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6400 Roberts Street, Suite 210
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**Evaluating
Laboratory:**

Gaming Laboratories International, LLC
600 Airport Road, Lakewood, NJ 08701 USA

Report Recipient:

Jadestone Networks (Malta) Ltd
C49803
Vincenti Buildings, Suite 816, 28/19
Strait Street
Valletta, VLT 1432
Malta

Jurisdiction:

Malta

**Technical Standard
for Testing:**

Lotteries and Gaming Authority's **Remote Gaming
Regulations, 2004, Third Schedule – Technical
Requirement for Gaming System.**

Software Supplier:

Jadestone Networks (Malta) Ltd
C49803
Vincenti Buildings, Suite 816, 28/19
Strait Street
Valletta, VLT 1432
Malta

Submitting Party:

Jadestone Networks (Malta) Ltd
C49803
Vincenti Buildings, Suite 816, 28/19
Strait Street
Valletta, VLT 1432
Malta

Product Tested:

CasinArena Random Number Generator

Evaluation Period:

07 December 2012 to 09 January 2013

File Number:

RN-332-WII-12-01

Testing Result:

Subject to the Conditions of Evaluation (page 5):
Recommended for Approval

Report Sections:

- Software Product Details
- RNG Evaluation
- Conditions of Evaluation
- Terms and Conditions



Software Product Details

GLI performed a Random Number Generator (RNG) evaluation on the Jadestone Networks (Malta) Ltd (hereafter, Jadestone) "CasinArena" Casino RNG to be used with the following game types and parameters:

Game Type	Selections	Analyzed Ranges	Replacement
Slot	1	0-7	N/A
Slot	1	0-14	N/A
Slot	5	0-25	Yes
Slot	3	0-48	Yes
Slot	2	0-63	Yes
Slot	5	0-89	Yes
Slot	1	0-132	N/A
Slot	1	0-254	N/A
Slot	1	0-998	N/A
Slot	4	0-1638	Yes
Slot	1	0-9998	N/A

The Jadestone "CasinArena" Casino RNG was evaluated for implementation within the following games:

Game Name	GLI Project Reference Number
Zeus	MO-332-WII-12-02
Wizard of Oz	MO-332-WII-12-03
Bruce Lee	MO-332-WII-12-04
Leprechaun's Fortune	MO-332-WII-12-05
Kingdom of Titans	MO-332-WII-12-06
Black Knight	MO-332-WII-12-07
Casino Island	MO-332-WII-12-08
Super Jackpot Party	MO-332-WII-12-09
Gorilla Chief 2	MO-332-WII-12-10
Kronos	MO-332-WII-12-11
Magic Wand	MO-332-WII-12-12
Buffalo Spirit	MO-332-WII-12-13
Invaders from the Planet Moolah	MO-332-WII-12-14
Lancelot	MO-332-WII-12-15
Reel'Em In	MO-332-WII-12-16

The Jadestone "CasinArena" Casino RNG is intended for operation with a 32 or 64 bit Windows Server 2008 R2 Install.



For version-control of the Jadestone "CasinArena" Casino RNG, GLI gathered Message Digest Five (MD5) and Secure Hash Algorithm One (SHA-1) checksums of the following files:

File Name	MD5 Checksum	SHA-1 Checksum
_Rng.dll	67CAC7D51C4D1DC78C5D6869934110E5	7B350A896CE05E74858DC55766F393567C70D551
r250.cpp	E43D11D88B6B8B87C5885DB50CDACB68	1210CB6F83014FD5D1C37AF4A40CD9CBF86E926A
r250.h	2CAB6C04B9057639FC8D442F7741B5E0	6EF4EC695455E8D2EF50BC1A8FE9EF9835678BE3
randlcg.cpp	F5873A0AFCB9A722FDC11C2F7E88ADA4	EDC37AC1B69271B6838F6498850DEE13B4DF4A25
randlcg.h	D4570E2A1D85089C2B3830B369333FEF	EF0690B549ED47AC59870CD6418EE76800588558
main.cpp	1C6E2CCF2BC7E16BD98C8F44F73DF198	C9CE9E1510EECB100975CCAEAD625C85C2CACE7A
WmsRng.cpp	6CB2711ED4331E944D161BC525550C8A	F3FC2642BDE85940AD9D72331709ADE47007D88B
WmsRng.h	271CD681AD15FC0D73412652A1BC087C	8B4F8B916A2847F53DA9AEDE6D11AAC3AF9EA0A9

RNG Evaluation

GLI's RNG Evaluation included (but was not necessarily limited to) the following elements:

- General RNG Analysis
 - Submitted Documentation Review
 - Source Code Read
 - Theoretical Mathematics Analysis
 - Assessment of the RNG Period
 - Determination of the RNG Range,
 - Investigation of the Seeding / Re-Seeding, and
 - Inspection of the Background Cycling / Activity, and
- Final Outcome Distribution Tests

In addition, GLI's evaluation of the Jadestone "CasinArena" Casino RNG was performed with the aim of identifying and detailing system weaknesses and potential issues of non-compliance with applicable requirements from the following appointed standard:

The Technical Standards Document (TSD) for the jurisdiction of Malta, the **Remote Gaming Regulations, 2004, Third Schedule – Technical Requirement for Gaming System**, which states the following RNG-specific requirements:

3. The gaming system must satisfy the following criteria for randomness, following Schneier:-
 - (a) the data must be randomly generated, passing appropriate statistical tests of randomness;
 - (b) the data must be unpredictable, i.e. it must be computationally infeasible to predict what the next number will be, given complete knowledge of the algorithm or hardware generating the sequence, and all previously generated numbers;
 - (c) the series cannot be reliably reproduced, i.e. if the sequence generator is activated again with the same input (as exactly as is reasonably possible) it will produce two completely unrelated random sequences.



General RNG Analysis

The RNG submitted for testing is a software-based pseudo-RNG. GLI has verified the RNG's period is sufficiently large and covers all possible outcomes for the games / applications to which it is connected.

The RNG algorithm requires a seed value to produce a random number. GLI has verified that the method of initial seed generation implemented in the Jadestone "CasinArena" Casino RNG complies with the appointed Technical Standard, and is considered to be acceptable.

The RNG implements background cycling / activity at an acceptable level.

Final Outcome Distribution Tests

GLI has verified, through mathematical and statistical analysis, that the Jadestone "CasinArena" Casino RNG distributes numbers with sufficient non-predictability, fair distribution and lack of bias to particular outcomes. GLI's statistical analysis of the scaled outcomes of the RNG was performed using confidence levels of 95%, 98%, and 99%, which are documented levels of confidence for such statistical analysis.

GLI collected RNG data from the Jadestone "CasinArena" Casino RNG in the format shown below. The following table below summarises the results of GLI's statistical testing of the scaled output of the RNG for the games connected to the RNG.

Data Set	Game Type	Range		# of Selections	Replacement	Samples	Result
		Minimum	Maximum				
1	Slot	0	7	1	N/A	8,000,000	Pass
2	Slot	0	14	1	N/A	15,000,000	Pass
3	Slot	0	25	5	Yes	27,000,000	Pass
4	Slot	0	48	3	Yes	51,000,000	Pass
5	Slot	0	63	2	Yes	67,000,000	Pass
6	Slot	0	89	5	Yes	95,000,000	Pass
7	Slot	0	132	1	N/A	141,000,000	Pass
8	Slot	0	254	1	N/A	270,000,000	Pass
9	Slot	0	998	1	N/A	1,060,000,000	Pass
10	Slot	0	1638	4	Yes	675,700,000	Pass
11	Slot	0	9998	1	N/A	2,038,600,000	Pass

The following were run on each data set:

- Data Format Check (To ensure that the data conformed to the parameters given in the table above)
- Chi-Square
- Runs
- Serial Correlation
- Interplay Correlation (Sets 3, 4, 5, 6, 10)
- Duplicates (Sets 3, 4, 5, 10)
- Total Distribution
- Total Distribution by Columns (Sets 2, 3, 4, 5, 6, 7, 10)
- Vertical Coupon Collector (Sets 1-9)



The evaluation took place at the following two locations:

1. Gaming Laboratories International, LLC's office located in Lakewood, New Jersey, USA, and
2. Gaming Laboratories International, LLC's office located in Golden, Colorado, USA.

Overall Evaluation of the Random Number Generator

Our conclusion based upon the tests applied to the Jadestone "CasinArena" Casino RNG data is that this Random Number Generator has exhibited random behaviour and is suitable for the applications as described herein. If a game utilizes a different range or a different set of selections from the included range, the RNG must be resubmitted to test that set of parameters.

Conditions of Evaluation

GLI's compliance evaluation of the Jadestone "CasinArena" Casino RNG is subject to the following limitations:

- The recipient, by its acceptance of this report or analysis, will be deemed to have acknowledged and agreed to all of the "terms and conditions" set forth below. If the recipient does not agree to all of such terms and conditions, GLI withdraws the certification provided or analysis established by this report and the recipient must immediately return to GLI all copies of this report and make no reference to this report for any purpose at any time.
- GLI's compliance evaluation of the Jadestone "CasinArena" Casino RNG was related only to the technical scope of work elements discussed herein. This specifically excludes any other features or functions provided by the submission not related to these elements. Any sections of the aforementioned Technical Standards specific to the Games, Platform, or Financial Reporting were outside of the scope of this RNG evaluation.
- GLI's findings concerning any statistical analysis of the RNG are within the confidence levels tested.
- All testing results are based on information and materials submitted by Jadestone to GLI throughout the duration of the project. There are inherent limitations to performing compliance testing within a laboratory environment, and within a finite time period. As a result of these limitations, anticipating all possible configurations, scenarios and events which could potentially occur in the live environment was not feasible.
- GLI generated the checksums of the software and source code files using the methods stated below:

GLI Verify® - Verification Procedure for Files or Directories:

1. Open GLI Verify®.
2. Select the 'File' or 'Directory' radio button option.
3. Select the 'Browse' button and then choose the file or the top directory for which a signature is being requested.
4. Click the "Verify" button.
5. The current file/directory being checked will be displayed in the window.
6. The program will generate a CDCK, SHA-1 and MD5 signature and display the results in the centre window.

GLI Verify® v5.3 is an application developed by **Gaming Laboratories International, LLC (GLI)** to generate CDCK, SHA-1 and MD5 signatures on files, folders, DVD, CD and Compact Flash media. GLI Verify® v5.3 can be downloaded from GLI's website at www.gaminglabs.com.

Or contact GLI Compliance at:
1-888-GLI-REGS (454-7347) or
E-Mail at compliance@gaminglabs.com.



Subject to the limitations outlined in the **Conditions of Evaluation**, it is GLI's position that the evaluated elements of the Jadestone "CasinArena" Casino RNG comply with the requirements of the applicable Technical Standard. Accordingly, GLI recommends the approval of the Jadestone "CasinArena" Casino RNG for use within the jurisdiction of Malta.

If you should have any questions regarding this information, please feel free to contact our office.

Sincerely,

Ms. Mavis Chan
Quality Assurance Administrator
GLI TEST LABS CANADA ULC



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Sincerely,

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EVALUATION DOCUMENT