



Certification Report: ITL2202149

Platipus Trading Limited

Random Number Generator Certification Report Malta Gaming Authority

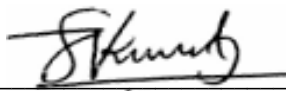
20 July 2022

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1 Test Laboratory details

Nº	Description	Details
1.	Contact Details of Test Laboratory	iTech Labs Suite 24, 40 Montclair Ave, Glen Waverley, VIC 3150, Australia URL: www.itechlabs.com E-mail: info@itechlabs.com
2.	Physical location of where testing was performed	iTech Labs, Suite 24, 40 Montclair Ave, Glen Waverley, VIC 3150, Australia
3.	Date Commenced	12 July 2022
4.	Date Completed	20 July 2022
5.	Scope of Work	This RNG was previously certified. This is a recertification.
6.	Result	Passed all tests, subject to Section 5 Final declaration and conformity, Item 1 Conditions.
7.	Other	None
8.	Test Supervisor Signature:	 Kiren Sreekumar, Principal Consultant, iTech Labs

2 Executive summary

2.1 General Information

Nº	Description	Details
1.	Identification	Platipus Trading Limited RNG
2.	Type of system	Online Casino
3.	Games using this RNG	Non-card games: Slots
4.	Target Jurisdiction	Malta
5.	Guidelines used for testing	Malta Remote Gaming Regulations S.L.438.04.
6.	Software provider	Name: Platipus Trading Limited Address: 170, Pater House Level 1 (Suite A283), Psaila Street, Birkirkara, BKR 9077 Malta Reg# C99643 URL: www.platipusgaming.mt Contact: Martijn Peters Email: martijn@platipusgaming.com
7.	Operator details	Operator Name: N/A Address: N/A URL: N/A Contact: N/A Email: N/A

2.2 Description of RNG

2.2.1 Software Details

Nº	Description	Details
1.	RNG type	Pseudo Random Number Generator (PRNG)
2.	Implementation language	C#
3.	RNG version number	3.0.1.1
4.	RNG build number	3.0.1.1

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N°	Description	Details
5.	Superseded RNG	This RNG was previously certified. This is a recertification.
6.	RNG algorithm	Mersenne Twister
7.	Period of algorithm	$(2^{19937} - 1)$
8.	Dimension of numbers from algorithm	32-bit integer with the interval 0 to $(2^{32}-1)$
9.	Seeding	Seeded with the output of a system RNG which in turn is seeded by System Time (TimerTicks)
10.	Reseeding	No Reseeding
11.	Library name and version	None
12.	Operating system	Linux
13.	Environmental particulars	Platform supplier hosting the RNG: IIS version 8.5 Platform version hosting the RNG: IIS version 8.5
14.	Files and SHA-1 hashes	Refer to Section 2.3 Critical Components of RNG Table 1 and Table 2 below for the list of hashes of source code files and binaries (if applicable) of the RNG.

2.2.2 Hardware Details

Not Applicable, software RNG.

2.3 Critical Components of RNG

Table 1: SHA-1 Signature of RNG source files

File Name	Size (bytes)	SHA-1
RandomLocker.cs	605	f02bea5f478eb4a721b6ab2101c5fc67ea47eab8
RandomMT.cs	4,454	6b998df9b5882134bb34015636548087c6613af5

Table 2: SHA-1 Signature of executables

File Name	Size (bytes)	SHA-1
Casino.RNG.dll	6,656	a4d08a20bb8b4719d0d4f9907af2894a65fdd0fe

2.4 Scope of Testing

N°	Description	Details
1.	Vendor supplied output testing	Not Applicable
2.	Test Laboratory generated output from vendor supplied source	Source files were compiled by iTech Labs using the source code supplied by the customer. Refer to Section 2.3 Critical Components of RNG.
3.	Source code review	The source code review verified that the implementation of the RNG is in accordance with the technical requirements. This includes, but is not limited to: a) Identification of algorithm; b) Security of internal state, seeding and re-seeding, thread safety; c) Scaling for Slot games.
4.	Statistical tests	The statistical tests undertaken by iTech Labs are: a) Diehard tests b) Chi-square tests

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Nº	Description	Details
5.	Theoretical basis of algorithm and supporting crypto-analysis evidence	Literature is readily available, describing the theoretical basis of the algorithm (refer to Section 2.2) i. Mersenne Twister (the original site of the authors): http://www.math.sci.hiroshima-u.ac.jp/~m-mat/MT/emt.html ii. Wikipedia: http://en.wikipedia.org/wiki/Mersenne_twister

2.5 Limitation of use of RNG

Nº	Description	Details
1.	Acceptable degrees of freedom (DOF) permitted	Acceptable DOF's are listed in Section 3.1 Item 5 (below).
2.	Dependency on operating system functionality	None
3.	Library-based implementation	None
4.	Other	None

3 Detailed test results

3.1 Tests methodology

This RNG was previously certified. This is a recertification. There are minor changes to the code and no retesting is required. The following apply to previous testing rounds. iTech Labs carried out the evaluation for the implementation of the PRNG as indicated below:

Nº	Test Performed	Test Methodology	Result
1.	Review of RNG documentation	Review of RNG documentation was conducted to understand the implementation of RNG in the gaming system.	Comply
2.	Research conducted about RNG algorithm/ hardware	Research conducted about the RNG algorithm to ensure there is no publicly known weakness or vulnerabilities associated with the RNG under evaluation.	Comply
3.	Review of source code	Review of source code was conducted to verify that the implementation of the RNG is in accordance with the technical requirements.	Comply
4.	Statistical testing of raw output of RNG.	Marsaglia's diehard tests were applied to 80 million bits of raw 32 bit random numbers generated by the algorithm. The following diehard tests were conducted on 2 sets of 80 million bits; i. BIRTHDAY SPACINGS ii. OVERLAPPING 5-PERMUTATIONS iii. BINARY RANK TEST for 31x31 matrices iv. BINARY RANK TEST for 32x32 matrices v. BINARY RANK TEST for 6x8 matrices vi. BITSTREAM TESTS ON 20-BIT Words vii. BITSTREAM TESTS OPSO, QQSO, DNA viii. COUNT-THE-1's IN A STREAM OF BYTES ix. COUNT-THE-1's IN SPECIFIC BYTES x. PARKING LOT TEST xi. MINIMUM DISTANCE TEST xii. THE 3DSPHERES TEST xiii. THE SQUEEZE TEST xiv. OVERLAPPING SUMS TEST xv. RUNS TEST xvi. CRAPS TEST	Comply Refer Section 4.1 for results.
5.	Statistical testing of scaled / shuffled data	Chi-square tests were conducted for the following:	Comply

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Nº	Test Performed	Test Methodology	Result
		• DOF for Slots (Range =12): 11 • DOF for Slots (Range =31): 30 • DOF for Slots (Range =64): 63 • DOF for Slots (Range =129): 128 • DOF for Slots (Range =200): 199 • DOF for Slots (Range =350): 349	Refer Section 4.2 for results
6.	Other	The above test results apply to the code provided by the customer as specified in section 2.3.	-

Note: Evaluation was conducted at iTech Labs facilities in Australia, India and Bulgaria. All functional tests (if any) were conducted remotely (i.e. remote test environment hosted on customer's site).

3.2 Compliance to technical standards

Nº	Requirement Description	Results	Comments
3rd Schedule Regulation 25			
3.	The gaming machine must satisfy the randomness following Schneier:		
	(a) the data must be randomly generated, passing appropriate statistical tests of randomness;	Comply	
	(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;	Comply	
	(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.	Comply	

4 Statistical test results

4.1 Testing results for raw output of RNG

This RNG was previously certified. This is a recertification. There are minor changes to the code and no retesting is required. The following apply to previous testing rounds.

The Diehard tests were performed on two random sequences. The columns 'Result Random sequence-1' and 'Result Random sequence-2' contain the filenames for the detailed results. These files are supplied as attachments with this Certification report.

Confidence Level for the tests is: 95%

Overall result: Pass

Result Random sequence-1	Result Random sequence-2	Sample size	Confidence level	Result
Refer to attachment platipus1.txt	Refer to attachment platipus2.txt	80 million bits	95%	Pass

4.2 Testing results for scaled/ shuffled data

The Chi-square tests were performed with the results listed in Appendix A. The columns 'Result Datafile1' and 'Result Datafile 2' contain the filenames for the detailed results. These files are supplied with this Certification report.

Confidence Level for the tests is:95%

Overall result: Pass

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5 Final declaration and conformity

Nº	Description	Details
1.	Conditions/Observations	None
2.	Certification	Certification Date: 20 July 2022 Software Provider: Platipus Trading Limited Software Provider site URL: www.platipusgaming.mt Operator Name: N/A Operator site URL: N/A This is to certify that iTech Labs has evaluated the Random Number Generator (RNG) by Platipus Trading Limited and found that the RNG complies with the relevant standards and is in conformity to the Malta Remote Gaming Regulations S.L.438.04. It is hereby certified that the Random Number Generator (RNG) as specified in Section 2.3 and used by the games listed in Section 2.1 Item 3, is compliant with the technical requirements set in the Third Schedule of the Malta Remote Gaming Regulations S.L.438.04 and that the Random Number Generator (RNG) was tested as an integral part of the gaming system.

6 Conclusion

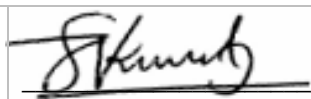
While it is not possible to test all possible scenarios in a laboratory environment, iTech Labs has conducted a level of testing appropriate for a submission of this type.

Accordingly, subject to the above comment, iTech Labs certifies that the items under test comply with the relevant Technical Standards, unless otherwise stated.

Signatures:



Geoff Nicoll
Principal Consultant
iTech Labs
20 July 2022



Kiren Sreekumar
Principal Consultant
iTech Labs
20 July 2022



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Appendix A – Chi Square Testing Result (refer to Section 4.2)

Table A.1 Non Card Games

Game Type	Range	DOF	Result Datafile 1 (Refer attachments)	Result Datafile2 (Refer attachments)	Scaled numbers*	C.L. ^	Result
Slot	12	11	Platipus-Single-12-results-20200303150021.xls	Platipus-Single-12-results-20200303152408.xls	23500000	95%	Pass
Slot	31	30	Platipus-Single-31-results-20200303150734.xls	Platipus-Single-31-results-20200303151914.xls	23500000	95%	Pass
Slot	64	63	Platipus-Single-64-results-20200303151206.xls	Platipus-Single-64-results-20200303153538.xls	23500000	95%	Pass
Slot	129	128	Platipus-Single-129-results-20200303150257.xls	Platipus-Single-129-results-20200303151446.xls	23500000	95%	Pass
Slot	200	199	Platipus-Single-200-results-20200303150517.xls	Platipus-Single-200-results-20200303151704.xls	23500000	95%	Pass
Slot	350	349	Platipus-Single-350-results-20200303150947.xls	Platipus-Single-350-results-20200303152126.xls	23500000	95%	Pass

* Scaled numbers for each data file; ^ Confidence Level