FUSION TECH

ZENA

Security Assessment

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Disclaimer

About

Summary

This report has been prepared for Zena to discover issues and vulnerabilities in the source code of the Zena - BSC project as well as any contract dependencies that were not part of an officially recognized library.A comprehensive examination has been performed, utilizing Static Analysisand Manual Reviewtechniques. The auditingprocess pays specialattention to the following considerations:

Testing the smart contracts against both commonand uncommon attackvectors. Assessing the codebase to ensure compliancewith current best practices and industry standards.Ensuring contract logic meets the specifications and intentions of the client.
Cross referencing contract structure and implementation againstsimilar smart contracts produced by industryleaders.
Thorough line-by-line manual review of the entirecodebase by industryexperts.

The security assessment resulted in findings that ranged from critical to informational. We recommendaddressing these findings to ensure a high level of security standards and industry practices. We suggest recommendations that could betterserve the projectfrom the securityperspective:

Enhance generalcoding 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, especiallycontracts that are verified in public;
Provide more transparency on privileged activities once the protocolis live.

Project Summary

Project Name	ZENA TOKEN - (https://zena.io)
Platform	Binance Smart Chain
Language	Solidity
Codebase	https://bscscan.com/token/0x251e88310e67FE13E4eeD4Cc766A91Eb832Dd19b#code#L1
Commit	c7d24f0a15f22ef12c93fbc5a891edadf9a8611ed0e0a0fe234bf50e32b66713

Audit Summary

Delivery Date	Feb,24 2023
Audit Methodology	Static Analysis, Manual Review
Key Components	CoinToken

Vulnerability Summary

ID	Title	Category	Severity	Status
CKP-01	**Centralization Related Risks**	**Centralization / Privilege**	**Major**	**Acknowledged**
HEC-01	Lack Of Storage Gap In Upgradeable Contract	Volatile Code	Minor	Resolved
HRK-01	Missing Pool Authority Check In RFQt Cross Chain Trading	Logical Issue	Minor	Resolved
HXU-01	Third Party Dependency	Volatile Code	Minor	Acknowledged
CKP-02	Typos In Comments And Error Messages	Coding Style	Informational	Resolved
HRK-02	Inconsistency Between Comment And Code	Inconsistency	Informational	Resolved
HXU-02	Missing Nonce Check For `lzReceive()`	Volatile Code	Informational	Acknowledged

SWARM SOURCE

ID	File	SHA256 Checksum
CKP	contract.sol	4a310b76e5b119338e078bbc68d5f5819db9e5e7cd31685bca1c89084502f100

Overview

External Dependencies

Thecontract serves as the underlying entity to interactwith third-party protocols (token- wapping). The scopeof the audit treats third-party entities as blackboxes and assumestheir functional correctness. However, in the real world, third parties can be compromised and this may lead to lost or stolenassets.

Privileged Functions

The contract contains the followingprivileged functions that are restricted by role with the modifier. They are used to modify the contractconfigurations and addressattributes. We grouped these functions below.

- excludeFromReward() / includeInReward()
- excludeFromFee() / includeInFee()
- setTaxFeePercent()
- setminimumTokensBeforeSwap()
- setLiquidityFeePercent
- setMaxTxAmount()
- setMaxWalletAccount()
- setSwapAndLiquifyEnabled()
- setRouterAddress()
- setNumTokensSellToAddToLiquidity()

To improve the trustworthiness of the project, dynamic runtime updates in the project should be notified to the community. Any plan to invoke the aforementioned functions should be also considered to move to the execution queue of the Timelock contract.

01 | Centralization Risk in Function

Description

The addLiquidity()_hasLiqBeenAdded() function calls the uniswapV2Router.addLiquidityETH function with the to() address specified as owner() for acquiring the generated LP tokens from the corresponding pool. As a result, over time the _owner address will accumulate a significant portionof LP tokens. If _owner the is an EOA (Externally Owned Account),mishandling of its private key can have devastating consequences to the projectas a whole.

Recommendation

We advise to() the address of the uniswapV2Router.addLiquidityETH() function call to be replaced by the contract() itself, i.e. address(this) , and to restrict the managementof the LP tokens within the scope of the contract's businesslogic. This will also protectthe LP tokens from being stolen if the _owner() account is compromised. In general, we strongly recommend centralized privileges or roles in the protocolto be improved via a decentralized mechanism or via smart-contract based accounts with enhanced securitypractices, f.e.Multisignature wallets().

Indicatively, here are some feasible solutionsthat would also mitigate the potential risk:

- Time-lock with reasonable latency, i.e. 48 hours, for awareness on privileged operations;
- Assignment of privileged roles to multi-signature wallets to preventsingle point of failure due to the private key;
- Introduction of a DAO / governance / voting moduleto increase transparency and user involvement

02 | Centralization Risk in Contract

Category	Severity	Location	Status
Centralization / Privilege	Major	projects/contract.sol (98ba012): 603, 640, 644, 648, 652, 656, 660, 665, 906, 912, 612, 636	Acknowledged

Description

In the contract CoinTokens(), the role _owner() has the authority over the following function:

- excludeFromReward() / includeInReward() ; the owner of the contractcan exclude/include an account from/inrewards.
- excludeFromFee() / includeInFee() : the owner of the contractcan exclude/include an account from/in fee.
- setTaxFeePercent() : the owner of the contractcan set the percentage of the tax fee.
- setDevFeePercent() : the owner of the contract can set the percentageof the dev fee.
- setLiquidityFeePercent() : the owner of the contract can set the percentageof liquidity fee.
- setMaxTxPercent() : the owner of the contract can set the maximum transaction amount.
- setDevWalletAddress() : the owner of the contractcan update the arbitrary address.
- setRouterAddress() : the owner of the contractcan set any arbitrary addressas the router address.
- setNumTokensSellToAddToLiquidity() : the owner of the contract can set the thresholdto trigger liquidity-adding process.

Any compromise to the _owner() account may allow the hacker to take advantageof this and modify the significant state of the contract,thus introducing centralization risk.

03 | Contract Gains Non-withdrawable BNB via the __owner Function

Description

The swapAndLiquify() function converts half of the contractTokenBalance() tokens to BNB. The other half of the tokens and partof the converted BNB are deposited into the corresponding pool on pancakeswap as liquidity. For every swap&liquify() function call, a small amountof BNB leftover in the contract. This is due to the price of drops after swapping the first half of tokens into BNBs, and the other half of tokens require less than the converted BNB to be paired with it when adding liquidity. The contract doesn't appear to provide a way to withdraw those BNB, and they will be locked in the contract forever.

Recommendation

It'snot ideal that more and more BNBare lockedinto the contract over time. The simplest solution is to add a withdraw() function in the contract to withdrawBNB. Other approaches that benefit the token holders add a can be:

- Distribute BNB to token holders proportional to the amount of token they hold.
- Use leftover BNB to buy back tokens from the market to increase the token price.

04 | Regaining Ownership After Renouncing the Contract Ownership

Description

Generally, renouncing the ownership should leave the contract without an owner, thereby removing any functionality that is only available owner to the owner. However, the owner of the cointoken is possible to gain ownership of the contract again even if the ownerhas called the function renounceOwnership() is possibleto gain to renounce() the ownership. This can be achieved by performing the following operations:

- Call lock() Call to lock the contract.The variable _previousownwer() to unlockthe contract.
- Call unlock() to unlock the contract
- would be set to the current owner.
- Call renounce() to renounce the contract ownership. to regain ownership.
- Call unlock() to gain the ownership

Recommendation

We advise the client to review the logic and ensure if it is the intended design. If timelock functionality should be introduced, we recommend usingthe implementation of Compound financeas reference.

05 | Initial Token Distribution

Category	Severity	Location	Status
Logical Issue	Minor	projects/contract.sol (98ba012): 497	Acknowledged

Description

All of the tokens are sent to the contract deployer when deploying the contract. This could be a centralization risk as the deployer can distribute those tokens withoutobtaining the consensusof the community.

Recommendation

We recommend the team to be transparent regarding the initialtoken distribution process.

06 | Lack of Return Value Handling

Category	Severity	Location	Status
Volatile Code	Minor	projects/contract.sol (98ba012): 843	Acknowledged

Description

The return valuesof function addLiquidityETH() are properly handled.

```
46      function addLiquidity(
47          address tokenA,
48          address tokenB,
49          uint amountADesired,
50          uint amountBDesired,
51          uint amountAMin,
52          uint amountBMin,
53          address to,
54          uint deadline
55      ) external returns (uint amountA,
    uint amountB, uint liquidity);
```

Recommendation

We recommend using variables to receive the return value of the functions mentionedabove and handleboth success and failure cases if neededby the business logic.

07 | Potential Sandwich Attacks

Category	Severity	Location	Status
Logical Issue	Minor	projects/contract.sol (98ba012): 832~838, 843~850	Acknowledged

Description

A sandwich attack might happen when an attackerobserves 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 (beforethe transaction being attacked) a transaction to purchase one of the assets and make profitsby backrunning (afterthe transaction beingattacked) a transaction to sell the asset.

The following functionsare called withoutsetting restrictions on slippage or minimum outputamount, so transactions triggering these functions are vulnerable to sandwich attacks, especially when the input amount is large:

```
35 interface IRouter01 {
36     function factory() external pure
   returns (address);
37     function WETH() external pure
   returns (address);
```

```
38     function addLiquidityETH(
39         address token,
40         uint amountTokenDesired,
41         uint amountTokenMin,
42         uint amountETHMin,
43         address to,
44         uint deadline
45     ) external payable returns (uint
```

Recommendation

We recommend settingreasonable minimum output amounts, insteadof 0, based on token prices when calling the aforementioned functions.

08 | Lack of Error Message

Description

The require statement can be used to check for conditions and throw an exception if the condition is not met.It is better to providea string messagecontaining details about the errorthat will be passed back to the caller.

Recommendation

We advise refactoring the linked codes as below:

```
560          _approve(_msgSender(), spender, _allowances[_msgSender()]
[spender].add(addedValue), "increase allowance overflow");
```

09 | Redundant Code

Category	Severity	Location	Status
Logical Issue	Informational	projects/contract.sol (98ba012): 862	Acknowledged

Description

The condition! _isExcluded[sender] & !_isExcluded[recipient]
can be included in else .

Recommendation

The following code can be removed:

```
861  ... else if (!_isExcluded[sender] && !_isExcluded[recipient]) {
862      _transferStandard(sender, recipient, amount);
863  } ...
```

10 | Typos In The Contract

Description

There are several typos in the code and comments.

1. In the following code snippet, tokensIntoLiquidity() should be tokensIntoLiquidity()

```
562     // Setters
563     function activateTrading() external onlyOwner {
564         isTradingEnabled = true;
565         if(_launchStartTimestamp == 0) {
566             _launchStartTimestamp = block.timestamp;
567             _isLaunched = true;
568         }
```

2. recieve() should be recieve() _swapping() should be _swapping() in the line of comment //to _recieve ETH from uniswapV2Router when swaping() .

Recommendation

We recommend correcting all typos in the contract.

11 | Function and VariableNaming Doesn't Match the OperatingEnvironment

Category	Severity	Location	Status
Coding Style	Informational	projects/contract.sol (98ba012): 1	Acknowledged

Description

There are multiplenaming issues inside the current contract, which can be misleading to use uniswap() and ETH() instead of pancakeswap() and BNB() if the project landingon BSC.

For example, the cointoken() contract uses pancakeswap() for swapping and adding liquidity to the Pancakeswap pool but names it uniswap()

Recommendation

Change "Uniswap" and "ETH" to "Pancakeswap" and "BNB" in the contract respectively to match the operating environment and avoid confusion.

12 | Potential Resource Exhaustion

Category	Severity	Location	Status
Logical Issue	Informational	projects/contract.sol (98ba012): 614, 709	Acknowledged

Description

The farloop() within functions includeInReward(address) and _getCurrentSupply() takes the variable _excluded.length(), as the maximal iterationtimes. If the size of the array is very large, it could exceed the gas limit to execute the functions. In this case, the contract might suffer from DoS (Denial of Service) situation.

Recommendation

We recommendthe team reviewthe design and ensure this would not cause loss to the project.

13 | Inconsistency Between Comment and Code

Category	Severity	Location	Status
Inconsistency	Informational	projects/contract.sol (98ba012): 230~236	Acknowledged

Description

According to the commentin L238, the lock() function will lock the contract **for a given time period**. However, the code implementation will lock the contract **until the given timestamp.**

```
238     //Unlocks the contract for owner when _lockTime is exceeds
239     function unlock() public virtual {
240         require(_previousOwner == msg.sender, "You don't have permission to
unlock.");
241         require(block.timestamp > _lockTime , "Contract is locked.");
242         emit OwnershipTransferred(_owner, _previousOwner);
243         _owner = _previousOwner;
244     }
```

Recommendation

We recommend the team reviewthe design and update either comments or code implementation to ensure consistent logic between code and comment.

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 mechanismto relocate funds.

Logical Issue

Logical Issue findingsdetail a faultin the logic of the linked code, such as an incorrect notion on how block.timestamp works.

Volatile Code

Volatile Code findingsrefer to segmentsof code that behave unexpectedly on certain edge cases that may resultin a vulnerability.

Coding Style

Coding Style findingsusually do not affect the generated byte-code but rather commenton how to make the codebase more legible and, as a result, easilymaintainable.

Inconsistency

Inconsistency findings referto functions that should seemingly behave similarly yet contain different code, such as a constructor assignment imposing differentrequire statements on the input variables than a setterfunction.

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 specifiedcommit.

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

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