CERTIK

Code Security Assessment

Road Token

Feb 11th, 2022

Table of Contents

Summary

This report has been prepared for Road Token to discover issues and vulnerabilities in the source code of the Road Token project as well as any contract dependencies that were not part of an officially recognized library. A comprehensive examination has been performed, utilizing Static Analysis and Manual Review techniques.

The auditing process pays special attention to the following considerations:

- Testing the smart contracts against both common and uncommon attack vectors.
- Assessing the codebase to ensure compliance with current best practices and industry standards.
- Ensuring contract logic meets the specifications and intentions of the client.
- Cross referencing contract structure and implementation against similar smart contracts produced by industry leaders.
- Thorough line-by-line manual review of the entire codebase by industry experts.

The security assessment resulted in findings that ranged from critical to informational. We recommend addressing these findings to ensure a high level of security standards and industry practices. We suggest recommendations that could better serve the project from the security perspective:

- Enhance general coding practices for better structures of source codes;
- Add enough unit tests to cover the possible use cases;
- Provide more comments per each function for readability, especially contracts that are verified in public;
- Provide more transparency on privileged activities once the protocol is live.

Overview

Project Summary

Project Name	Road Token
Platform	BSC
Language	Solidity
Codebase	https://github.com/roadfc/Roadtoken
Commit	4ff4cd59b104e037e40705da96256c18f99bc2f7

Audit Summary

Delivery Date	Feb 11, 2022
Audit Methodology	Static Analysis, Manual Review

Vulnerability Summary

Vulnerability Level	Total	Pending	Declined	Acknowledged	Partially Resolved	Mitigated	Resolved
Critical	0	0	0	0	0	0	0
Major	1	0	0	0	0	0	1
Medium	0	0	0	0	0	0	0
Minor	1	0	0	1	0	0	0
Informational	3	0	0	3	0	0	0
Discussion	0	0	0	0	0	0	0

Audit Scope

ID	File	SHA256 Checksum
RTR	RoadToken.sol	f0c139fa2a83477909830b02e00ace3278f7c24dfe8a6afc69ca96d957fa599e

Findings

Critical	**0** (0.00%)
Major	**1** (20.00%)
Medium	**0** (0.00%)
Minor	**1** (20.00%)
Informational	**3** (60.00%)
Discussion	**0** (0.00%)

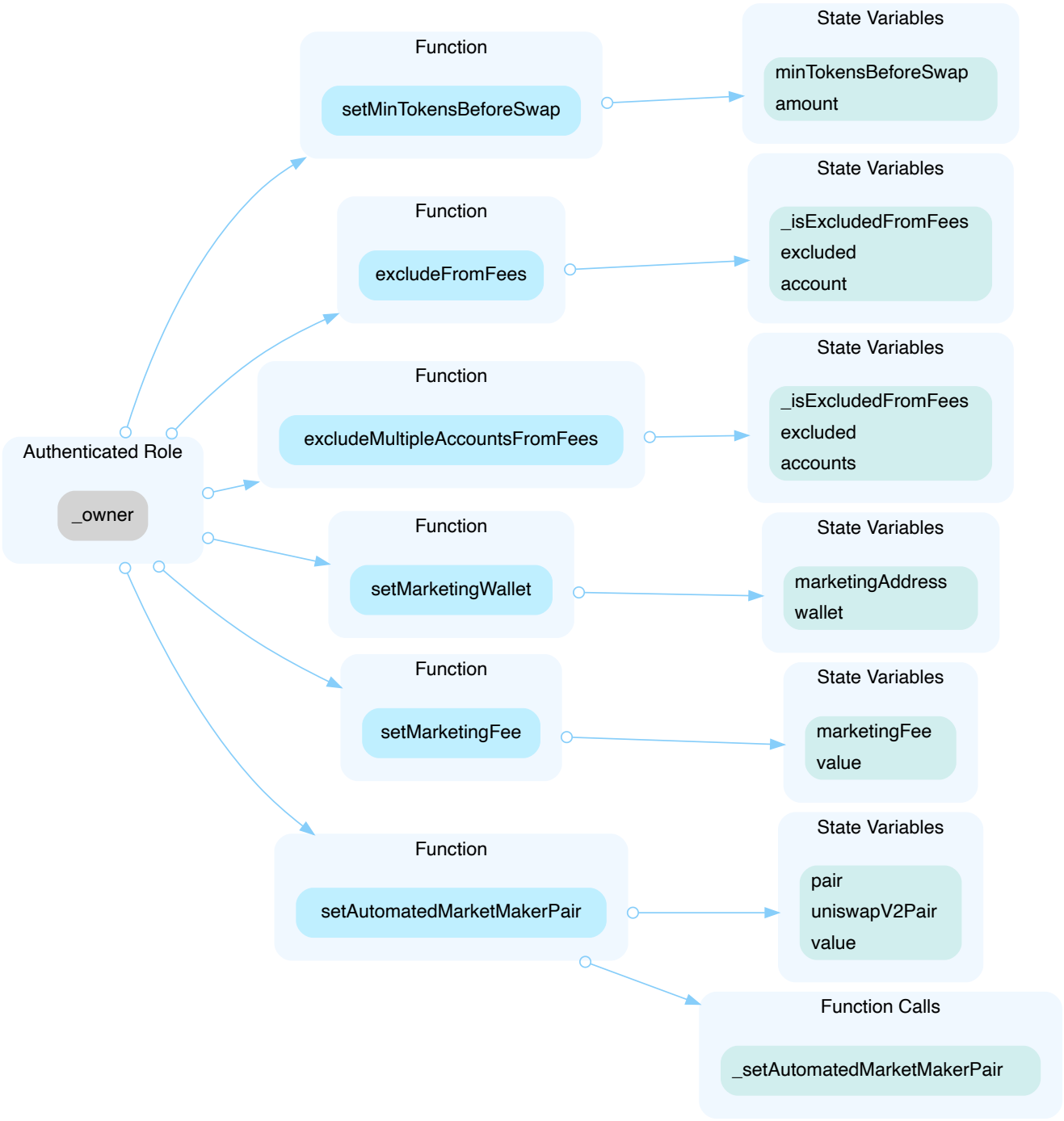
ID	Title	Category	Severity	Status
RTR-01	Centralization Risk in RoadToken.sol	**Centralization / Privilege**	**Major**	Resolved
RTR-02	Variable Declare as `Constant`	Gas Optimization	Informational	Acknowledged
RTR-03	Missing Emit Events	Coding Style	Informational	Acknowledged
RTR-04	Unlocked Compiler Version	Language Specific	Informational	Acknowledged
RTR-05	Potential Sandwich Attacks	Logical Issue	Minor	Acknowledged

RTR-01 | Centralization Risk In RoadToken.sol

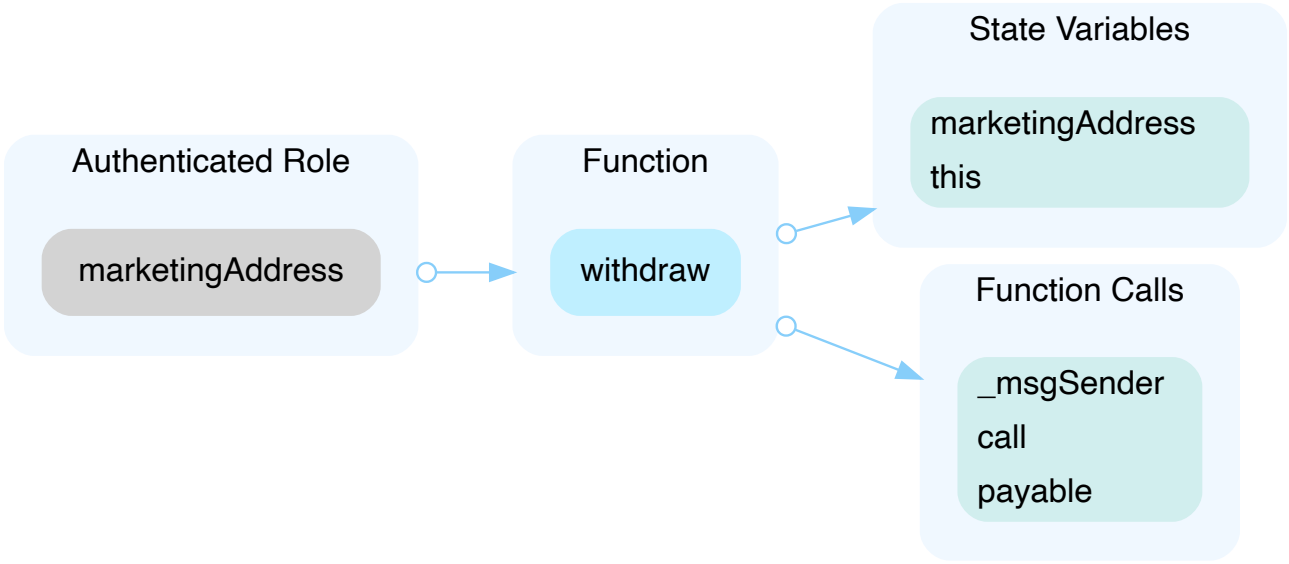
Category	Severity	Location	Status
Centralization / Privilege	**Major**	RoadToken.sol: 1095~1097, 1110~1114, 1116~1125, 1127~1129, 1131~1133, 1135~1145, 1234~1243, 1005~1007, 1013~1016	Resolved

Description

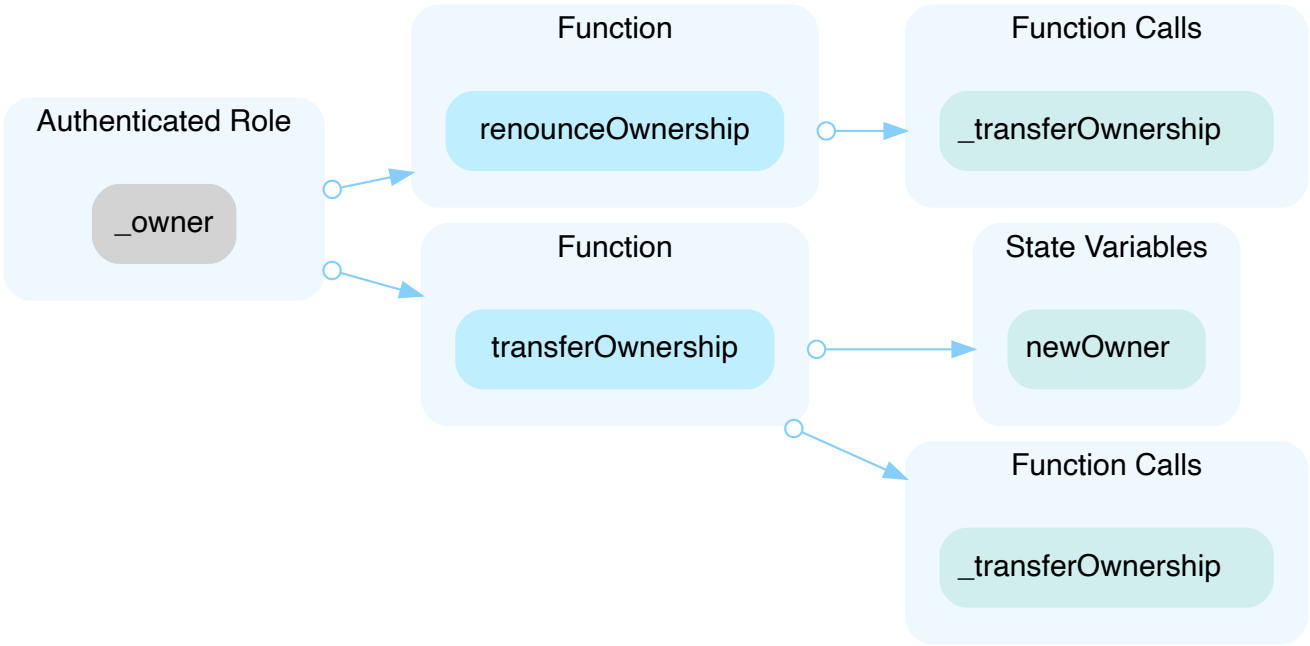
In the contract, `ERC20DividendToken`, the role, `_owner`, has authority over the functions shown in the diagram below.



In the contract, `ERC20DividendToken`, the role, `marketingAddress`, has authority over the functions shown in the diagram below.



In the contract, `Ownable`, the role, `_owner`, has authority over the functions shown in the diagram below.



Any compromise to the privileged accounts may allow the hacker to take advantage of this authority and update sensitive settings and execute sensitive functions of the project

Recommendation

The risk describes the current project design and potentially makes iterations to improve in the security operation and level of decentralization, which in most cases cannot be resolved entirely at the present stage. We advise the client to carefully manage the privileged account's private key to avoid any potential risks of being hacked. In general, we strongly recommend centralized privileges or roles in the protocol be

improved via a decentralized mechanism or smart-contract-based accounts with enhanced security practices, e.g., multisignature wallets.

Indicatively, here are some feasible suggestions that would also mitigate the potential risk at a different level in terms of short-term, long-term and permanent:

Short Term:

Timelock and Multi sign (⅔, ⅗) combination *mitigate* by delaying the sensitive operation and avoiding a single point of key management failure.

- Time-lock with reasonable latency, e.g., 48 hours, for awareness on privileged operations;
  AND
- Assignment of privileged roles to multi-signature wallets to prevent a single point of failure due to the private key compromised;
  AND
- A medium/blog link for sharing the timelock contract and multi-signers addresses information with the public audience.

Long Term:

Timelock and DAO, the combination, *mitigate* by applying decentralization and transparency.

- Time-lock with reasonable latency, e.g., 48 hours, for awareness on privileged operations;
  AND
- Introduction of a DAO/governance/voting module to increase transparency and user involvement.
  AND
- A medium/blog link for sharing the timelock contract, multi-signers addresses, and DAO information with the public audience.

Permanent:

Renouncing the ownership or removing the function can be considered *fully resolved*.

- Renounce the ownership and never claim back the privileged roles.
  OR
- Remove the risky functionality.

Alleviation

`[CertiK]`: The `RoadToken` deployment is at the address 0x5739e5f4a306848f8e8633bc135e770cf1f0902e and the address of the `owner` role is 0xaea55e969161094dc1db2521ccd5cf34dc05fd3b, which is a `TimelockController` deployment.

For the `TimelockController` deployment, its `PROPOSER_ROLE` is a Gnosis Safe deployment at the address 0x13914937CA147de2235cf3396da1161dA1948d7D.

Any transaction requires the confirmation of 2 out of 3 following signers:

- 0x71e913baaf06a5E02Ee38Fe87e7d790F06D6E213
- 0xB650f200BFE12909B6A289ADAff122DC54152995
- 0xb47090c9d0A8c533087f48efeA9dF3B3fe444B11

More details of the Timelock and Gnosis Safe deployment can be found at https://medium.com/@roadfctoken/the-mma-meets-nft-bet-to-earn-e511d2b74534

RTR-02 | Variable Declare As `Constant`

Category	Severity	Location	Status
Gas Optimization	Informational	RoadToken.sol: 1248, 1256, 1258	Acknowledged

Description

The linked variables could be declared as `constant` since these state variables are never modified.

Recommendation

We recommend to declare these variables as `constant`.

Alleviation

[CertiK] : The team acknowledged the finding and chose to leave the source code unchanged.

RTR-03 | Missing Emit Events

Category	Severity	Location	Status
Coding Style	Informational	RoadToken.sol: 1095~1097, 1127~1129, 1131~1133	Acknowledged

Description

There should always be events emitted in the sensitive functions that are controlled by centralization roles.

Recommendation

It is recommended emitting events for the sensitive functions that are controlled by centralization roles.

Alleviation

[CertiK] : The team acknowledged the finding and chose to leave the source code unchanged.

RTR-04 | Unlocked Compiler Version

Category	Severity	Location	Status
Language Specific	Informational	RoadToken.sol: 4	Acknowledged

Description

The contract has unlocked compiler version. An unlocked compiler version in the source code of the contract permits the user to compile it at or above a particular version. This, in turn, leads to differences in the generated bytecode between compilations due to different compiler versions. This can lead to an ambiguity when debugging as compiler specific bugs may occur in the codebase that would be hard to identify over a span of multiple compiler versions rather than a specific one.

Recommendation

We advise that the compiler version is instead locked at the lowest version possible that the contract can be compiled at. For example, for version `v0.6.2` the contract should contain the following line:

```
pragma solidity 0.6.2;
```

Alleviation

[CertiK] : The team acknowledged the finding and chose to leave the source code unchanged.

RTR-05 | Potential Sandwich Attacks

Category	Severity	Location	Status
Logical Issue	Minor	RoadToken.sol: 1221	Acknowledged

Description

A sandwich attack might happen when an attacker observes a transaction swapping tokens or adding liquidity without setting restrictions on slippage or minimum output amount. The attacker can manipulate the exchange rate by frontrunning (before the transaction being attacked) a transaction to purchase one of the assets and make profits by back running (after the transaction being attacked) a transaction to sell the asset.

The following functions are called without setting restrictions on slippage or minimum output amount, so transactions triggering these functions are vulnerable to sandwich attacks, especially when the input amount is large:

- `uniswapV2Router.swapExactTokensForETHSupportingFeeOnTransferTokens()`

Recommendation

We recommend setting reasonable minimum output amounts, instead of 0, based on token prices when calling the aforementioned functions.

Alleviation

[CertiK] : The team acknowledged the finding and chose to leave the source code unchanged.

Appendix

Finding Categories

Centralization / Privilege

Centralization / Privilege findings refer to either feature logic or implementation of components that act against the nature of decentralization, such as explicit ownership or specialized access roles in combination with a mechanism to relocate funds.

Gas Optimization

Gas Optimization findings do not affect the functionality of the code but generate different, more optimal EVM opcodes resulting in a reduction on the total gas cost of a transaction.

Logical Issue

Logical Issue findings detail a fault in the logic of the linked code, such as an incorrect notion on how block.timestamp works.

Language Specific

Language Specific findings are issues that would only arise within Solidity, i.e. incorrect usage of private or delete.

Coding Style

Coding Style findings usually do not affect the generated byte-code but rather comment on how to make the codebase more legible and, as a result, easily maintainable.

Checksum Calculation Method

The "Checksum" field in the "Audit Scope" section is calculated as the SHA-256 (Secure Hash Algorithm 2 with digest size of 256 bits) digest of the content of each file hosted in the listed source repository under the specified commit.

The result is hexadecimal encoded and is the same as the output of the Linux "sha256sum" command against the target file.

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