Cyberscope

# Audit Report

# zoozToken

February 2023

SHA256 e70a4a1de2336825b93622c836a7317ae371ea7f70fc86d071e761c7c6114c3d

Audited by © cyberscope

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# Review

| | |
|---|---|
| **Contract Name** | ZOOZToken |
| **Repository** | https://github.com/coalichain/ZOOZToken/blob/main/contracts |
| **Commit** | 26a3c8eb77920bcb95e8f27fce25e83bf14b7abc |
| **Testing Deploy** | https://testnet.bscscan.com/address/0xd75ae0d91a2db2c8f5363c87999e75e7dad7cf28 |
| **Symbol** | ZOOZ |
| **Decimals** | 9 |
| **Total Supply** | 770.000.000 |

# Audit Updates

| | |
|---|---|
| **Initial Audit** | 16 Feb 2023 |

# Source Files

| **Filename** | SHA256 |
|---|---|
| **contracts/ZOOZToken.sol** | e70a4a1de2336825b93622c836a7317ae371ea7f70fc86d071e761c7c6114c3d |

# Roles

The contract consist of three roles. The `owner`, `manager,` and `governor` roles.

The `Owner` has the authority to

- Grant or revokes the `governor` and the `manager` role.
- Renounce or Transfer ownership.
- Set blacklisted addresses.
- Set excluded from fees addresses.

The `Manager` has the authority to

- Transfer the `manager` role.
- Configure reward address.

The `Governor` has the authority to

- Set blacklisted addresses.
- Set excluded from fees addresses.

# Analysis

● Critical ● Medium ● Minor / Informative ● Pass

| Severity | Code | Description | Status |
|---|---|---|---|
| ● | ST | Stops Transactions | Passed |
| ● | OCTD | Transfers Contract's Tokens | Passed |
| ● | OTUT | Transfers User's Tokens | Passed |
| ● | ELFM | Exceeds Fees Limit | Passed |
| ● | ULTW | Transfers Liquidity to Team Wallet | Passed |
| ● | MT | Mints Tokens | Passed |
| ● | BT | Burns Tokens | Passed |
| ● | BC | Blacklists Addresses | Unresolved |

# BC - Blacklists Addresses

| | |
|---|---|
| **Criticality** | Medium |
| **Location** | contracts/ZOOZToken.sol#L886 |
| **Status** | Unresolved |

## Description

The contract owner has the authority to stop addresses from transactions. The owner may take advantage of it by calling the `setBlocked` function.

```
function setBlocked(address holderAddress, bool blocked)
    public
  onlyGovernance
{
  require(
    holderAddress != address(0),
    "HolderAddress can't be the zero address"
  );

  _blocked[holderAddress][_msgSender()] = blocked;

  if (blocked) {
    emit AddressBlocked(holderAddress);
    return;
  }

  emit AddressUnblocked(holderAddress);
}
```

## Recommendation

The team should carefully manage the private keys of the owner's account. We strongly recommend a powerful security mechanism that will prevent a single user from accessing the contract admin functions. That risk can be prevented by temporarily locking the contract or renouncing ownership.

# Diagnostics

Critical Medium Minor / Informative

| Severity | Code | Description | Status |
|---|---|---|---|
| ● | RSML | Redundant SafeMath Library | Unresolved |
| ● | US | Untrusted Source | Unresolved |
| ● | TUU | Time Units Usage | Unresolved |
| ● | MVN | Misleading Variables Naming | Unresolved |
| ● | L02 | State Variables could be Declared Constant | Unresolved |
| ● | L04 | Conformance to Solidity Naming Conventions | Unresolved |
| ● | L09 | Dead Code Elimination | Unresolved |
| ● | L16 | Validate Variable Setters | Unresolved |
| ● | L17 | Usage of Solidity Assembly | Unresolved |
| ● | L19 | Stable Compiler Version | Unresolved |

# RSML - Redundant SafeMath Library

| | |
|---|---|
| **Criticality** | Minor / Informative |
| **Location** | contracts/ZOOZToken.sol#L321 |
| **Status** | Unresolved |

## Description

SafeMath is a popular Solidity library that provides a set of functions for performing common arithmetic operations in a way that is resistant to integer overflows and underflows.

Starting with Solidity versions that are greater than or equal to 0.8.0, the arithmetic operations revert on underflow and overflow. As a result, the native functionality of the Solidity operations replaces the SafeMath library. Hence, the usage of the SafeMath library adds complexity, overhead and increases unnecessarily the gas consumption.

```
library SafeMath { ... }
```

## Recommendation

The team is advised to remove the SafeMath library. Since the version of the contract is greater than `0.8.0` then the pure Solidity arithmetic operations produce the same result.

If the previous functionality is required, then the contract could exploit the `unchecked { ... }` statement.

Read more about the breaking change on https://docs.soliditylang.org/en/v0.8.16/080-breaking-changes.html#solidity-v0-8-0-breaking-changes.

# US - Untrusted Source

| | |
|---|---|
| **Criticality** | Critical |
| **Location** | contracts/ZOOZToken.sol#L941 |
| **Status** | Unresolved |

## Description

The contract uses an external contract in order to determine the transaction's flow. The external contract is untrusted. As a result, it may produce security issues and harm the transactions.

```
function setAntiBotAddr(address pinkbotAddr) external onlyManager() {
    pinkAntiBot = IPinkAntiBot(pinkbotAddr);
    pinkAntiBot.setTokenOwner(msg.sender);
}
```

## Recommendation

The contract should use a trusted external source. A trusted source could be either a commonly recognized or an audited contract. The pointing addresses should not be able to change after the initialization.

# TUU - Time Units Usage

| | |
|---|---|
| **Criticality** | Minor / Informative |
| **Location** | contracts/ZOOZToken.sol#L816 |
| **Status** | Unresolved |

## Description

The contract is using arbitrary numbers to form time-related values. As a result, it decreases the readability of the codebase and prevents the compiler to optimize the source code.

```
function _getFees(uint timestamp) internal view returns(uint256) {
    if(timestamp == 0 || timestamp >= block.timestamp)
        return 14;

    uint diff = block.timestamp - timestamp;

    // 1 Week: 3600 * 24 * 7
    if(diff <= 604800)
        return 14;

    // 1 Month: 3600 * 24 * 30
    if(diff <= 2592000)
        return 10;

    // 3 Months: 3600 * 24 * 30 * 3
    if(diff <= 7776000)
        return 5;

    // 6 Months: 3600 * 24 * 30 * 6
    if(diff <= 15552000)
        return 2;

    // > 6 Months
    return 0;
}
```

## Recommendation

It is a good practice to use the time units reserved keywords like `seconds`, `minutes`, `hours`, `days`, `weeks` and `years` to process time-related calculations.

It's important to note that these time units are simply a shorthand notation for representing time in seconds, and do not have any effect on the actual passage of time or the execution of the contract. The time units are simply a convenience for expressing time in a more human-readable form.

# MVN - Misleading Variables Naming

| | |
|---|---|
| **Criticality** | Minor / Informative |
| **Location** | contracts/ZOOZToken.sol#L639,807 |
| **Status** | Unresolved |

## Description

Variables can have misleading names if their names do not accurately reflect the value they contain or the purpose they serve. The contract uses some variable names that are too generic or do not clearly convey the information stored in the variable. Misleading variable names can lead to confusion, making the code more difficult to read and understand.

The contract utilizes the variable `bots` and the function `_isBot`. This variable and function implement a mechanism to exclude address from fees.

```
mapping (address => mapping (address => bool)) internal _bots;

function _isBot(address addr) internal view returns(bool) {
    return _bots[addr][governance1Address]
            && _bots[addr][governance2Address]
            && _bots[addr][governance3Address];
}
```

## Recommendation

It's always a good practice for the contract to contain variable names that are specific and descriptive. The team is advised to keep in mind the readability of the code.

# L02 - State Variables could be Declared Constant

| | |
|---|---|
| **Criticality** | Minor / Informative |
| **Location** | ZOOZToken.sol#L664,665,666,667 |
| **Status** | Unresolved |

## Description

State variables can be declared as constant using the constant keyword. This means that the value of the state variable cannot be changed after it has been set. Additionally, the constant variables decrease gas consumption of the corresponding transaction.

```
string public name = "ZOOZ Token"
string public symbol = "ZOOZ"
uint8 public decimals = 9
uint256 public _totalSupply = 770 * 10**6 * 10**9
```

## Recommendation

Constant state variables can be useful when the contract wants to ensure that the value of a state variable cannot be changed by any function in the contract. This can be useful for storing values that are important to the contract's behavior, such as the contract's address or the maximum number of times a certain function can be called. The team is advised to add the constant keyword to state variables that never change.

# L04 - Conformance to Solidity Naming Conventions

| | |
|---|---|
| **Criticality** | Minor / Informative |
| **Location** | ZOOZToken.sol#L658,660,661,662,667 |
| **Status** | Unresolved |

## Description

The Solidity style guide is a set of guidelines for writing clean and consistent Solidity code. Adhering to a style guide can help improve the readability and maintainability of the Solidity code, making it easier for others to understand and work with.

The followings are a few key points from the Solidity style guide:

1. Use camelCase for function and variable names, with the first letter in lowercase (e.g., myVariable, updateCounter).
2. Use PascalCase for contract, struct, and enum names, with the first letter in uppercase (e.g., MyContract, UserStruct, ErrorEnum).
3. Use uppercase for constant variables and enums (e.g., MAX_VALUE, ERROR_CODE).
4. Use indentation to improve readability and structure.
5. Use spaces between operators and after commas.
6. Use comments to explain the purpose and behavior of the code.
7. Keep lines short (around 120 characters) to improve readability.

```
mapping(address => Holder) internal _balances
mapping(address => bool) internal _pairs
mapping(address => mapping(address => bool)) internal _bots
mapping(address => mapping(address => bool)) internal _blocked
uint256 public _totalSupply = 770 * 10**6 * 10**9
```

## Recommendation

By following the Solidity naming convention guidelines, the codebase increased the readability, maintainability, and makes it easier to work with.

Find more information on the Solidity documentation
https://docs.soliditylang.org/en/v0.8.17/style-guide.html#naming-convention.

# L09 - Dead Code Elimination

| | |
|---|---|
| **Criticality** | Minor / Informative |
| **Location** | ZOOZToken.sol#L120,148,176,189,208,228,250,265,282,300,311 |
| **Status** | Unresolved |

## Description

In Solidity, dead code is code that is written in the contract, but is never executed or reached during normal contract execution. Dead code can occur for a variety of reasons, such as:

- Conditional statements that are always false.
- Functions that are never called.
- Unreachable code (e.g., code that follows a return statement).

Dead code can make a contract more difficult to understand and maintain, and can also increase the size of the contract and the cost of deploying and interacting with it.

```
function isContract(address account) internal view returns (bool) {
    // This method relies on extcodesize, which returns 0 for contracts
in
    // construction, since the code is only stored at the end of the
    // constructor execution.

    uint256 size;
    assembly {
      size := extcodesize(account)
    }
    return size > 0;
  }

...
```

## Recommendation

To avoid creating dead code, it's important to carefully consider the logic and flow of the contract and to remove any code that is not needed or that is never executed. This can help improve the clarity and efficiency of the contract.

# L16 - Validate Variable Setters

| | |
|---|---|
| **Criticality** | Minor / Informative |
| **Location** | ZOOZToken.sol#L920,929 |
| **Status** | Unresolved |

## Description

The contract performs operations on variables that have been configured on user-supplied input. These variables are missing of proper check for the case where a value is zero. This can lead to problems when the contract is executed, as certain actions may not be properly handled when the value is zero.

```
managerAddress = newAddress
rewardsAddress = newAddress
```

## Recommendation

By adding the proper check, the contract will not allow the variables to be configured with zero value. This will ensure that the contract can handle all possible input values and avoid unexpected behavior or errors. Hence, it can help to prevent the contract from being exploited or operating unexpectedly.

# L17 - Usage of Solidity Assembly

| | |
|---|---|
| **Criticality** | Minor / Informative |
| **Location** | ZOOZToken.sol#L126,323 |
| **Status** | Unresolved |

## Description

Using assembly can be useful for optimizing code, but it can also be error-prone. It's important to carefully test and debug assembly code to ensure that it is correct and does not contain any errors.

Some common types of errors that can occur when using assembly in Solidity include Syntax, Type, Out-of-bounds, Stack, and Revert.

```
assembly {
      size := extcodesize(account)
    }

assembly {
          let returndata_size := mload(returndata)
          revert(add(32, returndata), returndata_size)
        }
```

## Recommendation

It is recommended to use assembly sparingly and only when necessary, as it can be difficult to read and understand compared to Solidity code.

# L19 - Stable Compiler Version

| | |
|---|---|
| **Criticality** | Minor / Informative |
| **Location** | ZOOZToken.sol#L3 |
| **Status** | Unresolved |

## Description

The `^` symbol indicates that any version of Solidity that is compatible with the specified version (i.e., any version that is a higher minor or patch version) can be used to compile the contract. The version lock is a mechanism that allows the author to specify a minimum version of the Solidity compiler that must be used to compile the contract code. This is useful because it ensures that the contract will be compiled using a version of the compiler that is known to be compatible with the code.

```
pragma solidity ^0.8.7;
```

## Recommendation

The team is advised to lock the pragma to ensure the stability of the codebase. The locked pragma version ensures that the contract will not be deployed with an unexpected version. An unexpected version may produce vulnerabilities and undiscovered bugs. The compiler should be configured to the lowest version that provides all the required functionality for the codebase. As a result, the project will be compiled in a well-tested LTS (Long Term Support) environment.

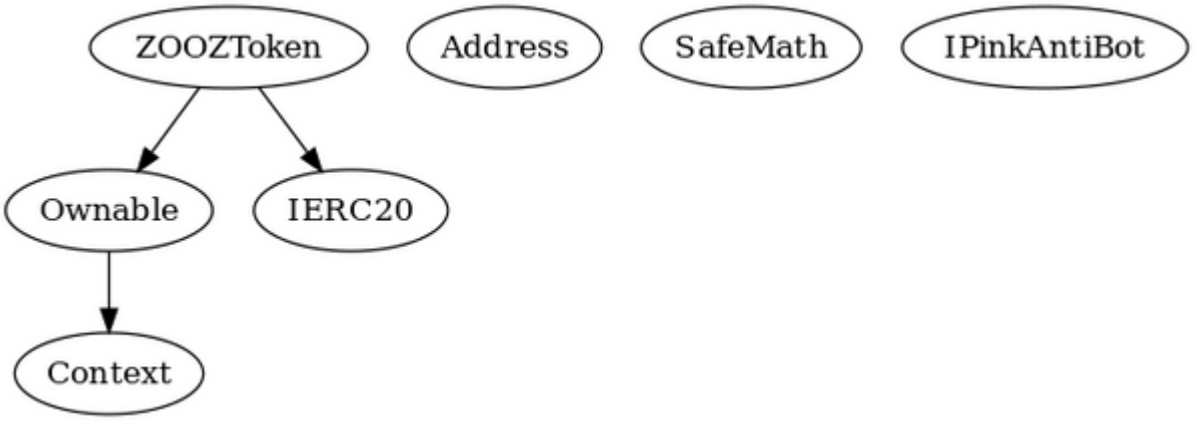
# Functions Analysis

| Contract | Type | Bases | | |
|---|---|---|---|---|
| | **Function Name** | **Visibility** | **Mutability** | **Modifiers** |
| | | | | |
| **Context** | Implementation | | | |
| | _msgSender | Internal | | |
| | _msgData | Internal | | |
| | | | | |
| **Ownable** | Implementation | Context | | |
| | | Public | ✓ | - |
| | owner | Public | | - |
| | renounceOwnership | Public | ✓ | onlyOwner |
| | transferOwnership | Public | ✓ | onlyOwner |
| | _transferOwnership | Internal | ✓ | |
| | | | | |
| **Address** | Library | | | |
| | isContract | Internal | | |
| | sendValue | Internal | ✓ | |
| | functionCall | Internal | ✓ | |
| | functionCall | Internal | ✓ | |
| | functionCallWithValue | Internal | ✓ | |
| | functionCallWithValue | Internal | ✓ | |
| | functionStaticCall | Internal | | |
| | functionStaticCall | Internal | | |
| | functionDelegateCall | Internal | ✓ | |
| | functionDelegateCall | Internal | ✓ | |
| | _verifyCallResult | Private | | |
| | | | | |

| | | | | |
|---|---|---|---|---|
| **SafeMath** | Library | | | |
| | tryAdd | Internal | | |
| | trySub | Internal | | |
| | tryMul | Internal | | |
| | tryDiv | Internal | | |
| | tryMod | Internal | | |
| | add | Internal | | |
| | sub | Internal | | |
| | mul | Internal | | |
| | div | Internal | | |
| | mod | Internal | | |
| | sub | Internal | | |
| | div | Internal | | |
| | mod | Internal | | |
| | | | | |
| **IERC20** | Interface | | | |
| | totalSupply | External | | - |
| | balanceOf | External | | - |
| | transfer | External | ✓ | - |
| | allowance | External | | - |
| | approve | External | ✓ | - |
| | transferFrom | External | ✓ | - |
| | | | | |
| **IPinkAntiBot** | Interface | | | |
| | setTokenOwner | External | ✓ | - |
| | onPreTransferCheck | External | ✓ | - |
| | | | | |
| **ZOOZToken** | Implementation | Ownable, IERC20 | | |
| | | Public | ✓ | - |

| | | | | |
|---|---|---|---|---|
| | totalSupply | Public | | - |
| | balanceOf | Public | | - |
| | timestampOf | Public | | - |
| | balancesOf | Public | | - |
| | transfer | Public | ✓ | - |
| | allowance | Public | | - |
| | approve | Public | ✓ | - |
| | transferFrom | Public | ✓ | - |
| | _approve | Private | ✓ | |
| | _transfer | Private | ✓ | |
| | _isBlocked | Internal | | |
| | _isBot | Internal | | |
| | _getFees | Internal | | |
| | _holdDateHook | Internal | ✓ | |
| | _stdTransfer | Private | ✓ | |
| | setManagerAddress | Public | ✓ | onlyManager |
| | setRewardsTeamAddress | Public | ✓ | onlyManager |
| | setBlocked | Public | ✓ | onlyGovernance |
| | setBot | Public | ✓ | onlyGovernance |
| | setPair | Public | ✓ | onlyManager |
| | setEnableAntiBot | External | ✓ | onlyManager |
| | setAntiBotAddr | External | ✓ | onlyManager |
| | setGovernance | Public | ✓ | onlyOwner |

# Inheritance Graph



# Flow Graph


Legend
Internal Call
External Call
Defined Contract
Undefined Contract
totalSupply
balanceOf
transfer
allowance
approve
transferFrom
tryAdd
trySub
tryMul
tryDiv
tryMod
add
sub
mul
div
mod
sendValue
functionCallWithValue
functionCall
functionStaticCall
functionDelegateCall
verifyCallResult
isContract
Address (lib)
target
staticcall
delegatecall
renounceOwnership
transferOwnership
onlyOwner
owner
_msgSender
Ownable
ZOOZToken
setBlocked
setBot
totalSupply
balanceOf
timestampOf
onlyGovernance
allowance
onlyManager
setManagerAddress
setRewardsTeamAddress
_transfer
_approve
setPair
setAntiBotAddr
setGovernance
holdDateHook
_getFees
isBot
isBlocked
stdTransfer
amount
sub
mul
onPreTransferCheck
setTokenOwner
Context
_msgData

# Summary

There are some functions that can be abused by the owner like stopping transactions. A multi-wallet signing pattern will provide security against potential hacks. Temporarily locking the contract or renouncing ownership will eliminate all the contract threats. The fee percentage decreases over time, as the time elapsed since the last transaction of the holder. If the time elapsed is less than or equal to 1 week, the fee percentage is 14%. After 1 week, the fee percentage decreases to 10% for the next 3 weeks (1 month total). After 3 months, the fee percentage decreases again to 5%, and after 6 months, the fee percentage decreases to 2%. Eventually, after more than 6 months the fee percentage reaches 0.

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Blockchain technology and cryptographic assets present a high level of ongoing risk Cyberscope's position is that each company and individual are responsible for their own due diligence and continuous security Cyberscope's goal is to help reduce the attack vectors and the high level of variance associated with utilizing new and consistently changing technologies and in no way claims any guarantee of security or functionality of the technology we agree to analyze. The assessment services provided by Cyberscope are subject to dependencies and are under continuing development. You agree that your access and/or use including but not limited to any services reports and materials will be at your sole risk on an as-is where-is and as-available basis Cryptographic tokens are emergent technologies and carry with them high levels of technical risk and uncertainty. The assessment reports could include false positives false negatives and other unpredictable results. The services may access and depend upon multiple layers of third parties.

# About Cyberscope

Cyberscope is a blockchain cybersecurity company that was founded with the vision to make web3.0 a safer place for investors and developers. Since its launch, it has worked with thousands of projects and is estimated to have secured tens of millions of investors' funds.

Cyberscope is one of the leading smart contract audit firms in the crypto space and has built a high-profile network of clients and partners.

The Cyberscope team

https://www.cyberscope.io