Red Light Coin

Smart Contract Review

Deliverable: Smart Contract Audit Report

Security Report

August 2021

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Report Summary

Title	**Red Light Coin Smart Contract Audit**		
Project Owner	Red Light Coin		
Type	Public		
Reviewed by	Vatsal Raychura	**Revision date**	24/08/2021
Approved by	eNebula Solutions Private Limited	**Approval date**	24/08/2021
		N° Pages	**21**

Overview

Background

Red Light Coin requested that eNebula Solutions perform an Extensive Smart Contract audit of their Red Light Coin Smart Contract.

Project Dates

The following is the project schedule for this review and report:

- **August 24**: Smart Contract Review Completed *(Completed)*
- **August 24**: Delivery of Smart Contract Audit Report *(Completed)*

Review Team

The following eNebula Solutions team member participated in this review:

- Sejal Barad, Security Researcher and Engineer
- Vatsal Raychura, Security Researcher and Engineer

Coverage

Target Specification and Revision

For this audit, we performed research, investigation, and review of the smart contract of Red Light Coin.

The following documentation repositories were considered in-scope for the review:

- Red Light Coin Project: https://github.com/RedLightCoin/RedLightCoin/blob/main/RedLightCoin.sol

Introduction

Given the opportunity to review Red Light Coin Project related smart contract source code, we in the report outline our systematic approach to evaluate potential security issues in the smart contract implementation, expose possible semantic inconsistencies between smart contract code and design document, and provide additional suggestions or recommendations for improvement. Our results show that the given version of smart contracts is ready to launch after resolving the mentioned issues, there are no critical or high issues found related to business logic, security or performance.

About Red Light Coin: -

Item	Description
Issuer	Red Light Coin
Website	www.redlightcoin.net
Platform	Solidity
Audit Method	Whitebox
Latest Audit Report	August 24, 2021

The Test Method Information: -

Test method	Description
Black box testing	Conduct security tests from an attacker's perspective externally.
Grey box testing	Conduct security testing on code modules through the scripting tool, observing the internal running status, mining weaknesses.
White box testing	Based on the open-source code, non-open-source code, to detect whether there are vulnerabilities in programs such as nodes, SDK, etc.

The vulnerability severity level information:

Level	Description
Critical	Critical severity vulnerabilities will have a significant effect on the security of the DeFiproject, and it is strongly recommended to fix the critical vulnerabilities.
High	High severity vulnerabilities will affect the normal operation of the DeFi project. It isstrongly recommended to fix high-risk vulnerabilities.
Medium	Medium severity vulnerability will affect the operation of the DeFi project. It isrecommended to fix medium-risk vulnerabilities.
Low	Low severity vulnerabilities may affect the operation of the DeFi project in certain scenarios. It is suggested that the project party should evaluate and consider whetherthese vulnerabilities need to be fixed.
Weakness	There are safety risks theoretically, but it is extremely difficult to reproduce in engineering.

The Full List of Check Items:

Category	Check Item
Basic Coding Bugs	Constructor Mismatch
	Ownership Takeover
	Redundant Fallback Function
	Overflows & Underflows
	Reentrancy
	MONEY-Giving Bug
	Blackhole
	Unauthorized Self-Destruct
	Revert DoS
	Unchecked External Call
	Gasless Send
	Send Instead of Transfer
	Costly Loop
	(Unsafe) Use of Untrusted Libraries
	(Unsafe) Use of Predictable Variables
	Transaction Ordering Dependence
	Deprecated Uses
Semantic Consistency Checks	Semantic Consistency Checks
	Business Logics Review
	Functionality Checks

Advanced DeFi Scrutiny	Authentication Management
	Access Control & Authorization
	Oracle Security
	Digital Asset Escrow
	Kill-Switch Mechanism
	Operation Trails & Event Generation
	ERC20 Idiosyncrasies Handling
	Frontend-Contract Integration
	Deployment Consistency
	Holistic Risk Management
Additional Recommendations	Avoiding Use of Variadic Byte Array
	Using Fixed Compiler Version
	Making Visibility Level Explicit
	Making Type Inference Explicit
	Adhering To Function Declaration Strictly
	Following Other Best Practices

Common Weakness Enumeration (CWE) Classifications Used in This Audit:

Category	Summary
Configuration	Weaknesses in this category are typically introduced during the configuration of the software.
Data Processing Issues	Weaknesses in this category are typically found in functionality that processes data.
Numeric Errors	Weaknesses in this category are related to improper calculation or conversion of numbers.
Security Features	Weaknesses in this category are concerned with topics like authentication, access control, confidentiality, cryptography, and privilege management. (Software security is not security software.)
Time and State	Weaknesses in this category are related to the improper management of time and state in an environment that supports simultaneous or near-simultaneous computation by multiplesystems, processes, or threads.
Error Conditions, Return Values, Status Codes	Weaknesses in this category include weaknesses that occur if a function does not generate the correct return/status code,or if the application does not handle all possible return/status codes that could be generated by a function.
Resource Management	Weaknesses in this category are related to improper management of system resources.

Behavioral Issues	Weaknesses in this category are related to unexpected behaviors from code that an application uses.
Business Logics	Weaknesses in this category identify some of the underlying problems that commonly allow attackers to manipulate the business logic of an application. Errors in business logic can be devastating to an entire application.
Initialization and Cleanup	Weaknesses in this category occur in behaviors that are used for initialization and breakdown.
Arguments and Parameters	Weaknesses in this category are related to improper use arguments or parameters within function calls.
Expression Issues	Weaknesses in this category are related to incorrectly written expressions within code.
Coding Practices	Weaknesses in this category are related to coding practices that are deemed unsafe and increase the chances that an ex pilotable vulnerability will be present in the application. They may not directly introduce a vulnerability, but indicate the product has not been carefully developed or maintained.

Findings

Summary

Here is a summary of our findings after analyzing the RED LIGHT COIN Smart Contract Review. During the first phase of our audit, we studied the smart contract source code and ran our in-house static code analyzer through the Specific tool. The purpose here is to statically identify known coding bugs, and then manually verify (reject or confirm) issues reported by tool. We further manually review business logics, examine system operations, and place DeFi-related aspects under scrutiny to uncover possible pitfalls and/or bugs.

Severity	No. of Issues
Critical	0
High	0
Medium	0
Low	1
Total	1

We have so far identified that there are potential issues with severity of **0 Critical, 0 High, 0 Medium, and 1 Low**. Overall, these smart contracts are well-designed and engineered, though we recommend to resolve/acknowledge the issues to improve the implementation and bug free by common recommendations given under POCs.

Functional Overview

($) = payable function # = non-constant function	[Pub] public [Ext] external [Prv] private [Int] internal

+ [Lib] SafeMath
  - [Int] add
  - [Int] sub
  - [Int] sub
  - [Int] mul
  - [Int] div
  - [Int] div

+ [Int] IBEP20
  - [Ext] totalSupply
  - [Ext] decimals
  - [Ext] symbol
  - [Ext] name
  - [Ext] getOwner
  - [Ext] balanceOf
  - [Ext] transfer #
  - [Ext] allowance
  - [Ext] approve #
  - [Ext] transferFrom #

+ Auth
  - [Pub] <Constructor> #
  - [Pub] authorize #
    - modifiers: onlyOwner
  - [Pub] unauthorize #
    - modifiers: onlyOwner
  - [Pub] isOwner
  - [Pub] isAuthorized
  - [Pub] transferOwnership #
    - modifiers: onlyOwner

+ [Int] IDEXFactory
  - [Ext] createPair #

+ [Int] IDEXRouter
  - [Ext] factory
  - [Ext] WETH
  - [Ext] addLiquidity #
  - [Ext] addLiquidityETH ($)
  - [Ext] swapExactTokensForTokensSupportingFeeOnTransferTokens #
  - [Ext] swapExactETHForTokensSupportingFeeOnTransferTokens ($)
  - [Ext] swapExactTokensForETHSupportingFeeOnTransferTokens #

+ [Int] IDividendDistributor
  - [Ext] setDistributionCriteria #
  - [Ext] setShare #
  - [Ext] deposit ($)
  - [Ext] process #

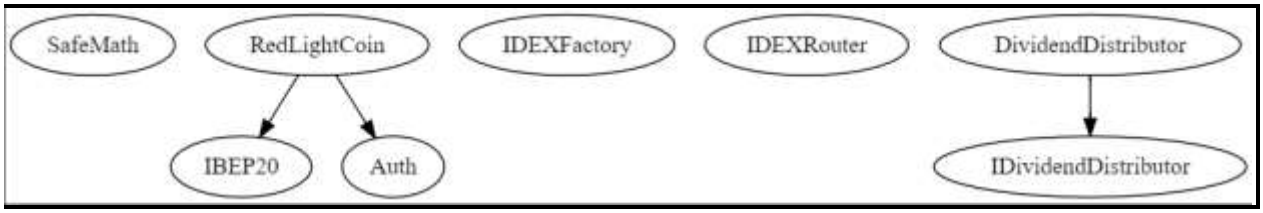
+ DividendDistributor (IDividendDistributor)
  - [Pub] <Constructor> #
  - [Ext] setDistributionCriteria #
    - modifiers: onlyToken
  - [Ext] setShare #
    - modifiers: onlyToken
  - [Ext] deposit ($)
    - modifiers: onlyToken
  - [Ext] process #
    - modifiers: onlyToken
  - [Int] shouldDistribute
  - [Int] distributeDividend #
  - [Ext] claimDividend #
  - [Pub] getUnpaidEarnings
  - [Int] getCumulativeDividends
  - [Int] addShareholder #
  - [Int] removeShareholder #

+ RedLightCoin (IBEP20, Auth)
  - [Pub] <Constructor> #
    - modifiers: Auth
  - [Ext] <Fallback> ($)
  - [Ext] totalSupply
  - [Ext] decimals
  - [Ext] symbol
  - [Ext] name
  - [Ext] getOwner
  - [Pub] balanceOf

- [Ext] allowance
- [Pub] approve #
- [Ext] approveMax #
- [Ext] transfer #
- [Ext] transferFrom #
- [Ext] setMaxWalletPercent #
  - modifiers: onlyOwner
- [Int] _transferFrom #
- [Int] _basicTransfer #
- [Int] checkTxLimit
- [Int] shouldTakeFee
- [Int] takeFee #
- [Int] shouldSwapBack
- [Ext] clearStuckBalance #
  - modifiers: onlyOwner
- [Pub] tradingStatus #
  - modifiers: onlyOwner
- [Pub] cooldownEnabled #
  - modifiers: onlyOwner
- [Int] swapBack #
  - modifiers: swapping
- [Ext] setTxLimit #
  - modifiers: authorized
- [Ext] setIsDividendExempt #
  - modifiers: authorized
- [Ext] setIsFeeExempt #
  - modifiers: authorized
- [Ext] setIsTxLimitExempt #

- modifiers: authorized
- [Ext] setIsTimelockExempt #
  - modifiers: authorized
- [Ext] setFees #
  - modifiers: authorized
- [Ext] setSwapAllowance #
- [Ext] setFeeReceivers #
  - modifiers: authorized
- [Ext] setSwapBackSettings #
  - modifiers: authorized
- [Ext] setTargetLiquidity #
  - modifiers: authorized
- [Ext] setDistributionCriteria #
  - modifiers: authorized
- [Ext] setDistributorSettings #
  - modifiers: authorized
- [Pub] getCirculatingSupply
- [Pub] getLiquidityBacking
- [Pub] isOverLiquified
- [Ext] airdrop #
  - modifiers: onlyOwner

Inheritance



Detailed Results

Issues Checking Status

1. State Variable Default Visibility

- SWC ID: 108
- Severity: Low
- Location: RedLighCoin-Code-AA.txt
- Relationships: CWE-710: Improper Adherence to Coding Standards
- Description: State variable visibility is not set. It is best practice to set the visibility of state variables explicitly. The default visibility for "marketingWallet", "marketingFee", and "liquidityFee" is internal. Other possible visibility settings are public and private.

```
412
413     address marketingWallet=0xdbD3a0b24eDF56C43420f3e9DdB17f30D4fAf9d2;
414
415     uint256 marketingFee=300; //marketing fee 3%
416     uint256 liquidityFee=200; // liquidity fee 2%
417
```

- Remediations: Variables can be specified as being public, internal or private. Explicitly define visibility for all state variables.
- Resolved: After the first phase of Audit, this issue was discussed with the RedLightCoin's dev team, and they Acknowledged this but as no serious or performance issue with this, they've decided to remain the code unchanged.

Basic Coding Bugs

No.	Name	Description	Severity	Result
1.	Constructor Mismatch	Whether the contract name and its constructor are not identical to each other.	Critical	PASSED
2.	Ownership Takeover	Whether the set owner function is not protected.	Critical	PASSED
3.	Redundant Fallback Function	Whether the contract has a redundant fallback function.	Critical	PASSED
4.	Overflows & Underflows	Whether the contract has general overflow or underflow vulnerabilities	Critical	PASSED
5.	Reentrancy	Reentrancy is an issue when code can call back into your contract and change state, such as withdrawing ETHs	Critical	PASSED
6.	MONEY-Giving Bug	Whether the contract returns funds to an arbitrary address	High	PASSED
7.	Blackhole	Whether the contract locks ETH indefinitely: merely in without out	High	PASSED
8.	Unauthorized Self-Destruct	Whether the contract can be killed by any arbitrary address	Medium	PASSED

9.	Revert DoS	Whether the contract is vulnerable to DoS attack because of unexpected revert	Medium	**PASSED**
10.	Unchecked External Call	Whether the contract has any external call without checking the return value	Medium	**PASSED**
11.	Gasless Send	Whether the contract is vulnerable to gasless send	Medium	**PASSED**
12.	Send Instead of Transfer	Whether the contract uses send instead of transfer	Medium	**PASSED**
13.	Costly Loop	Whether the contract has any costly loop which may lead to Out-Of-Gas exception	Medium	**PASSED**
14.	(Unsafe) Use of Untrusted Libraries	Whether the contract use any suspicious libraries	Medium	**PASSED**
15.	(Unsafe) Use of Predictable Variables	Whether the contract contains any randomness variable, but its value can be predicated	Medium	**PASSED**
16.	Transaction Ordering Dependence	Whether the final state of the contract depends on the order of the transactions	Medium	**PASSED**

17.	Deprecated Uses	Whether the contract use the deprecated tx.origin to perform the authorization	Medium	PASSED
18.	Semantic Consistency Checks	Whether the semantic of the white paper is different from the implementation of the contract	Critical	PASSED

Conclusion

In this audit, we thoroughly analyzed Red Light Coin's Smart Contract. The current code base is well organized and there are promptly some low-level issues found in the first phase of Smart Contract Audit.

Meanwhile, we need to emphasize that smart contracts as a whole are still in an early, but exciting stage of development. To improve this report, we greatly appreciate any constructive feedbacks or suggestions, on our methodology, audit findings, or potential gaps in scope/coverage.

About eNebula Solutions

We believe that people have a fundamental need to security and that the use of secure solutions enables every person to more freely use the Internet and every other connected technology. We aim to provide security consulting service to help others make their solutions more resistant to unauthorized access to data & inadvertent manipulation of the system. We support teams from the design phase through the production to launch and surely after.

The eNebula Solutions team has skills for reviewing code in C, C++, Python, Haskell, Rust, Node.js, Solidity, Go, and JavaScript for common security vulnerabilities & specific attack vectors. The team has reviewed implementations of cryptographic protocols and distributed system architecture, including in cryptocurrency, blockchains, payments, and smart contracts. Additionally, the team can utilize various tools to scan code & networks and build custom tools as necessary.

Although we are a small team, we surely believe that we can have a momentous impact on the world by being translucent and open about the work we do.

For more information about our security consulting,
please mail us at – contact@enebula.in