out to the player

The Network Switches are used to provide multi-player capabilities. Once a minimum number of players required for a specific game is met, the actual bingo game can start. The bingo server is the system that allows players to join a game until the group is at the minimum required and that provides the outcomes to the slot machines.

There are other central servers, such as the casino accounting server that tracks the amounts wagered and amount won, and the reporting server that allows the casino operators to report on the collected data.



2.2.4 Lottery and its ecosystem

The lottery ecosystem is comprised of systems and devices deployed at the lottery and at each retail location.

The main device is the point of sale (POS) lottery terminal. The POS lottery terminal facilitates the sale of traditional lottery tickets by allowing the retail employee to either scan a selection slip containing the player selected numbers, or to select a Quick Pick option where the POS lottery terminal randomly selects numbers for the player. The POS lottery terminal then prints the tickets on the attached printer. The POS lottery terminal facilitates the sale of instant tickets by scanning the instant ticket sold. The attached customer display unit (CDU) allows the customer to view all steps of the sales transaction. The POS lottery terminal must coordinate all lottery ticket sale transactions with the lottery CMS. The POS Lottery terminal, printer and CDU/PDU unit are either separate devices or, in some cases, these devices can be integrated into one unit. When a player is ready to validate a ticket, the player can choose to have the retail employee scan the ticket using the POS Lottery terminal or perform the validating themselves on a POS Self-Serve Terminal.

The final device at the retail location is the multimedia display. The multimedia display is used for in-store advertising of lottery products, upcoming lottery promotions and winning numbers.

Once the numbers are drawn, the numbers are entered into the lottery CMS. Using the data stored in the database of the CMS, reports can be generated indicating how many winning traditional lottery tickets were sold and which retail location sold the ticket(s). For instant tickets, the barcode data of each ticket is stored in the CMS database. This allows the lottery employees to generate reports indicating how many tickets remain unsold and manage replenishment of physical tickets to retailers. The lottery CMS is responsible for storing all transactional data of tickets sold at each retail location. It also manages the advertising content to be displayed on the multimedia display units at the retail locations and downloads the appropriate content to the POS lottery terminal from which the multimedia display unit displays the content.

Lotteries are beginning to introduce alternative means by which to purchase lottery tickets. For example, purchases can be made at self-serve vending machines for instant tickets, self-serve ATMs like kiosks for traditional lottery tickets or online at their website for lottery tickets. These alternative devices and components must also coordinate all sale transactions with the lottery CMS.

Some of the areas that are covered during functional testing of the lotter ecosystem include:

- Online game rules and functionality
- Scratch ticket management
- Player account management
- Geolocation functionality
- Player services manager
- Multi-player gaming
- Player loyalty and rewards
- Account based play “cashless”
- Responsible gaming functionality
- Game play functionality and playability
- RNG algorithm and math rules
- Artwork versus requirements
- Host accounting and reporting – determine that the game pays out what it should and that the money at play goes to the client if they win, or to the casino if the client loses
- Tournament and real time event setup and management
- Multiple game engines functionality and capabilities
- Integrations with external gaming sites and mobile devices

3. Testing in the Gambling Industry - 435 mins.

Keywords

Par sheet testing

Learning Objectives for Test Types

3.1 Gambling and Wagering Testing

GTFL-3.1.1 (K2) Summarize the concepts of functional testing within the gambling industry (15 mins)
GTFL-3.1.2 (K2) Identify common areas where gambling and wagering defects are found (15 mins)
GTFL-3.1.3 (K2) Summarize the concepts of casino game compliance testing (15 mins)

3.2 Math Testing

GTFL-3.2.1 (K2) Explain math testing (15 mins)

3.3 Platform Testing

GTFL-3.3.1 (K2) Summarize the concepts of platform functional testing (15 mins)
GTFL-3.3.2 (K2) Identify what areas are covered by platform functional testing (15 mins)
GTFL-3.3.3 (K2) Summarize the concepts of platform compliance testing (15 mins)
GTFL-3.3.4 (K2) Identify what areas are covered by platform compliance testing (15 mins)

3.4 Casino System Testing

GTFL-3.4.1 (K2) Summarize the concepts of casino system functional testing (15 mins)
GTFL-3.4.2 (K2) Summarize the concepts of casino system compliance testing (15 mins)
GTFL-3.4.3 (K2) Identify what areas are covered by casino system compliance testing (15 mins)

3.5 Protocol Testing

GTFL-3.5.1 (K2) Summarize the concepts of protocol functional testing (15 mins)
GTFL-3.5.2 (K2) Identify what areas are covered by protocol functional testing (15

mins)
GTFL-3.5.3 (K2) Summarize the concepts of protocol compliance testing (15 mins)
GTFL-3.5.4 (K2) Identify what areas are covered by protocol compliance testing (15 mins)

3.6 Hardware Testing

GTFL-3.6.1 (K2) Summarize the concepts of hardware functional testing (15 mins)
GTFL-3.6.2 (K2) Identify what areas are covered by hardware functional testing (15 mins)
GTFL-3.6.3 (K2) Summarize the concepts of hardware compliance testing (15 mins)
GTFL-3.6.4 (K2) Identify what areas are covered by hardware compliance testing (15 mins)
GTFL-3.6.5 (K2) Summarize the concepts of hardware integration testing (15 mins)
GTFL-3.6.6 (K2) Identify common areas where hardware integration defects are found (15 mins)
GTFL-3.6.7 (K2) Identify what test types are done for hardware integration testing (15 mins)

3.7 Remote Gambling Testing

GTFL-3.7.1 (K2) Explain remote gambling testing (15 mins)

3.8 System and Network Security Testing

GTFL-3.8.1 (K2) Explain system and network security testing in the gambling industry (15 mins)

3.9 Jackpot Controller Testing

GTFL-3.9.1 (K2) Summarize the concepts of jackpot controller testing (15 mins)
GTFL-3.9.2 (K2) Identify what areas are covered by jackpot controller testing (15 mins)

3.10 Online Gambling Testing

GTFL-3.10.1 (K2) Summarize the concepts of online gambling testing (15 mins)
GTFL-3.10.2 (K2) Identify what areas are covered by online gambling testing (15 mins)
GTFL-3.10.3 (K2) Identify what test types are done for online gambling testing (15 mins)

3.1 Gambling and Wagering Testing

3.1.1 Gambling and wagering functional testing overview

Gambling functional testing covers the functions and features in the Game Design documentation and the interoperability with specific systems, platforms and operating systems. ISTQB® standard test plans, test conditions and test cases are derived from the test basis (e.g., functionality of the software or system, game specifications and the jurisdictional specifications).

Some of the areas that are covered during gambling and wagering functional testing per the game specifications include:

- Game setup and configuration – testing to determine that the game functions with the specified setup and configuration parameters
- Game functionality – testing to determine the complete game functionality versus the Game Design documents
- Game play – testing to determine the game functions as stated in the Game Design documents
- Math and probability accounting report (PAR) sheet testing – testing to determine that the game returns the correct mathematical results to the screen, the correct amount of money to the player's account, and the correct amount of money to the casino account in all cases
- Memory and memory leaks – testing to determine that the game correctly manages memory allocations in such a way that memory which is no longer needed is properly released
- Game lockups, tilts and recovery – testing to determine areas that may lock the game, cause it to go into a "tilt" state and how well the game recovers. When the EGM is in a tilt state the gambling machine must be disabled and normal play must not occur until the error conditions have been cleared
- Attract Mode – testing to determine the proper pre-recorded demonstration of a video game when the game is not being played. Attract mode is also known as display mode or show mode
- Help Screen – testing to determine the help screen versus all documentation and the Game Design documents
- Audit Mode – testing to determine the audit mode game functionality versus the Game Design documents and jurisdictional specifications
- Games played on a standalone progressive machine. The standalone progressive machine is not linked to any other machine. Instead of having a

fixed jackpot, it takes a percentage of the coins played and adds that to the award for the highest winning combination. It has a meter on the front that shows the jackpot.

- Graphic Sequences – testing to determine that the graphic sequences adhere to the Game Design documents
- Game Messages – testing to determine that the game messages appear at the right time, in the right sequences and they abide by the Game Design documents
- Artwork – testing to determine that all artwork and graphics are clear, do not have elements that overlap, and are free of grammatical or spelling errors. For Rules, Pay and Help screens, ensure they reflect the actual game play and rules, that they are free of grammatical and spelling errors, and that they follow a correct sequence of display
- Game Bonus Features – testing to determine that any bonuses, free spins, etc., function as designed
- Player Interface – testing to determine that the touch screen, video buttons, button panel buttons and all other player interface options function as designed
- Money In, Money Out and Wagering – testing to determine that all functions pertaining to inserting money, removing money or wagering behave as designed and that the credit meter balance correctly reflects the outstanding balance of the player
- Game History – testing to determine that all game play recall screens that are available to the casino operator correctly reflect the actual game play including, but not limited to:
    - The game start time/date
    - The game end time/date
    - The total number of credits at start of play minus the wager amount
    - The wager amounts
    - The total number of credits at the end of play
    - The total number of credits won
- Audio testing – testing to determine that the sound synchronizes with what is happening in the game or gambling machine. For example, the happiness sounds that are heard when a player is winning must occur when he/she is actually winning, not when he/she is losing
- Fun factor or a player perspective testing – Testers are asked to play the game, to do exploratory testing and provide feedback on whether a game is fun to play or not

3.1.2 Gambling and wagering functional testing defects

When performing gambling and wagering functional testing there are specific areas to target. Examples of these areas include the following:

- Game rules
- Digital graphics – hardware video components
- Graphics – image components
- Digital software
- Accounting - money wagered on a game is correctly accounted for
- Game or player history
- Pay tables
- Game play
- Menus
- Audio components
- Peripherals
- Help files
- Overall game fun or player perspective

The types of defects that are often found in the above areas include, but are not limited to the following examples:

- Documentation does not comply with the game specifications
- Game rules are not followed
- Graphics, both video and images, are not synchronized with the game and do not follow game specifications
- Audio is not synchronized with the game and does not follow game specifications
- Game software stops or does not work correctly
- The player history, what the player put in the machine and their results are not accurate
- Menus and help files are wrong versus the game specifications
- When two buttons are hit simultaneously by accident the game does not handle the situation as expected
- The game does not play well and provides pleasure to the player
- Game does not pay the correct amounts of money as per the game specifications
- There are loopholes in the game where someone can change the software or cheat

- Legal specifications in each jurisdiction have not been met where the game will be played
- The game does not handle the loss of power as expected

3.1.3 Casino game compliance testing overview

When performing casino game compliance testing, ISTQB® standard test plans and compliance checklists are used. Many areas of the casino game compliance testing will be the same as those performed in game functional testing, but testing is against the jurisdictional specifications and not game specifications.

Some of the areas that are covered during casino game compliance testing per the jurisdictional specifications include:

- Rules of play
- RNG
- Payout Percentages, odds and non-cash awards
- Bonus games
- Multiple games on a machine
- Electronic metering
- Tokens and residual credits
- Game history

3.2 Math Testing

3.2.1 Math testing

Although a gambling industry tester will not create return to player calculations or do things that need to be done by mathematicians, they still must do math testing on the following:

- multitude of different pay tables
- any permutations that there are to those pay tables
- RNG results
- RTP computations

Math testing focuses on ensuring that the game returns the correct mathematical results to the player and to the casino operator (i.e., casino or lottery). The mathematics of a gambling machine center around the RNG and the RTP percentage.

The RTP, sometimes also called theoretical payback percentage, is the percentage of money wagered on a gambling machine that is returned to players in the form of winnings over a period of over time.

To achieve the required RTP, the mathematicians design the mathematics behind a game by deciding the frequency of symbols on the mechanical reel strips and the amount any given combination of game stops will pay. The RNG is the algorithm or program within the slot machine that determines where the mechanical reels will stop each time. The RNG works independently and is unaware of the overall odds of each “stop position”. The RNG waits until someone presses a button or pulls a handle, at which point it generates the required amount of numbers depending on how many mechanical reels are being played. The odds of the game itself are designed by the mathematician by defining the number of mechanical reels, the stops and the symbols in proportion to the pay lines.

The odds defined by the mathematician are described in a operator mode. A PAR sheet is defined as “a document that details how a game’s match is designed, including pay table, mechanical reel strips, and any other pertinent information to rules of the game, e.g., bonuses”. Various theories exist of what the acronym PAR comes from. Some say it stands for “Probability Accounting Report”, while others say it stands for “Pay table and mechanical reel strips”.

The PAR sheet includes information such as:

- The game name
- The number of mechanical reels
- The number of pay combinations, which may consist of line, scatter or pattern wins
- Supported denominations and the value of one credit wagered
- The minimum and maximum wager per spin
- The number of symbols per mechanical reel
- Payback percentage RTP
- Hit frequency, i.e., the percentage of times, on average, that the player will win something on each line
- If the game has a jackpot, the average number of plays before the jackpot is won
- If the game has a bonus, the average number of plays before the bonus is won
- Volatility Index, which is an indication of how much the game's payback percentage will vary for a given number of games played. Games with a high volatility index have a larger variance in the payback percentage per gambling session than do games with a low volatility index
- Diagrams of the line, scatter or pattern wins

Below is an example of a PAR Sheet:

Game / reels / lines/ scatter	Min/max wager ($)	Symbols per reel	Pay-back %	Hit freq (%)	Plays per jackpot	Jackpot amount (credits)	Plays per bonus	VI
DD/3/1	0.25/0.75	72/72/72	92.6	14.3	46,656	800/1,600/2,500	n/a	10.5
P1/3/1	0.25/0.75	256/256/256	98.0	13.6	114,131	1,000/2,000/5,000	n/a	16.3
P2/3/1	0.25/0.75	256/256/256	97.4	13.6	114,131	1,000/2,000/5,000	n/a	16.2
P3/3/1	0.25/0.75	256/256/256	95.0	13.0	114,131	1,000/2,000/5,000	n/a	17.4
P4/3/1	0.25/0.75	256/256/256	94.0	13.0	114,131	1,000/2,000/5,000	n/a	17.3
P5/3/1	0.25/0.75	256/256/256	92.5	12.9	133,153	1,000/2,000/5,000	n/a	16.1
P6/3/1	0.25/0.75	256/256/256	90.0	12.8	155,345	1,000/2,000/5,000	n/a	14.9
P7/3/1	0.25/0.75	256/256/256	87.5	12.3	155,345	1,000/2,000/5,000	n/a	15.6
P8/3/1	0.25/0.75	256/256/256	85.0	11.7	155,345	1,000/2,000/5,000	n/a	17.1
L1/5/15/S	0.05/3.75	47/46/48/50/50	96.2	5.2	8,107,500	10,000-50,000	1,730	n/a
L2/5/15/S	0.05/3.75	47/46/48/50/50	95.0	5.2	8,107,500	10,000-50,000	1,730	n/a
L3/5/15/S	0.05/3.75	47/46/48/50/50	94.0	5.2	8,107,500	10,000-50,000	1,730	n/a
L4/5/15/S	0.05/3.75	47/46/48/50/50	92.5	5.3	8,107,500	10,000-50,000	1,730	n/a
L5/5/15/S	0.05/3.75	47/46/48/50/50	90.0	5.0	8,107,500	10,000-50,000	1,730	n/a
L6/5/15/S	0.05/3.75	47/46/48/50/50	87.5	5.0	8,107,500	10,000-50,000	1,730	n/a
L7/5/15/S	0.05/3.75	47/46/48/50/50	85.0	4.9	8,107,500	10,000-50,000	1,730	n/a
M1/5/20/S	0.05/5.00	35/35/35/35/35	96.2	16.7	2,188,411	10,000-50,000	536/1,429	n/a
M2/5/20/S	0.05/5.00	35/35/35/35/35	95.0	16.7	2,188,411	10,000-50,000	536/1,429	n/a
M3/5/20/S	0.05/5.00	35/35/35/35/35	94.0	16.7	2,188,411	10,000-50,000	536/1,429	n/a
M4/5/20/S	0.05/5.00	35/35/35/35/35	92.5	16.7	2,188,411	10,000-50,000	536/1,429	n/a
M5/5/20/S	0.05/5.00	35/35/35/35/35	90.0	16.7	2,188,411	10,000-50,000	536/1,429	n/a
M6/5/20/S	0.05/5.00	35/35/35/35/35	87.5	16.5	2,188,411	10,000-50,000	536/1,429	n/a
M7/5/20/S	0.05/5.00	35/35/35/35/35	85.5	16.5	2,188,411	10,000-50,000	536/1,429	n/a

Note. freq = frequency; S = scatter wins are available; max = maximum; min = minimum; n/a = not applicable; VI = volatility index.

Below is an example of a pay table:

The goal of math testing is:

- To test that the RNG is truly generating random numbers, i.e., that no patterns can be seen over time
- To test that the game implementation matches the mathematical design documented in the PAR sheet
- To test all game specifications that affect the payback percentage
- To test all jurisdictional specifications that relate to the mathematics of the game

3.3 Platform Testing

3.3.1 Platform functional testing overview

The platform is the total package on which casino games can run. From a casino games perspective, this includes the platform's hardware, the EGM, the operating systems and runtime libraries that reside on the EGM and / or on the servers, for server centric systems. The casino games are distributed through the platform and run on top of the platform.

These platforms provide the following capabilities:

- Open architecture, to allow casinos to choose the content they want from multiple games
- They are a business-to-business platform for the casino industry as they provide the core casino management, bonusing, and business intelligence systems integration for casino players
- Online marketing tools to reach new players and obtain new valuable player data
- Mobile integration
- Custom, casino-branded look and feel
- Security features including geolocation and age verification
- Convenience features, such as payment processing
- Integrated affiliates module for player acquisition

The platform needs to be tested for gambling quality assurance and pre-compliance specifications. Each jurisdiction will have specific specifications for the platform and how it interacts with games. So, in addition to testing the game functionality, the platform functionality needs to be tested.

3.3.2 Areas covered by platform functional testing

Some of the areas that are covered during platform functional testing per the game specifications include:

- Power-up and down functionality
- Setup and configuration
- Operator mode – testing to determine that the casino operator can only do what the game specifications indicate

- General game play – testing to determine that the game launches and spot checks game play
- Accounting meter – testing to determine that all accounting functions follow the game specifications
- Credit cards, money, vouchers
- Tilt conditions
- Diagnostic logs
- Recovery test modes

There are also iGambling platforms which are online gambling portals, allowing casino operators the ability to provide mobile, social, and online play-for-free and wager-based gambling.

3.3.3 Platform compliance testing overview

Many areas of the platform compliance testing will be the same as those performed in platform functional testing, but they are tested against the jurisdictional specifications instead of the functional game specifications.

ISTQB® standard test plans and compliance checklists are used for platform compliance testing. These eliminate subjective evaluation and criteria in analyzing and certifying gambling platforms. The end objective of platform compliance testing is to determine that every platform level meets all the jurisdictional specifications including technical integrity, safety and security.

3.3.4 Areas covered by platform compliance testing

Some of the areas that are covered during platform compliance testing per the jurisdictional specifications include:

- Power-up and down
- Setup and configuration
- Operator mode – testing to determine that the casino operator can only do what the jurisdiction allows
- General game play
- Accounting meter – testing to determine that all accounting functions follows the rules
- Credit, bills, vouchers
- Diagnostic logs
- Recovery testing

- Graphics sequences
- Game messages
- System Integration between the platform, operating systems and printers

3.4 Casino System Testing

3.4.1 Casino system functional testing overview

Some of the areas that are covered during casino system functional testing per the game specifications include:

- Cashless wagering – testing to determine that systems which facilitate electronic transfers of money directly to or from a game or gambling machine meet the game specifications
- Peripheral integration – testing to determine that all peripherals integrate as per the game specifications
- Redemption – testing to determine that the system allows the user to properly get or win the proper amounts as specified
- Patron kiosk – testing to determine that the kiosk captures, reports and measures the player's play as specified
- End-to-end testing – testing to determine that a user can navigate the system as expected and that it works as specified using an actual flow through the system in a realistic end user scenario

3.4.2 Casino system compliance testing overview

ISTQB® standard test plans and compliance checklists are used for casino system compliance testing. They eliminate subjective evaluation and criteria in analyzing and certifying casino systems. The end objective of casino system compliance testing is to determine that every system functionality meets all the jurisdictional minimum control standards.

3.4.3 Areas covered by casino system compliance testing

Some of the areas that are covered during casino system compliance test per the jurisdictional specifications include:

- Slot accounting system (SAS) – testing to determine that all the transactions are recorded and accessible
- Revenue reporting – testing to determine that the casino system reports all revenue to the government and stakeholders correctly
- Minimum Internal Control Standards – testing to determine that the system meets all the jurisdictional specifications of the areas where the system will be implemented

3.5 Protocol Testing

3.5.1 Protocol functional testing overview

Protocols are a system of rules that allow two or more entities of a communications system to transmit information via any kind of variation of a physical quantity. These are the rules or standards that define the syntax, semantics and synchronization of communication and possible error recovery methods. Protocols may be implemented by hardware, software, or a combination of both. The protocols used in a casino include G2S, SAS and QCOM.

G2S is one of the protocols that connects the slot machines to the host systems. It is a communication protocol that allows networked gambling and controls the way information is exchanged between EGMs and host systems. This protocol enables software download, remote configuration, and remote software verification. G2S is comprised of multiple classes. Each class is responsible for supporting a specific function such as voucher, cabinet, printer, communications, etc. Each of these classes has specific commands and responses to support the function described in the class name. Also, each class must have an owner host. These hosts may be separate and distinct servers. They may all be owned by a single owner host or they may be any combination thereof.

The SAS protocol was initially designed to automate slot machine meter reporting and event logging. However, SAS has steadily evolved over the years to meet the needs of the industry, including player tracking, bonusing, ticketing and cashless gambling.

In Queensland, EGMs in clubs and hotels must be connected to an electronic monitoring system using the QCOM protocol. QCOM is an Australian version of G2S following the Queensland jurisdictional requirements.

Casino gambling protocol compatibility needs to be tested for gambling quality assurance, pre-compliance and compliance specifications. Each jurisdiction will have specific requirements for the protocol and how they interact with games. So, in addition to testing the game and the platform functionality, protocol functionality needs to be tested as well.

3.5.2 Areas covered by protocol functional testing

Some of the areas that are covered during protocol functional testing per the game specifications include:

- Communication link with EGM and the host
- Real time clock and time synchronization
- Host reporting of accounting meters
- Host reporting of peripherals and device drivers
- Host reporting of security doors
- Cashless transfer and TITO
- Host reporting of game status
- Non-volatile random-access memory (RAM) clears – testing to determine after physically pulling the plug on the EGM, when the EGM is again plugged in, it contains all the same data as before the plug was pulled.
- Rebooting
- Volume control
- Power off
- Power on

Various tools are available to facilitate the testing of communication protocols. Protocol simulation tools can simulate one end of the protocol conversation or the other. For example, if an EGM is being tested, a host protocol simulator can be used, or if the system is being tested, an EGM protocol simulator can be used. A protocol compliance verification tool can help determine that gambling products meet a basic standard implementation of a protocol. This type of tool helps to ensure interoperability. ITLs use protocol compliance verification tools to certify compliance of a protocol implementation.

3.5.3 Protocol compliance testing overview

Gambling protocols connect EGMs to the host systems. It is a communication protocol that allows networked gambling and controls the way information is exchanged between EGMs and host systems.

When performing protocol compliance testing, ISTQB® standard test plans and compliance checklists are used. Many areas of the protocol compliance testing will be the same as those performed in protocol functional testing, but they refer to the jurisdictional specifications as a test basis not the game specifications.

3.5.4 Areas covered by protocol compliance testing

Some of the areas that are covered during protocol compliance test per the jurisdictional specifications include:

- Communication link with EGM and host. The gambling machine hardware, the printers and the bill readers must utilize a communication protocol which ensures that erroneous data or signals will not adversely affect the operation of the gambling machine
- Host reporting of accounting meters. Any associated equipment that communicates with the host equipment must only pass the data or signals necessary for the operation of the game, such as acceptance of a specific bill denomination or valid coin in
- Power off and Power on. During the loss of communication with external associated equipment, any critical information related to revenue, integrity, and security of the equipment must be preserved and transmitted as soon as the communication resumes
- Progressive jackpots. The communication between the gambling machine and the progressive jackpot controllers must employ a secure, real time, two-way communication protocol. Progressive jackpot communications may only be used for progressive jackpot functions and to complement game approved functions.

3.6 Hardware Testing

3.6.1 Hardware functional testing overview

Hardware functional testing is based on examining the functionality of the different hardware components in the casino gambling ecosystem to determine the components versus the game specifications for each component.

3.6.2 Areas covered by hardware functional testing

The tester references the game specification as a test basis to look for defects in each of the hardware components. Some of the areas covered during hardware functional testing include:

- Testing to determine that all doors must resist forced illegal entry into the gambling machine and must retain evidence of any such forced entry
- Testing to determine that the game logic, program storage devices and any other circuitry affecting game outcome, accounting, communication, security and integrity including, but not limited to, game programs, RNG, RAM, read-only memory (ROM), and boot storage media, must be secured in a separately locked metal cabinet inside the gambling machine cabinet
- Testing to determine that the cashbox must be equipped with a separate keyed lock that is required to remove the bills from within the machine
- Testing to determine that gambling machine must be equipped with a tower light located on top of the gambling machine cabinet, or in case of bar top games, there must be at least one tower light that is shared among all games on the bar

Defects are often found in the following hardware functional testing areas:

- Cabinet door
- Monitor and touch screens
- Mechanical reels
- Bank note acceptor (BNA)
- Coin acceptor
- Coin diverter and drop box
- Printer
- Coin hopper
- Tower light
- Edge lighting

- Topper
- Firmware
- Drivers

3.6.3 Hardware compliance testing overview

Hardware compliance testing is based on testing the operations of the different hardware components versus the jurisdictional specifications of the areas where the hardware will be used. When performing hardware compliance testing, ISTQB® standard test plans and compliance checklists are used for each component and the integrated equipment.

3.6.4 Areas covered by hardware compliance testing

Some of the areas covered during hardware compliance testing per the jurisdictional specifications include:

- Cabinet Door – the cabinet must be of rigid construction and must resist forced illegal entry, tampering and willful damage using human force such as kicking, blows and bending, or using small tools such as a screwdriver
- BNA – must satisfy Hardware Integrity Standards – testing to determine whether an electrostatic discharge (ESD) impacts the integrity of a gambling machine. ESD testing is intended to simulate techniques observed in the field that may be used to disrupt the integrity of EGMs
- Tower Light – validate that the gambling machine is equipped with a tower light located on top of the gambling machine cabinet
- Printers – testing to determine that an audible alarm or the display of a message is provided to the player when a voucher is ready for collection and must not allow the printing of another voucher until the previous voucher has been collected
- Money Handling Device – testing to determine that any money handling devices such as coin boxes, note stackers or coin hoppers are equipped with a separate keyed lock that is required to remove the money from within, and that they accept only currency accepted in that jurisdiction, i.e., do not accept foreign currency and accept only enabled denominations
- Machine critical non-volatile memory (NVRAM) – testing to determine that the gambling machine is equipped with NVRAM and that all critical data is retained accurately for a minimum specified amount of time

- Player identification devices – testing to determine that the player identification device only accepts player identification cards configured to function within the venue or jurisdiction and detects different ones as invalid
- Touch screen display – testing to determine that touch screens are accurate and have a calibration method available to recalibrate to maintain accuracy
- Tilt conditions – testing to determine that the appropriate tilt conditions are shown on the gambling machine in the case that any of the required hardware components are no longer detected as being connected or are experiencing an error condition of some kind
- Peripheral device communication protocol – testing to determine that it implements all functions to be supported within the jurisdiction

3.6.5 Hardware integration testing overview

Hardware integration testing is based on how each of the different hardware components integrates into the casino gambling ecosystem. Testing two or more integrated hardware components in a single environment will often produce failures caused by interface defects. This attempt to cause failures of the integrated hardware components is usually tested against a single casino platform.

3.6.6 Hardware integration defects

Hardware integration defects are often found in the following areas:

- BNA
- Hopper payouts
- Edge lighting
- Printers
- Coin acceptors
- Light tower functionality
- Topper
- LCD buttons
- Cabinet door
- Monitor and touch screens
- Mechanical reels
- Firmware
- Drivers

3.6.7 Test types for hardware integration testing

Testers perform the following test types for hardware integration testing per the game specifications include:

- Interface testing
- Functional testing
- End-to-end testing
- Reliability testing
- System-level fault injection testing

3.7 Remote Gambling Testing

3.7.1 Remote gambling testing overview

Remote gambling system testing determines that all the tools manage every area of the casino, streamline operations, and attract and retain players.

Some of the areas covered during remote gambling testing per the game specifications and the jurisdictional specifications include:

- Cashless Wagering Functions – testing to determine that systems which facilitate electronic wallet functions meet the game specifications. Such functions may be the transfer of money directly to or from a game or gambling machine in a casino environment, and deposit and withdraw money in the electronic wallet, especially when used for online gambling
- Progressive Jackpot Functions – testing to determine that systems which facilitate managing of progressive jackpot games meet the game specifications
- Central Monitoring Functions – testing to determine that the system meets specifications for all monitoring functions supported by the system. Such functions may include monitoring of credit issuance and redemption to player, money added or removed from a gambling machine by a casino operator and all metering information
- Central Control Functions – testing to determine that the system meets specifications for all control functions supported by the system. In a casino environment, such functions may include control of enabling/disabling gambling machines, enabling/disabling specific games on a gambling machine, downloading new software to a gambling machine, remotely configuring a gambling machine, and validating installed software on gambling machines. In a lottery environment, this may include facilitating the sale of lottery tickets and managing lottery draws
- Reporting Functions – testing to determine that the system meets the minimum required reporting capabilities for a jurisdiction. In a casino system, this would include at a minimum:
    - Net win/revenue report for each gambling machine
    - Casino Drop report for each medium dropped
    - Metered versus actual jackpot report
    - Theoretical hold versus actual hold report
    - Significant event log for each gambling machine
    - Other reports as required by individual jurisdictions

- Backup and Recovery Functions – testing to determine that the system has sufficient redundancy and modularity so that if any single component fails, gambling can continue

3.8 System and Network Security Testing

3.8.1 System and network security testing overview

System and network security testing to determine that:

- Regulatory network security specifications are met
- Network security design principles are implemented both at the hardware and software level
- The network performs its critical functions correctly
- Sensitive information has been protected through the secure transport of gambling messages between two endpoints

This can be achieved by ensuring the secure service specifications of confidentiality, data integrity, authenticity and availability are met. Confidentiality ensures that information is accessible only to those authorized to have access. Data integrity ensures that the data received is the same as the data that was sent. Authenticity confirms the identity of the specific sender of a message or data. Availability ensures service and data are accessible when needed.

The test team validates that all software on the network is an authentic copy of the original software as distributed by its manufacturer. This can be verified by ensuring that a solution such as the Game Authentication Terminal (GAT) protocol is properly implemented. GAT is a Gambling Standards Association communication protocol standard used by regulators and casino operators to identify and authenticate gambling software and firmware deployed in venues and casinos. The test team also validates that the network and all its services are secured from unauthorized modification, destruction or disclosure by ensuring the proper physical access controls have been implemented.

3.9 Jackpot Controller Testing

3.9.1 Jackpot controller testing overview

A jackpot controller is a system that can remotely manage jackpots and progressive jackpots, update jackpot settings, emphasize jackpot values and trigger special effects. A jackpot controller can manage more than a thousand slot machines.

A progressive jackpot is a jackpot for an EGM where the amount of the jackpot increases incrementally with each game played, until the jackpot is won. Normally, multiple gambling machines are linked together to form one large progressive jackpot that grows as multiple players are contributing to the jackpot at the same time.

3.9.2 **Areas covered by** jackpot controller testing

Some of the jackpot controller areas to test include:

- Jackpot management
- EGM interfaces
- Bonus mode activation
- Jackpot display system
- Incremental contributions – the difference between the amount of a progressive jackpot and the amounts added as the result of wagers
- Entering a bonus mode time period when the current value is brought to or exceeds the bonus mode activation value as a result of unit bet information from a particular gambling machine
- Bonus jackpots are awarded based on the payout table that is being used when the bonus is won
- Subtracting bonus jackpots from the current value
- Ending the bonus mode time period when the jackpot is won
- Testing the system when the progressive jackpot must start over

3.10 Online gambling testing

3.10.1 Online gambling testing overview

Online gambling is defined as the act of wagering or betting on a result which depends on chance, through the Internet. The gambling types available on the Internet include Casino Games, Sports Betting, Card Games, Fantasy Sports, Lotteries and Social Gambling. Online games need to meet high user expectation, comply with rigorous legislation including geolocation, and be ready for concurrent release across multiple platforms.

The Internet allows for access to these games of chance through online websites, downloadable applications, and online platforms. Online gambling is accessed through multiple devices such as computers, smart phones, tablets, and video gaming consoles.

The video game consoles and online gambling worlds have merged. Some video game consoles offer realistic and authentic playing experience together with an outstanding design and an easy sign-in procedure. Some gambling machine manufacturers allow players to select their own avatar and adjust it according to their own wishes and preferences, and play casino games, such as blackjack, instant keno, online slot machines, roulette, and Texas Hold'em on video game consoles. All these devices complicate the testing requirements to be completed by online gambling testers.

3.10.2 **Areas covered by** online gambling testing

Some of the online gambling areas to test include, but are not limited to:

- Ensure that the game requested is the game that is loaded for each player for multi-player games
- Ensure that the game meets functional requirements, is playable, and that game play corresponds to the rules of the game
- Ensure that the game/system is compliant with relevant gambling standards including geolocation and security
- The RNG is correctly implemented
- The RTP calculation for each game is accurate and that the player history is correct
- Player administration module such as player registration and accounts, protection, privacy and backup and recovery

- Financial transactions between payment gateways and the individual users
- Backend financial transactions, analytics and administrative services
- Correct game operation if disruptions occur. Game operation includes areas such as:
    - Screen displays
    - Speed and Performance
    - Connectivity including delays, disruptions and recovery
    - User Interface
    - Input/Output
    - Performance
    - Application stability
    - Security
    - Multiple applications
    - Event Handling
    - Memory usage
    - Messaging and calls
    - Date and time including daylight savings and time zones
    - Error handling
- Game logs, game interruptions versus the game and legal requirements
- 3rd Party services
- Single player and multiplayer tournaments, and all possible stakes
- Collusion detection and prevention mechanisms for multiplayer games
- Verification of game history and audit logs, player reports, payment reports
- Online gambling websites using multiple desktop browsers and various mobile device browsers
- System reports – performance reports for games, player reports, and payments

3.10.3 Test types for online gambling testing

Testers perform the following test types for online testing:

- Functional and exploratory testing
- Browser testing for accessibility, usability and compatibility
- Portability testing for mobile phones, tablets, video game consoles, TV platforms, and other devices
- Interoperability testing
- Compatibility testing
- Network testing
- Platform testing
- Load and performance testing
- RNG testing as required
- Pre-compliance testing
- Compliance testing, as required
- Security testing is performed at the application, network and host level
- Payment testing to ensure that financial transactions between payment gateways and the individual users functions as required
- Scalability testing to meet future growth requirements and handle the load in an acceptable timeframe
- Affiliate testing to determine that affiliates that bring in players are properly managed and remunerated
- Testing that the gambling system is reliable and resilient and works on the intended mobile devices
- System integration testing with third party providers

4. References

4.1 Gambling Control Boards

4.1.1 Inter-regional associations

- Gaming Regulators European Forum (GREF)
- International Association of Gaming Regulators (IAGR)
- North American Gaming Regulators Association (NAGRA)

4.1.2 Regional and Tribal associations

Africa

- Botswana: Botswana Gambling Authority
- Ghana: Ghana Gaming Commissions
- Liberia: National Lottery Authority
- Malawi: Malawi Gaming Board
- Mauritius: Mauritius Gambling Regulatory Authority
- Seychelles: Seychelles Financial Services Authority
- Swaziland: Swaziland Gaming Board
- Uganda: Uganda Lotteries and Gaming Regulatory Board
- Zimbabwe: Zimbabwe Lotteries and Gaming Board
- South Africa:
    - Eastern Cape Gambling and Betting Board
    - Free State Gambling and Liquor Authority
    - Gauteng Gambling Board
    - KwaZulu-Natal Gaming & Betting Board
    - Limpopo Gambling Board
    - Mpumalanga Economic Regulator
    - National Gambling Board
    - National Lotteries Commission
    - North West Gambling Board
    - Western Cape Gambling & Racing Board

Asia and Oceania

- Macau: Macau Gaming Inspection and Coordination Bureau
- Singapore: Casino Regulatory Authority of Singapore
- New South Wales, Australia: Gaming Tribunal of New South Wales
- Queensland, Australia: Queensland Office of Gaming Regulation/Queensland Gaming Commission
- Victoria (Australia): Victorian Commission for Gambling Regulation
- South Australia: South Australia Independent Gambling Authority

- New Zealand: Department of Internal Affairs & New Zealand Gambling Commission
- Northern Marianas Islands: Tinian Casino Gaming Control Commission
- Samoa: Gambling Control Authority
- Korea:
    - The National Gaming Control Commission
    - Casino Regulatory Division, Jeju Special Self-Governing Province

Central America, Caribbean and South America

- Antigua and Barbuda: Financial Services Regulatory Commission
- Argentina: Loteria Nacional S.E.
- Bahamas: Gaming Board for the Bahamas
- Brazil: Brazilian Lottery Regulation General Coordination – Ministry of Finance
- Colombia: Coljuegos EICE
- Curaçao: Curaçao Gaming Control Board
- St. Lucia: St. Lucia Gaming Authority
- Peru: Ministry of Commerce and Tourism
- Virgin Islands:
    - Casino Control Commission
    - Division of Gaming Enforcement
- Jamaica:
    - Betting, Gaming and Lotteries Commission
    - Casino Gaming Commission

Europe

- Gibraltar: Gibraltar Regulatory Authority
- Hungary: Gaming Board of Hungary
- Malta: Malta Gaming Authority
- Belgium: Belgium Gaming Commission
- Bulgaria: State Commission on Gambling of the Republic of Bulgaria
- Czech Republic: Ministry of Finance, Gambling and Lottery Supervision Department
- Finland: National Police Board, Gambling Administration
- France: Autorite de Regulation des Jeux En Ligne (ARJEL)
- Greece: Hellenic Gaming Commission
- Ireland: Regulator of the National Lottery
- Lithuania: Gaming Control Authority
- Montenegro: Games of Chance Administration
- Netherlands: Netherlands Gaming Authority
- Spain: Ministry of Finance, General Directorate of Gaming Regulation and Supervision

- Switzerland: Federal Gaming Board
- Denmark: The Danish Gambling Authority
- Norway: Norwegian Gaming and Foundation Authority - part of Ministry of Culture
- Portugal: Gaming Inspection and Regulation Services - Portuguese Tourism Institute
- Slovenia: Office for Gaming Supervision - part of the Ministry of Finance
- Sweden: National Gaming Board
- United Kingdom: Gambling Commission
- Alderney: Alderney Gambling Control Commission
- Isle of Man: Isle of Man Gambling Supervision Commission

Canada

In Canada, gambling is essentially regulated exclusively by the provinces rather than federal law. Regulatory agencies include:

- British Columbia Gaming Policy and Enforcement Branch
- Kahnawake Gaming Commission
- Nova Scotia Alcohol and Gaming Authority
- Alcohol and Gaming Commission of Ontario
- Quebec Régie des Alcools des Courses et des Jeux

United States

In the United States, gambling is legal under federal law, although there are significant restrictions pertaining to interstate and online gambling.

States within the United States

Individual states have the right to regulate or prohibit the practice within their borders. Regulatory agencies include:

- Arizona Department of Gaming
- California Gambling Control Commission
  - California Bureau of Gambling Control
- Colorado Division of Gaming
- Connecticut Division of Special Revenue
- Delaware Lottery
  - Delaware Division of Gaming Enforcement
- Illinois Gaming Board
- Indiana Gaming Commission
- Iowa Racing and Gaming Commission
- Kansas Racing and Gaming Commission

- Louisiana Gaming Control Board
- Maine Gambling Control Board
- Maryland Lottery (Controls both the lottery and the state's slot machine program)
- Massachusetts Gaming Commission
- Michigan Gaming Control Board
- Mississippi Gaming Commission
- Missouri Gaming Commission
- Nevada Gaming Commission[1]
    - Nevada Gaming Control Board
- New Jersey Casino Control Commission
    - New Jersey Division of Gaming Enforcement
- New Mexico Gaming Control Board
- New York State Gaming Commission
- Ohio Casino Control Commission
- Pennsylvania Gaming Control Board
- South Dakota Commission on Gaming
- Washington State Gambling Commission
- West Virginia Lottery Commission

Tribes in the United States

In the United States, some Native American tribal nations have established their own gaming control boards for the purpose of regulating tribe-owned casinos located within reservations. Although the tribal nation also owns the casino, appointing an independent gaming control board to oversee regulatory activities provides tribal members with assurances that the casino is operated within expected standards and that tribal revenue is accurately collected and reported. Native American casinos are subject to the provisions of the Indian Gaming Regulatory Act, which is enforced by the National Indian Gaming Commission (NIGC). The NIGC establishes minimum internal control standards and other requirements that each Native American gaming control board must follow. However, the NIGC does not have jurisdiction over state-regulated entities.

4.2 Standards

For the gaming devices in casinos standards please refer to the below link:
https://www.gaminglabs.com/images/pdfs/new/GLI-11-Gaming-Devices-V3-0.pdf

For the progressive gaming devices in casinos standards please refer to the below link:
https://www.gaminglabs.com/images/pdfs/new/GLI-12-v2-1-FINAL.pdf

For the on-line monitoring and control systems and validations systems in casinos standards please refer to the below link:
https://www.gaminglabs.com/images/pdfs/new/GLI-13-v2-1-Standard.pdf

For the finite scratch ticket and pull tab systems standards please refer to the below link:
https://www.gaminglabs.com/images/pdfs/new/GLI-14-v2-2-Standard.pdf

For the electronic bingo and keno systems standards please refer to the below link:
https://www.gaminglabs.com/images/pdfs/new/GLI-15-v1-3.pdf

For the cashless systems in casino standards please refer to the below link:
https://www.gaminglabs.com/images/pdfs/new/GLI-16-v2-1-Standard.pdf

For the bonusing systems in casino standards please refer to the below link:
https://www.gaminglabs.com/images/pdfs/new/GLI-17-v1-3-Standard.pdf

For the promotional systems in casino standards please refer to the below link:
https://www.gaminglabs.com/images/pdfs/new/GLI-18-v2-1-Standard.pdf

For the interactive gaming systems standards please refer to the below link:
https://www.gaminglabs.com/images/pdfs/new/GLI-19-Interactive-Gaming-Systems-v2-0-Final.pdf

For the kiosks standards please refer to the below link:
https://www.gaminglabs.com/images/pdfs/new/GLI-20-v1-5-Standard.pdf

For the client-server systems standards please refer to the below link:
https://www.gaminglabs.com/images/pdfs/new/GLI-21-v2-2-Standard-Final.pdf

For the video lottery terminals standards please refer to the below link:
https://www.gaminglabs.com/images/pdfs/new/GLI-23-VLT-v1-0.pdf
For the electronic table game system standards please refer to the below link:
https://www.gaminglabs.com/images/pdfs/new/GLI-24-v1-3-Standard.pdf

For the dealer controlled electronic table game standards please refer to the below link:
https://www.gaminglabs.com/images/pdfs/new/GLI-25-v1-2-Standard.pdf

For the wireless gaming systems standards please refer to the below link:
https://www.gaminglabs.com/images/pdfs/new/GLI-26-Wireless-Systems-Standard-2-0.pdf

For the network security best practices please refer to the below link:
https://www.gaminglabs.com/images/pdfs/new/GLI-27-Network-Security-Best-Practices-v1-1.pdf

For the player user interface system standards please refer to the below link:
https://www.gaminglabs.com/images/pdfs/new/GLI-28-Player-User-Interface-Systems-v1-0.pdf

For the card shufflers and dealer shoes standards please refer to the below link:
https://www.gaminglabs.com/images/pdfs/new/GLI-29-Card-Shufflers-and-Dealer-Shoes-v1-0-Final-2012-07-16.pdf

For the electronic raffle system standards please refer to the below link:
https://www.gaminglabs.com/images/pdfs/new/GLI-31-Electronic-Raffle-Systems-v1-1.pdf

For the event wagering systems standards please refer to the below link:
https://www.gaminglabs.com/images/pdfs/GLI-33-Event-Wagering-Systems-v1.0.pdf

For the ISO 27001 International Standard for Information Security Management Practices please refer to the below link:
https://www.iso.org/obp/ui/#iso:std:iso-iec:27001:ed-2:v1:en

For the World Lottery Security Control Standard (WLA SCS) please refer to the below link:
https://www.world-lotteries.org/images/documents/security/scs/scs-standards/scs-2016/WLA-SCS-2016_ENGLISH_November_2016_28-April-2017.pdf

For the Security and Privacy Controls Standard for Federal Information Systems and Organizations NIST 800-53 standard please refer to the below link:
https://csrc.nist.gov/CSRC/media//Publications/sp/800-53/rev-5/draft/documents/sp800-53r5-draft.pdf

5. Appendices

5.1 Table of Acronyms

Acronym	Glossary Term
BNA	bank note acceptor
CDU	customer display unit
CMS	central management system
EFT	electronic funds transfer
EGM	electronic gaming machine
ESD	electrostatic discharge
GAT	Game Authentication Terminal
G2S	Game to System
ITL	independent test lab
NVRAM	non-volatile memory
PAR	probability accounting report
PDU	personal display unit
POS	point of sale
QCOM	the Queensland Protocol for gaming machines
RNG	random number generator
RTP	return to player
SAS	slot accounting system
SMIB	slot machine interface board
TITO	ticket-in/ticket-out
VLT	video lottery terminal

5.2 Glossary of Gambling Industry Domain-Specific Terms

Glossary Term	Definition
account based play (cashless)	A system that provides players the ability to establish a monitory player account with the lottery to pay for game play
attract mode	A pre-recorded demonstration of a video game that is displayed when the game is not being played
audit mode	The mode that allows EGM meters and statistics to be displayed
bank controller	A controller that collects and stores the data obtained from the SMIBs
bank note acceptor (BNA)	A device for accepting paper money
bet	An act of risking a sum of money on the outcome of a future event
bingo machine	A machine that is similar to a traditional slot machine but is actually a game of electronic bingo on which the outcomes are obtained from a centralized bingo server that offers cashless input methods
business intelligence server	A server that provides data warehousing and business analytics
cashbox	A device that contains the money put into the EGM
cashless wagering server	A server that allows for cashless transactions either through ticket-in/ticket-out functionality or through electronic funds transfer on electronic gaming machines
casino accounting system	A system that provides the ability to manage all aspects of the casino system with financial integrity and reporting
casino drop report	A monthly report provided by casinos that shows the amount of money exchanged for chips in a casino (drop) and the amount retained by the casino (win) based on a rolling year average for the previous twelve months
centralized bingo server	A server that provides an online bingo network that bingo site operators use to serve and host the bingo games
central management system (CMS)	A system that provides the ability to monitor game play, track, record and report security exceptions at a VLT and/or site controller, and monitor network availability
central server	A device that downloads games to slot machines and runs the games
certification board	A regulator that defines the rules with which the games in the gambling industry must comply

Glossary Term	Definition
chance	The likelihood of something happening
collusion	Simultaneous transmission between two or more network domain devices or nodes
coin acceptor	A device that accepts coins put into an EGM
coin diverter	A device that takes the coins from the coin hopper and drops them into the drop box
coin hopper	A container that holds the coins that are immediately available for payouts
customer display unit (CDU)	A device that allows players to view their order, tax, discounts, and loyalty information during the checkout process
data collection unit	Software that resides in the EGM that stores data collected in the EGM, sends it to the banking and game servers, stores the results of the game playback and payouts, and then distributes it to the EGM
distributed game content management server	A server that controls the selection, scheduling, distribution and auditing of VLT software to VLTs at remote retail sites
drop box	A container located in a slot machine's base where excess coins are diverted from the coin hopper
edge lighting	A lighting arrangement for an EGM that includes an edge and a lamp for transmitting light through at least a portion of the panel via the edge
electronic funds transfer (EFT)	The electronic transfer of money from one bank account to another, either within a single financial institution or across multiple institutions, via computer-based systems, without the direct intervention of bank staff
electronic gaming machine (EMG)	The physical machine that casino games are played on by one player at a time and do not require the involvement of casino employees to play
electronic gaming machine (EGM) meter	A device that tracks the activity on an EGM
electrostatic discharge (ESD)	The sudden flow of electricity between two electrically charged objects caused by contact, an electrical short, or dielectric breakdown
escaped compliance defect	A defect that has been missed by an ITL during pre-compliance testing and is found either by the compliance test team, the customer acceptance test team, or a player once the product has been deployed

Glossary Term	Definition
fantasy sports	A type of online game where participants assemble imaginary or virtual teams of real players of a professional sport
finite pool model	The game outcome obtained by a VLT from a database of pre-determined outcomes
first pass percentage	The percentage of games that receive certification from an ITL on the first submission of a product
future wager	A bet made with a long-term horizon measured in weeks or months that is placed before the sports season starts or on occasion midway through a season, and if successful, is paid at the end of the season
gambling	The money wager, referred to as stakes, on an event with an uncertain outcome, with the primary intent of winning additional money and/or material goods
gambling machine	A machine that enables gambling
gambling hardware	The physical components which make up the gambling ecosystem
gambling platform	The entity which contains the hardware, the EGM, the operating systems and runtime libraries that reside on the EGM and / or on the servers on which casino games run
gambling regulatory commission	An organization that is responsible for approving every game played in its jurisdiction after the ITL certifies that the game meets the commission's regulatory specifications
gambling software	A set of components containing source code, game graphics, mathematical models, sound effects and music which grouped together, make a game that is installed on a gambling machine
gambling standards association	An international trade association that creates standards for gambling machine manufacturers, suppliers, operators and regulators to facilitate the identification, definition, development, promotion and implementation of those standards to enable interoperability, innovation, education and communication for the benefit of the entire gambling industry
game alpha phase	The gambling industry software development lifecycle phase in which game play functionality is developed and implemented, math functionality is completed, video and audio components are partially finished, and the game contains the major features

Glossary Term	Definition
Game Authentic Terminal (GAT)	The process performed by the host to verify or validate the hash code value result of the files on the EGM terminal that is triggered by an event on the VLT
game design phase	The gambling industry software development lifecycle phase in which the development team produces the first version of a Game Design document incorporating all or most of the material from the product development plan, the artwork, mathematical models and prototype results
game developer	A developer who independently develops a casino game and then tries to find a manufacturer or casino to distribute it
game product phase	The gambling industry software development lifecycle phase in which the final product development occurs, and when assets and source code for the game are produced
game prototype phase	The gambling industry software development lifecycle phase in which a small team of programmers, mathematicians and artists begin working on prototypes showcasing one or more features that product management would like to see incorporated in the final game
game protocol converter	A server that translates the protocol implemented on a VLT to the protocol understood by a central server
Game to System (G2S)	A protocol that connects a slot machine to a host system
geolocation	The identification or estimation of the real-world geographic location of an internet connected device
hardware generator	A device that generates random numbers from a physical process rather than a computer program
handicap	The practice of assigning advantage through scoring compensation or other advantage given to different contestants to equalize the chances of winning
hit frequency	The percentage of times, on average, that the player will win something on each pay line on the slot or VLT
instant ticket	A numbered ticket from a pre-determined finite pool of ticket outcomes
Integrated affiliates module	The module that manages when players may be coming into a game from different places or casinos
jackpot controller	A system that can remotely manage jackpots and progressive jackpots, update settings, emphasize jackpot values and trigger special effects

Glossary Term	Definition
jurisdiction	A geographical area which has a set of standards and rules which need to be adhered to by casinos, sports books, lotteries and online gambling sites
linked progressive jackpot	A jackpot where bets placed on gambling machines linked together within a venue to contribute to a progressive jackpot
lottery	A type of gambling that involves selling numbered tickets and giving prizes to holders of winning tickets
Lottery Central Management System	A system that provides lottery operators with the technology required to manage their networks while providing their players with an optimal gaming experience
machine manufacturer	An organization that develops its own games and hardware
major field issue	A defect that stops a game from playing, provides erroneous payouts, or causes a deviation from any of the rules of engagement that are required for certification
mechanical reel	A physical reel that spins inside a slot machine
metered versus actual jackpot report	A report from an auditor that compares the count of the metered bills to the physical bills
minor field issue	A defect that will force a machine manufacturer to correct a game that is in the field within a given timeframe
mobile gambling	A type of online gambling on a mobile device
moneyline bet	A bet that is successful only if the chosen team wins the game outright
multimedia display	A display of in-store advertising of lottery products, upcoming lottery promotions and winning numbers
multi-site progressive jackpot	A jackpot where bets placed on gambling machines linked together across multiple venues contribute to a progressive jackpot
non-volatile memory (NVRAM)	A type of computer memory that can retrieve stored information even after having been power cycled
odds	The probability that one event will happen rather than another
online gambling	All areas of gambling offered via Internet, mobile, wireless in-venue, and interactive-TV channels
online platforms	A digital distribution platform for video games.
over/under bet	A bet made on whether an outcome will be over or under an estimated outcome
patron kiosk	A self-serve lottery terminal that communicates with a server over standard TCP/IP sockets
PAR sheet	Documentation that details how a game is designed, including pay table, mechanical reel strips, and any other pertinent information on the rules of the game

Glossary Term	Definition
parlay	A bet that rewards a large payout for successfully making every one of a set of multiple selections within a single wager
pay line	The icons shown in the center of each reel of a slot machine used to form a combination, and then used to lookup the amount won, if any, in the pay table
pay table	The list of payouts on a VLT or slot machine that shows how many coins the player will win for each combination of symbols on the VLT or slot machine for the number of coins bet
personal display unit (PDU)	A device that displays the information privately to the player, like when an account is created on a device.
player loyalty program	A set of structured marketing strategies designed to encourage players to continue their game play in return for receiving rewards
player services manage	An application that manages a players account
player services server	A server that supports player loyalty, player rewards and responsible gaming functionality
player tracking card	A player's account card
point of sale (POS)	The time and place where a transaction is completed
(progressive) jackpot	A prize or payout (jackpot) which continues to increase by a small percentage of each unsuccessful wager made, until a successful wager is made
progressive jackpot display	The display of the current amount of the progressive jackpot
progressive jackpot server	A server that manages multiple jackpot controllers and different progressive jackpot games, and monitors and collects all related data for analytics and auditing of progressive jackpots within a venue or across multiple venues
progressive parlay	A bet that rewards a payout lower than a parlay payout for successfully making every one of a set of multiple selections within a single wager but makes a reduced payout if only some of the selections are successful
progressive server	A server that manages progressive game play
QCOM	the Queensland Protocol for gaming machines
random number generator (RNG)	A computational or physical device designed to generate a sequence of numbers that lack any pattern, so they are random

Glossary Term	Definition
redemption	The action of regaining or gaining possession of something in exchange for payment
regulator	A government agency responsible for regulating casino and online gambling in a defined geographical area and for enforcing gaming law in general
responsible gambling	A set of initiatives aimed at educating players to play responsibly
resubmittal factor	The number of times a game must be resubmitted to the ITL to pass certification
retailer	The licensed owner of the casino or lottery terminal
return to player (RTP)	The expected percentage of money wagered on a gambling machine that is returned to players in the form of winnings over a large number of spins or over time
rules and pay and help screens	Screens available to a player on an EGM to provide guidance on the rules and payouts for the game
security control standard (SCS)	The standard designed to help lottery and gambling organizations around the world achieve levels of control that are in accordance with both generally accepted information security and quality practices as well as specific industry requirements
selection process	The process that a gambling machine uses to determine and display the outcome of a game
sensitive data	Information that is protected against unwarranted disclosure
simulated racing	Computer software that attempts to accurately simulate auto or horse racing
site controller	A controller that communicates and monitors VLTs to ensure they are online, records gameplay transactions, cash-in/cash-out transactions and security exceptions, and may act as a protocol converter by translating the protocol implemented on the VLT to the protocol understood by the central server
slot accounting system (SAS)	A casino protocol that captures slot machine meter reporting and event logging
slot machine	A casino gambling machine that contains mechanical reels or a video display, a random number generator, and optional currency input and output devices
slot machine interface board (SMIB)	A casino gambling machine that contains mechanical reels or a video display, a random number generator, and optional currency input and output devices
social gambling	Gambling on social media

Glossary Term	Definition
sports betting	The activity of predicting a sports result and placing a wager on the outcome
spread	A number assigned by a bookmaker which handicaps one team and favors another
spread betting	A bet that is successful only if the chosen team wins the game by the spread
standalone progressive jackpot	A jackpot where bets placed on an individual gambling machine increment the progressive jackpot
table game	A type of casino game that is played on a table and operated by one or more live dealers
theoretical hold versus actual hold report	A report that shows the amount of money a casino can theoretically anticipate earning from a particular gambling machine over the long run
ticket-in/ticket-out (TITO)	A slip of paper with a barcode indicating the amount of money represented
tilt switch	A switch that makes or breaks a circuit if the gambling machine is tilted or otherwise tampered with and triggers an alarm
topper	A graphic plex or video display on top of the terminal that can be viewed 360 degrees for increased floor presence and recognition
video lottery terminal (VLT)	A type of gambling machine that allows players to bet on the outcome of a game that is operated by government lotteries
volatility index	The amount that the game's payback percentage will vary for a given number of games played
voucher	A piece of paper that is printed when a player cashes out an EGM that entitles the holder to a certain amount of money
World Lottery Association	A member-based organization to advance the interests of state-authorized lotteries