



Cyberscope

# Audit Report

## **Cultiv8**

February 2025

Repository <https://github.com/LayerZCode/LayerZContracts>

Commit [d0f31da6adfa53eb218badb28ee3573ad37f3017](#)

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## Review

Repository	<a href="https://github.com/LayerZCode/LayerZContracts">https://github.com/LayerZCode/LayerZContracts</a>
Commit	d0f31da6adfa53eb218badb28ee3573ad37f3017

## Audit Updates

Initial Audit	08 May 2024
Corrected Phase 2	02 Aug 2024
Corrected Phase 3	16 Feb 202

## Source Files

Filename	SHA256
contracts/LotteryToken.sol	f2d1125931edcb1e4ea19f4dcb627b1b4476603461456661d60fc7f186083f88
contracts/lib/PancakeAdapter.sol	7181bc4c8b9cf5d208fb09694b7f1c4aa5191c59b96a818cfb35ac5459e740e1
contracts/lib/ConstantsAndTypes.sol	89b0d2e772aa57d7bfb304b23d3859662ab4f5fc8529326005dd977e5c9f28f3
contracts/lib/configs/VRFConsumerConfig.sol	a6e505d28bde3f9fc055f64ad14fd2e25d01a8d9abe5216dbe20460ac517f41c
contracts/lib/configs/ProtocolConfig.sol	74c6a4008a660ef7aee40a8291558eac5704062c65e623791862a0fe3143aa9f
contracts/lib/configs/LotteryEngineConfig.sol	6272e15f5e21f702f5ea59f439db7a145c8f9679472d3d8dffe34d321b871f46
contracts/lib/configs/Configuration.sol	51556ecf3735c9437623d20636eff405b99acfb7bee42c39a01bfdbc39c6a59

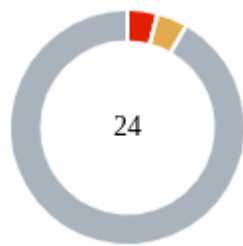
<b>contracts/lib/chainlink/VRFCoordinatorV2Interface.sol</b>	d7607ab085b0ff3bc835eb4b262bc15dbfc5a29690e11281740f94b58e02fc1d
<b>contracts/lib/chainlink/VRFCConsumerBaseV2.sol</b>	0f00782f0f67c996544407a420e1278a12f58cd1ac956cf4e18b33f89957acbd
<b>contracts/lib/chainlink/Link.sol</b>	708e240096af6312c0d96543b97e04479c837fcc7dd813dcc6d0f657dd32583c
<b>contracts/interfaces/IPegSwap.sol</b>	6d35b09568f477a5fe8362644bc88a812d402fdeded3e762b6ede53c52b0ede6
<b>contracts/interfaces/IPancakeRouter02.sol</b>	317bb97d04fc0c31fda776b93416f04fc5ddf1127e5bce27b61173a68879a6ad
<b>contracts/interfaces/IPancakeRouter01.sol</b>	80b3675c9e6ad87ee429cf6c71fae3b41d49929b000795890048b289ba4a2e7e
<b>contracts/interfaces/IPancakePair.sol</b>	5e52a76cb64aa0607e2dd207de97461d5f7ade01b469b2564e1fd0e30f39dfce
<b>contracts/interfaces/IPancakeFactory.sol</b>	d9490895664b99ea0c44f3608ca6b9b903e521c9ddb2c7d1aa3ac7337ed6b6bc
<b>contracts/interfaces/IConfiguration.sol</b>	5a14f9ce51da861408736d1fc93b680aa94d14a00c00f8d8ce8b2949bae2de80

## Overview

LayerZ introduces a reflection token incorporating a lottery mechanism powered by Chainlink VRF. The lottery system comprises three distinct types:

1. **Smash Time:** Activated during buy or sell transactions exceeding \$100. For every \$100 increment, users receive one ticket, with a maximum of 10 tickets per transaction. Each ticket holds a 1% chance of winning, cumulating to a maximum of 10% with 10 tickets.
2. **Donation:** Participation in the donation lottery requires sending a minimum amount to the designated donation address. The quantity of donation tickets correlates with the total donation amount. Additionally, owners can generate donation tickets. This lottery type is initiated upon any transfer if sufficient eligible addresses are present.
3. **Holder:** Triggered by any transfer, the holder lottery awards tickets based on the number of transactions occurring since the last lottery event. Participants receive up to 3 tickets depending on their holding amount.

## Findings Breakdown



● Critical	1
● Medium	1
● Minor / Informative	22

Severity	Unresolved	Acknowledged	Resolved	Other
● Critical	0	1	0	0
● Medium	0	1	0	0
● Minor / Informative	0	21	0	1



# Diagnostics

● Critical ● Medium ● Minor / Informative

Severity	Code	Description	Status
●	ST	Stops Transactions	Acknowledged
●	FRWPR	Fulfilling Random Words Potential Revert	Acknowledged
●	CO	Code Optimization	Acknowledged
●	CR	Code Repetition	Acknowledged
●	CCR	Contract Centralization Risk	Acknowledged
●	DPI	Decimals Precision Inconsistency	Acknowledged
●	ISAC	Inconsistent Significant Amount Check	Acknowledged
●	MEE	Missing Events Emission	Acknowledged
●	MSC	Missing Sanity Check	SemiResolved
●	PIL	Potential Incorrect Logic	Acknowledged
●	PIMTC	Potential Incorrect Max Transaction Calculation	Acknowledged
●	PLR	Potential Lost Rewards	Acknowledged
●	PPDLD	Potential Premature Donator Lottery Draw	Acknowledged

●	RCS	Redundant Code Segments	Acknowledged
●	RSW	Redundant Storage Writes	Acknowledged
●	RSD	Redundant Swap Duplication	Acknowledged
●	TMF	Transfer Minimum Fee	Acknowledged
●	UPV	Unbound Protocol Values	Acknowledged
●	UAR	Unexcluded Address Restrictions	Acknowledged
●	L04	Conformance to Solidity Naming Conventions	Acknowledged
●	L07	Missing Events Arithmetic	Acknowledged
●	L13	Divide before Multiply Operation	Acknowledged
●	L15	Local Scope Variable Shadowing	Acknowledged
●	L17	Usage of Solidity Assembly	Acknowledged

## ST - Stops Transactions

Criticality	Critical
Location	contracts/LotteryToken.sol#L608,1526
Status	Acknowledged

### Description

The contract owner has the authority to stop the sales for all users excluding the owner. The owner may take advantage of it by setting the `maxBuyPercent` to zero. As a result, the contract may operate as a honeypot.

```
if (_amount > (balanceOf(PANCAKE_PAIR) * maxBuyPercent) / PRECISION) {
    revert TransferAmountExceedsPurchaseAmount();
}
...
function setMaxBuyPercent(uint256 _maxBuyPercent) external onlyOwner {
    maxBuyPercent = _maxBuyPercent;
}
```

### Recommendation

The contract could embody a check for not allowing setting the `_maxTxAmount` less than a reasonable amount. A suggested implementation could check that the minimum amount should be more than a fixed percentage of the total supply. 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.

#### Temporary Solutions:

These measurements do not decrease the severity of the finding

- Introduce a time-locker mechanism with a reasonable delay.
- Introduce a multi-signature wallet so that many addresses will confirm the action.
- Introduce a governance model where users will vote about the actions.

Permanent Solution:

- Renouncing the ownership, which will eliminate the threats but it is non-reversible.

## Team Update

The team added a check to the `setMaxBuyPercent` function, that it cannot be zero.

## FRWPR - Fulfilling Random Words Potential Revert

Criticality	Medium
Location	contracts/LotteryToken.sol#L808,822
Status	Acknowledged

### Description

During the audit of the contract, it was identified that the contract utilizes the Chainlink VRF (Verifiable Random Function) for randomness generation in determining lottery winners. However, a potential issue arises in the process of fulfilling random words and awarding prizes, particularly in the `_finishDonationLottery` function.

The `_finishDonationLottery` function is responsible for finalizing the donation lottery round by distributing prizes to the winners. It was observed that the function performs token swaps for BNB as part of the prize distribution process. The concern arises from the fact that the token swapping operation, specifically the `_convertDonationLotteryPrize` function, could potentially revert due to unforeseen circumstances such as insufficient liquidity or other errors in the swapping mechanism.

Furthermore, the `fulfillRandomWords` function, which is crucial for determining the randomness of lottery winners, directly calls the `_finishRound` function, initiating the prize distribution process. Consequently, if the token swapping operation within `_finishDonationLottery` reverts, it would lead to the `_finishRound` function reverting as well. This could result in the entire lottery round being aborted.

```
function _finishSmashTimeLottery(uint256 _requestId, RandomWords memory
_random) private {
    ...
    _convertSmashTimeLotteryPrize();
    ...
}
...
function _finishDonationLottery(uint256 _requestId, uint256 _random)
private {
    ...
    // convert prize
    _convertDonationLotteryPrize();
    ...
}
...
function _convertSmashTimeLotteryPrize() private {
    uint256 conversionAmount =
balanceOf(smashTimeLotteryPrizePoolAddress); //@audit function
redundancy/duplication

    _tokenTransfer(smashTimeLotteryPrizePoolAddress, address(this),
conversionAmount);

    uint256 convertedBNB = _swapTokensForBNB(conversionAmount);
    unchecked {
        smashtimeLotteryBNBPrize += convertedBNB;
    }
}
...
function _convertDonationLotteryPrize() private {
    uint256 conversionAmount =
balanceOf(donationLotteryPrizePoolAddress); //@audit function
redundancy/duplication

    _tokenTransfer(donationLotteryPrizePoolAddress, address(this),
conversionAmount);

    uint256 convertedBNB = _swapTokensForBNB(conversionAmount);
    unchecked {
        donationLotteryBNBPrize += convertedBNB;
    }
}
```

## Recommendation

To mitigate the risk of reverting due to token swapping issues, the team is advised to decouple the logic responsible for fulfilling random words from the token swapping process. This separation would ensure that the fulfillment of random words and the determination of

lottery winners remain independent of any potential issues encountered during token swaps.

By implementing these recommendations, the contract can enhance its resilience against potential reverts and ensure a more reliable and secure lottery experience for participants.

## Team Update

The team introduced a function `swapTokensForBNBUnsafe` that will try to swap tokens for BNB but if the swap fails, it will not revert.

## CO - Code Optimization

<b>Criticality</b>	Minor / Informative
<b>Location</b>	contracts/LotteryToken.sol#L1310,1378
<b>Status</b>	Acknowledged

### Description

There are code segments that could be optimized. A segment may be optimized so that it becomes a smaller size, consumes less memory, executes more rapidly, or performs fewer operations.

The function `_addDonationsLotteryTickets` contains a redundant conditional check towards the end of the function to verify if donations lottery is enabled and if the number of unique donators exceeds the minimum required for participation. However, this check is unnecessary since the function already begins by verifying if the donations lottery is enabled.

Furthermore, the `_uniqueDonatorsCounter` could be checked only after the variable has been incremented.

Finally, the `_uniqueDonatorsCounter` is updated within a for loop, that could be optimized by using a local variable and assigning it to the `_uniqueDonatorsCounter` variable after the end of the for loop.



```
function _addDonationsLotteryTickets(address _transferrer, address
_recipient, uint256 _amount) private {
    if (!_lotteryConfig.donationsLotteryEnabled) {
        return;
    }
    // if this transfer is a donation, add a ticket for transferrer.
    if (_recipient == _lotteryConfig.donationAddress && _amount >=
_lotteryConfig.minimalDonation) {
        if (_donatorTicketIdxs[_donationRound][_transferrer].length ==
0) {
            _uniqueDonatorsCounter++;
        }
        uint256 length = _donators.length;
        _donators.push(_transferrer);
        _donatorTicketIdxs[_donationRound][_transferrer].push(length);
    }
    if (_lotteryConfig.donationsLotteryEnabled && _uniqueDonatorsCounter
>= _lotteryConfig.minimumDonationEntries) {
        _donationsLottery();
    }
}
...
function mintDonationTickets(address[] calldata _recipients, uint256[]
calldata _amounts) external onlyOwner {
    uint256 recipientsLength = _recipients.length;
    if (recipientsLength != _amounts.length) {
        revert RecipientsLengthNotEqualToAmounts();
    }

    uint256 round = _donationRound;
    for (uint256 i = 0; i < recipientsLength;) {
        address recipient = _recipients[i];
        uint256 amount = _amounts[i];
        uint256 idx = _donatorTicketIdxs[round][recipient].length;
        uint256 newIdx = idx + amount;

        if (_donatorTicketIdxs[round][recipient].length == 0) {
            _uniqueDonatorsCounter++;
        }

        for (; idx < newIdx;) {
            _donators.push(recipient);
            _donatorTicketIdxs[round][recipient].push(idx);

            unchecked {
                ++idx;
            }
        }

        unchecked {
```

```
        ++i;  
    }  
}  
}
```

## Recommendation

The team is advised to take these segments into consideration and rewrite them so the runtime will be more performant. That way it will improve the efficiency and performance of the source code and reduce the cost of executing it.

## CR - Code Repetition

<b>Criticality</b>	Minor / Informative
<b>Location</b>	contracts/LotteryToken.sol#L808,822
<b>Status</b>	Acknowledged

### Description

During the assessment, we identified redundant logic in the contract related to prize conversion for two different lotteries, namely the SmashTime Lottery and the Donation Lottery. Specifically, the contract contains two private methods named `_convertSmashTimeLotteryPrize` and `_convertDonationLotteryPrize`, both of which essentially perform the same operations with minor differences in variable names.

In both methods, the following steps are executed:

1. Determine the amount of tokens held in the respective lottery prize pool.
2. Transfer these tokens to the contract.
3. Convert the transferred tokens into BNB (Binance Coin) using the `_swapTokensForBNB` function.
4. Update the BNB prize balance for the corresponding lottery.

While the functionality is identical, the only discrepancies lie in the variables used to identify the prize pool address and the BNB prize balance storage variable.

```
function _convertSmashTimeLotteryPrize() private {
    uint256 conversionAmount =
    balanceOf(smashTimeLotteryPrizePoolAddress);

    _tokenTransfer(smashTimeLotteryPrizePoolAddress, address(this),
    conversionAmount);

    uint256 convertedBNB = _swapTokensForBNB(conversionAmount);
    unchecked {
        smashtimeLotteryBNBPrize += convertedBNB;
    }
}

/**
 * Convert prize for Donation Lottery.
 */
function _convertDonationLotteryPrize() private {
    uint256 conversionAmount =
    balanceOf(donationLotteryPrizePoolAddress);

    _tokenTransfer(donationLotteryPrizePoolAddress, address(this),
    conversionAmount);

    uint256 convertedBNB = _swapTokensForBNB(conversionAmount);
    unchecked {
        donationLotteryBNBPrize += convertedBNB;
    }
}
```

## Recommendation

The team is advised to avoid repeating the same code in multiple places, which can make the contract easier to read and maintain. The authors could try to reuse code wherever possible, as this can help reduce the complexity and size of the contract. For instance, the contract could reuse the common code segments in an internal function in order to avoid repeating the same code in multiple places.

## CCR - Contract Centralization Risk

<b>Criticality</b>	Minor / Informative
<b>Location</b>	contracts/LotteryToken.sol#L1365,1470,1487,1507,1522,1526,1530,1534,1538,1542,1547,1551 contracts/lib/Configuration.sol#L53,59,63,67,73,77,83,89,95,99,103,107,111,115,119,123,127,131,135,139,143,147,151,155,159,168,172,176,185
<b>Status</b>	Acknowledged

### Description

The contract's functionality and behavior are heavily dependent on external parameters or configurations. While external configuration can offer flexibility, it also poses several centralization risks that warrant attention. Centralization risks arising from the dependence on external configuration include Single Point of Control, Vulnerability to Attacks, Operational Delays, Trust Dependencies, and Decentralization Erosion.

```
function mintDonationTickets(address[] calldata _recipients, uint256[]  
calldata _amounts) external onlyOwner  
...  
function updateHolderList(address[] calldata _holdersToCheck) external  
onlyOwner  
...  
function updateHolderList(address[] calldata _holdersToCheck) external  
onlyOwner  
...  
function includeInReward(address _account) external onlyOwner  
...  
function setWhitelist(address _account, bool _status) external onlyOwner  
...  
function setMaxBuyPercent(uint256 _maxBuyPercent) external onlyOwner  
...  
function setSwapAndLiquifyEnabled(bool _enabled) external onlyOwner  
...  
function setLiquiditySupplyThreshold(uint256 _amount) external onlyOwner  
...  
function setFeeSupplyThreshold(uint256 _amount) external onlyOwner  
...  
function setThreeDaysProtection(bool _enabled) external onlyOwner  
...  
function withdraw(uint256 _amount) external onlyOwner  
...  
function withdrawBNB(uint256 _amount) external onlyOwner  
...
```

## Recommendation

To address this finding and mitigate centralization risks, it is recommended to evaluate the feasibility of migrating critical configurations and functionality into the contract's codebase itself. This approach would reduce external dependencies and enhance the contract's self-sufficiency. It is essential to carefully weigh the trade-offs between external configuration flexibility and the risks associated with centralization.

## DPI - Decimals Precision Inconsistency

Criticality	Minor / Informative
Location	contracts/LotteryToken.sol#L1283
Status	Acknowledged

### Description

The decimals field of a contract's ERC20 token can be used to specify the number of decimal places that the token uses. For example, if decimals are set to `8`, it means that the smallest unit of the token is `0.00000001`, and if decimals are set to `18`, it means that the smallest unit of the token is `0.00000000000000000001`.

However, there is an inconsistency in the way that the decimals field is handled in some ERC20 contracts. The ERC20 specification does not specify how the decimals field should be implemented, and as a result, some contracts use different precision numbers.

This inconsistency can cause problems when interacting with these contracts, as it is not always clear how the decimals field should be interpreted. For example, if a contract expects the decimals field to be 18 digits, but the contract being interacted with uses 8 digits, the result of the interaction may not be what was expected.

```
uint256 usdAmount = _TokenPriceInUSD(_amount) / 1e18;
```

### Recommendation

To avoid these issues, it is important to carefully review the implementation of the decimals field of the underlying tokens. The team is advised to normalize each decimal to one single source of truth. A recommended way is to scale all the decimals to the greatest token's decimal. Hence, the contract will not lose precision in the calculations.

The following example depicts 3 tokens with different decimals precision.

ERC20	Decimals
-------	----------

Token 1	6
Token 2	9
Token 3	18

All the decimals could be normalized to 18 since it represents the ERC20 token with the greatest digits.



## ISAC - Inconsistent Significant Amount Check

Criticality	Minor / Informative
Location	contracts/LotteryToken.sol#L774 contracts/lib/configs/ProtocolConfig.sol#L24,73
Status	Acknowledged

### Description

The contract includes a feature where certain actions, such as incrementing a counter, are occurring when the transfer amount is "significant." According to the comments, this significance is defined as a transfer amount worth more than \$10. However, in the actual implementation, the contract uses a variable `significantAmount` to determine if a transfer is significant. This variable is set to `1e19` ( $10^{19}$ ) by default but can be modified through a setter function `_setSignificantAmountForTransfer`.

The description and the code implementation are inconsistent. The documentation specifies a hardcoded value of \$10, but the actual check uses a variable that can be altered. This discrepancy can lead to unintended behavior:

```
function _checkForHoldersLotteryEligibilities(address _transferrer,
address _recipient, uint256 _amount) private {
    ...
    if (_isSignificant(_amount, significantAmount) && (tx.origin ==
_recipient || tx.origin == _transferrer)) {
        _holdersLotteryTxCounter++;
    }
    ...
}
...
uint256 public significantAmount = 1e19;
...
function _setSignificantAmountForTransfer(uint256 _value) internal {
    significantAmount = _value;
}
```

### Recommendation

The comments should be clarified to reflect that the `significantAmount` is a variable that can be adjusted and provide guidance on its appropriate usage and limits. Additionally,

validation checks should be implemented within the setter method to ensure that the new value set for `significantAmount` is reasonable and within expected bounds, thereby maintaining the integrity and intended functionality of the contract.

## MEE - Missing Events Emission

<b>Criticality</b>	Minor / Informative
<b>Location</b>	contracts/LotteryToken.sol#L555,1499,1516,1522,1526,1530,1534,1538,1542 contracts/lib/configs/Configuration.sol
<b>Status</b>	Acknowledged

### Description

The contract performs actions and state mutations from external methods that do not result in the emission of events. Emitting events for significant actions is important as it allows external parties, such as wallets or dApps, to track and monitor the activity on the contract. Without these events, it may be difficult for external parties to accurately determine the current state of the contract.

```
function _takeLiquidity(uint256 _rLiquidity, uint256 _tLiquidity)
private
...
function excludeFromReward(address _account) public onlyOwner
...
function includeInReward(address _account) external onlyOwner
...
function setWhitelist(address _account, bool _status) external onlyOwner
...
function setMaxBuyPercent(uint256 _maxBuyPercent) external onlyOwner
...
function setSwapAndLiquifyEnabled(bool _enabled) external onlyOwner
...
function setLiquiditySupplyThreshold(uint256 _amount) external onlyOwner
...
function setFeeSupplyThreshold(uint256 _amount) external onlyOwner
...
function setThreeDaysProtection(bool _enabled) external onlyOwner
...
function setHolderLotteryPrizePoolAddress(
    address _newAddress
) external onlyOwner
...
function setSmashTimeLotteryPrizePoolAddress(
    address _newAddress
) external onlyOwner
...
function setDonationLotteryPrizePoolAddress(
    address _newAddress
) external onlyOwner
...
function setTeamAddress(address _newAddress) external onlyOwner
...
function setTeamAccumulationAddress(address _newAddress) external
onlyOwner
...
function setTreasuryAddress(address _newAddress) external onlyOwner
...
function setTreasuryAccumulationAddress(address _newAddress) external
onlyOwner
...
function setFeeConfig(uint256 _feeConfigRaw) external onlyOwner
...
function switchSmashTimeLotteryFlag(bool flag) external onlyOwner
...
function switchHoldersLotteryFlag(bool flag) external onlyOwner
...
function switchDonationsLotteryFlag(bool flag) external onlyOwner
...
function excludeFromFee(address account) external onlyOwner
```

```
...
function includeInFee(address account) external onlyOwner
...
function setHoldersLotteryTxTrigger(uint64 _txAmount) external onlyOwner
...
function setHoldersLotteryMinPercent(uint256 _minPercent) external
onlyOwner
...
function setDonationAddress(address _donationAddress) external onlyOwner
...
function setMinimalDonation(uint256 _minimalDonation) external onlyOwner
...
function setFee(uint256 _fee) external onlyOwner
...
function setMinimumDonationEntries(uint64 _minimumEntries) external
onlyOwner
...
function setSmashTimePrizePercent(uint256 _value) external onlyOwner
...
function setHoldersLotteryPrizePercent(uint256 _value) external
onlyOwner
...
function setDonationLotteryPrizePercent(uint256 _value) external
onlyOwner
...
function setTreasuryPlainTokenPercent(uint256 _value) external onlyOwner
...
function setSignificantAmountForTransfer(uint256 _value) external
onlyOwner
```

## Recommendation

It is recommended to include events in the code that are triggered each time a significant action is taking place within the contract. These events should include relevant details such as the user's address and the nature of the action taken. By doing so, the contract will be more transparent and easily auditable by external parties. It will also help prevent potential issues or disputes that may arise in the future.

## MSC - Missing Sanity Check

Criticality	Minor / Informative
Location	contracts/LotteryToken.sol#L187,1526,1534,1538 contracts/lib/Configuration.sol#L53
Status	SemiResolved

### Description

The contract is processing variables that have not been properly sanitized and checked that they form the proper shape. These variables may produce vulnerability issues.

The function arguments are not properly sanitized.

```
constructor (
    address _mintSupplyTo,
    address _coordinatorAddress,
    address _routerAddress,
    address _wnnbAddress,
    address _tusdAddress,
    uint256 _fee,
    ConsumerConfig memory _consumerConfig,
    DistributionConfig memory _distributionConfig,
    LotteryConfig memory _lotteryConfig
)
    VRFConsumerBaseV2(_coordinatorAddress)
    PancakeAdapter(_routerAddress, _wnnbAddress, _tusdAddress)
    Configuration(_fee, _consumerConfig, _distributionConfig,
    _lotteryConfig)
{
    ...
    function setMaxBuyPercent(uint256 _maxBuyPercent) external onlyOwner
    ...
    function setLiquiditySupplyThreshold(uint256 _amount) external onlyOwner
    ...
    function setFeeSupplyThreshold(uint256 _amount) external onlyOwner
    ...
    function setFeeConfig(uint256 _feeConfigRaw) external onlyOwner
    ...
    function setFee(uint256 _fee) external onlyOwner
}
```

### Recommendation

The team is advised to properly check the variables according to the required specifications.

## Team Update

The team added a check to the `setMaxBuyPercent` function.

## PIL - Potential Incorrect Logic

Criticality	Minor / Informative
Location	contracts/LotteryToken.sol#L945
Status	Acknowledged

### Description

The contract implements a mechanism to differentiate between regular transfers and other types of transactions, such as those involving liquidity pools. The relevant code segment for this check is as follows:

```
// if pair is not involved => its a regular transfer
bool regularTransfer = (_sender != PANCAKE_PAIR && _recipient !=
PANCAKE_PAIR) ||
    (_isExcludeFromRegularTransfer[_sender] ||
_isExcludeFromRegularTransfer[_recipient]);
```

The logic intends to mark a transaction as a regular transfer if both the sender and recipient are not the liquidity pair address ( `PANCAKE_PAIR` ). However, it incorrectly includes a condition that checks if either the sender or recipient is marked as excluded from regular transfers ( `_isExcludeFromRegularTransfer` ).

The boolean logic within this condition is flawed due to the use of the `or` ( `||` ) operator, which incorrectly results in the `regularTransfer` flag being set to `true` even when either the sender or recipient is excluded from regular transfers. This contradicts the intended behavior implied by the naming of the `_isExcludeFromRegularTransfer` array.

Specifically, the statement: `solidity`

```
(_isExcludeFromRegularTransfer[_sender] ||
_isExcludeFromRegularTransfer[_recipient])
```

 causes `regularTransfer` to be `true` if either `_sender` or `_recipient` is excluded from regular transfers, regardless of their involvement with the liquidity pair. This can lead to misclassifying transactions involving excluded addresses as regular transfers.

### Recommendation



To align the logic with the intended functionality, the condition should be revised to correctly reflect the exclusion logic. The corrected logic should ensure that a transaction is marked as a regular transfer only if neither the sender nor the recipient is the pair address and neither is excluded from regular transfers.

## PIMTC - Potential Incorrect Max Transaction Calculation

Criticality	Minor / Informative
Location	contracts/LotteryToken.sol#L584,906
Status	Acknowledged

### Description

The contract includes a mechanism to enforce a maximum transaction limit, ensuring that no single transfer exceeds a predefined percentage of the total supply. The contract also calculates and imposes fees on token transfers, which are intended to be factored into the max transaction limit check. However, the implementation incorrectly assumes the fee will be applied to the current transaction, potentially leading to inaccurate validation.

In the `_antiAbuse` function, the contract attempts to prevent large transactions by comparing the transaction amount against a percentage of the total supply. The relevant code snippet is:

```
uint256 lastUserBalance = balanceOf(_to) + ((_amount * (PRECISION -  
_calcFeePercent())) / PRECISION);  
...  
uint256 allowedAmount = (tSupply * dayLimit) / PRECISION;  
if (lastUserBalance >= allowedAmount) {  
    revert TransferAmountExceededForToday(); // @audit lastUserBalance =  
    allowed amount should not revert  
}
```

Here, the `_amount` is adjusted by subtracting the calculated fee percentage (`_calcFeePercent()`). This adjusted amount is then compared against the allowable max transaction limit. However, the fee might not be applicable to the current transaction due to various conditions (e.g., addresses being excluded from fees), leading to a discrepancy between the actual transaction amount and the assumed amount used in the validation.

As a result, transactions that should be permitted might be incorrectly reverted, and transactions that should be restricted might bypass the limitation.

### Recommendation

The team is advised to refactor the `_antiAbuse` function to correctly account for the actual transaction amount after fees are applied, ensuring accurate enforcement of the max transaction limit. This can be achieved by determining the fee applicability before performing the max transaction limit check.

This adjustment ensures that the actual amount being transferred (after fees) is used to check against the max transaction limit, thereby aligning the logic with the intended behavior.

## PLR - Potential Lost Rewards

<b>Criticality</b>	Minor / Informative
<b>Location</b>	contracts/LotteryToken.sol#L1105,1215
<b>Status</b>	Acknowledged

### Description

During the assessment a potential issue was identified. The contract utilizes the Chainlink Verifiable Random Function (VRF) to determine lottery winners, and upon receiving random words from the Chainlink VRF, the function `fulfillRandomWords` is called. This function subsequently invokes the `_finishRound` function, which then calls the appropriate lottery finish function based on the lottery type.

Specifically, in the `_finishSmashTimeLottery` and `_finishDonationLottery` functions, there are instances where native token transfers occur to distribute prizes to lottery winners. However, these transfers are implemented without error handling since the `fulfillRandomWords` function must not revert. As a consequence, the winners may not receive their rewards, and there is no mechanism in place for them to claim their prizes later.

```
function _finishSmashTimeLottery(uint256 _requestId, RandomWords memory
_random) private {
    // read lottery info
    LotteryRound storage _round = rounds[_requestId];
    address player = _round.player;

    // create array of 100 empty addresses.
    address[100] memory tickets;

    // seed array with player address equally to amount of entries
    for (uint256 i = 0; i < uint8(_round.entry);) {
        uint256 shift = (i * TWENTY_FIVE_BITS);
        // indices are chosen with second random word
        uint256 idx = (_random.second >> shift);
        assembly {
            idx := mod(idx, 100)
        }
        _seedTicketsArray(tickets, idx, player);
        unchecked {
            ++i;
        }
    }

    // select winner idx with first random word
    uint256 winnerIdx;
    assembly {
        winnerIdx := mod(mload(_random), 100)
    }
    _convertSmashTimeLotteryPrize();
    // if selected ticket is a winning one, convert and pay out the
    prize.
    if (tickets[winnerIdx] == player) {
        uint256 prize = _calculateSmashTimeLotteryPrize();

        // chainlnk doc states, that we should not revert callback txs.
        assembly {
            function transfer_unsafe(recipient, amount) {
                pop(call(gas(), recipient, amount, 0, 0, 0, 0))
            }
            transfer_unsafe(player, prize)
        }

        unchecked {
            smashtimeLotteryBNBPrize -= prize;
        }

        emit SmashTimeLottery(_requestId, player, prize);
    }

    _round.lotteryType = LotteryType.FINISHED_SMASHTIME;
}
```

```
}
```

## Recommendation

The team is recommended to revise the logic to safely distribute the rewards to the winners.

## PPDLD - Potential Premature Donator Lottery Draw

Criticality	Minor / Informative
Location	contracts/LotteryToken.sol#L1342
Status	Acknowledged

### Description

In the function `transferDonationTicket`, there is an oversight regarding the management of `_uniqueDonatorsCounter`. According to the current implementation, when a donation ticket is transferred from one address to another, the `_uniqueDonatorsCounter` is only incremented if the receiving address has zero donation tickets left. However, there is no corresponding check to decrement `_uniqueDonatorsCounter` when the transferring address has zero donation tickets left after the transfer.

In the scenario where `length == 1`, indicating that the transferring address has only one donation ticket left, the code should include logic to decrement `_uniqueDonatorsCounter` because after this transfer, the transferring address will have zero donations left. Without this check, the `_uniqueDonatorsCounter` may become inaccurate, potentially leading to premature lottery draws.

```
function transferDonationTicket(address _to) external {
    // get current Donation lottery round
    uint256 round = _donationRound;

    // read length of donator tickets and revert if there is nothing to
    transfer
    uint256 length = _donatorTicketIdxs[round][msg.sender].length;
    if (length == 0) {
        revert NoDonationTicketsToTransfer();
    }

    // transfer ticket
    uint256 idx = _donatorTicketIdxs[round][msg.sender][length - 1];
    _donatorTicketIdxs[round][msg.sender].pop();
    _donators[idx] = _to;
    if (_donatorTicketIdxs[round][_to].length == 0) {
        _uniqueDonatorsCounter++;
    }
    _donatorTicketIdxs[round][_to].push(idx);
}
```

## Recommendation

The team is advised to address this issue, by introducing the appropriate checks changes to the `_uniqueDonatorsCounter` protocol variable.

## Team Update

The team added a check where it checks if the new donator ticket owner had no other donator tickets, and if the old owner has more than one.

Although, the check should be if the old owner has at least one donator ticket because the ticket he is transferring has already been deleted from his `_donatorTicketsIdxs`.



## RCS - Redundant Code Segments

<b>Criticality</b>	Minor / Informative
<b>Location</b>	contracts/LotteryToken.sol#L138,139,145,246,253
<b>Status</b>	Acknowledged

### Description

The contract is currently containing code segments, that do not provide any actual functionality. Such redundant code segments can lead to confusion and misinterpretation of the contract's purpose and functionality. Moreover, they contribute to unnecessary bloat in the contract, potentially impacting its efficiency and clarity.

```
// TODO: use real value
```

### Recommendation

It is recommended to remove these redundant code segments from the contract. Eliminating these non-functional parts will streamline the contract, making it more efficient and easier to comprehend. This action will also reduce the potential for confusion among users and developers who interact with or audit the contract.

## RSW - Redundant Storage Writes

<b>Criticality</b>	Minor / Informative
<b>Location</b>	contracts/LotteryToken.sol#L1522,1530,1542
<b>Status</b>	Acknowledged

### Description

The contract modifies the state of the following variables without checking if their current value is the same as the one given as an argument. As a result, the contract performs redundant storage writes, when the provided parameter matches the current state of the variables, leading to unnecessary gas consumption and inefficiencies in contract execution.

```
function setWhitelist(address _account, bool _status) external onlyOwner
{
    whitelist[_account] = _status;
}
...
function setSwapAndLiquifyEnabled(bool _enabled) external onlyOwner {
    swapAndLiquifyEnabled = _enabled;
}
...
function setThreeDaysProtection(bool _enabled) external onlyOwner {
    threeDaysProtectionEnabled = _enabled;
}
```

### Recommendation

The team is advised to implement additional checks within to prevent redundant storage writes when the provided argument matches the current state of the variables. By incorporating statements to compare the new values with the existing values before proceeding with any state modification, the contract can avoid unnecessary storage operations, thereby optimizing gas usage.

## RSD - Redundant Swap Duplication

Criticality	Minor / Informative
Location	contracts/LotteryToken.sol#L664,697,698
Status	Acknowledged

### Description

The contract contains multiple swap methods that individually perform token swaps and transfer promotional amounts to specific addresses and features. This redundant duplication of code introduces unnecessary complexity and increases dramatically the gas consumption. By consolidating these operations into a single swap method, the contract can achieve better code readability, reduce gas costs, and improve overall efficiency.

```
function _distributeFees() private lockTheSwap {
    _distributeFeeToAddress(teamFeesAccumulationAddress, teamAddress);
    _distributeFeeToAddress(treasuryFeesAccumulationAddress,
treasuryAddress);
}
...
function _distributeFeeToAddress(address _feeAccumulationAddress,
address _destinationAddress) private {
    ...
    _swapTokensForTUSD(half, _destinationAddress);
    _swapTokensForBNB(accumulatedBalance - half, _destinationAddress);
    ...
}
```

### Recommendation

A more optimized approach could be adopted to perform the token swap operation once for the total amount of tokens and distribute the proportional amounts to the corresponding addresses, eliminating the need for separate swaps.

## TMF - Transfer Minimum Fee

Criticality	Minor / Informative
Location	contracts/LotteryToken.sol#L441
Status	Acknowledged

### Description

The function `_getTValues` is responsible for calculating various transaction values, including fees, based on the amount being transferred ( `_tAmount` ), whether fees should be taken ( `_takeFee` ), and whether the transfer is regular ( `_regularTransfer` ).

The function checks `_fee = _fee > ONE_PERCENT ? _fee : ONE_PERCENT;` suggesting that the fee should be set to at least 1%. This fee is taken only on regular transfers,

This means that even if `_fee` is set to 0 or any value less than 1%, the function imposes a minimum fee of 1% for regular transfers.

```
function _getTValues(uint256 _tAmount, bool _takeFee, bool
_regularTransfer)
    private
    view
    returns (TInfo memory tt)
{
    // if no fees taken, all token should be transferred. //@audit-ok
    if (!_takeFee) {
        tt.tTransferAmount = _tAmount;
        return tt;
    }

    // get fees
    uint256 _fee = _calcFeePercent();

    // tax transfers from one EOA to another, even if fees are 0%.
    if (_regularTransfer) {
        _fee = _fee > ONE_PERCENT ? _fee : ONE_PERCENT; //@audit
TRANSFERS HAVE 1% FEES MINIMUM
    }

    // read fees
    Fee fees = _fees;

    // Combined calculation for efficiency
    unchecked {
        tt.tBurnFee = (fees.burnFeePercent(_fee) * _tAmount) /
PRECISION;
        tt.tDistributionFee = (fees.distributionFeePercent(_fee) *
_tAmount) / PRECISION;
        tt.tTreasuryFee = (fees.treasuryFeePercent(_fee) * _tAmount) /
PRECISION;
        tt.tDevFundFee = (fees.devFeePercent(_fee) * _tAmount) /
PRECISION;
        tt.tSmashTimePrizeFee =
(feases.smashTimeLotteryPrizeFeePercent(_fee) * _tAmount) / PRECISION;
        tt.tHolderPrizeFee = (fees.holdersLotteryPrizeFeePercent(_fee) *
_tAmount) / PRECISION;
        tt.tDonationLotteryPrizeFee =
(feases.donationLotteryPrizeFeePercent(_fee) * _tAmount) / PRECISION;
        tt.tLiquidityFee = (fees.liquidityFeePercent(_fee) * _tAmount) /
PRECISION;

        uint256 totalFee = tt.tBurnFee + tt.tLiquidityFee +
tt.tDistributionFee + tt.tTreasuryFee + tt.tDevFundFee
            + tt.tSmashTimePrizeFee + tt.tDonationLotteryPrizeFee +
tt.tHolderPrizeFee;

        tt.tTransferAmount = _tAmount - totalFee;
    }
}
```

```
    return tt;  
}
```

## Recommendation

To address this finding, the team is advised to consider reviewing and potentially revising the logic within the `_getTValues` function to ensure that the fee calculation for regular transfers respects the value of `_fee` as intended.

## UPV - Unbound Protocol Values

Criticality	Minor / Informative
Location	contracts/LotteryToken.sol#L1526,1534,1538 contracts/lib/configs/ProtocolConfig.sol#L65,69,73
Status	Acknowledged

### Description

The contract contains multiple setter functions that allow the owner to update important parameters. Specifically, the functions `setMaxBuyPercent`, `setLiquiditySupplyThreshold`, and `setFeeSupplyThreshold` do not enforce any upper or lower bounds on the values that can be set.

```
function setMaxBuyPercent(uint256 _maxBuyPercent) external onlyOwner {
    maxBuyPercent = _maxBuyPercent;
}

function setLiquiditySupplyThreshold(uint256 _amount) external onlyOwner
{
    liquiditySupplyThreshold = _amount;
}

function setFeeSupplyThreshold(uint256 _amount) external onlyOwner {
    feeSupplyThreshold = _amount;
}
...
function _setFeeConfig(uint256 _feeConfigRaw) internal {
    _fees = Fee.wrap(_feeConfigRaw);
}

function _setTreasuryPlainTokenPercent(uint256 _value) internal {
    plainTokenPercent = _value;
}

function _setSignificantAmountForTransfer(uint256 _value) internal {
    significantAmount = _value;
}
```

### Recommendation

To mitigate these risks, the team is advised to introduce reasonable upper and lower bounds for each of these parameters. This can be done by adding validation logic within each setter function. By implementing these bounds, the contract can ensure that these critical parameters remain within a safe and reasonable range, thereby reducing the risk of misconfiguration and enhancing the overall security and reliability of the contract.

## Team Update

The team added a check to the `setMaxBuyPercent` function, that it cannot be zero.



## UAR - Unexcluded Address Restrictions

<b>Criticality</b>	Minor / Informative
<b>Location</b>	contracts/LotteryToken.sol#L456
<b>Status</b>	Acknowledged

### Description

The contract incorporates operational restrictions on transactions, which can hinder seamless interaction with decentralized applications (dApps) such as launchpads, presales, lockers, or staking platforms. In scenarios where an external contract, such as a launchpad factory, needs to integrate with the contract, it should be exempt from the limitations to ensure uninterrupted service and functionality. Failure to provide such exemptions can block the successful process and operation of services reliant on this contract.

```
if (_regularTransfer) {  
    _fee = _fee > ONE_PERCENT ? _fee : ONE_PERCENT;  
}
```

### Recommendation

It is advisable to modify the contract by incorporating functionality that enables the exclusion of designated addresses from transactional restrictions. This enhancement will allow specific addresses, such as those associated with decentralized applications (dApps) and service platforms, to operate without being hindered by the standard constraints imposed on other users. Implementing this feature will ensure smoother integration and functionality with external systems, thereby expanding the contract's versatility and effectiveness in diverse operational environments.

## L04 - Conformance to Solidity Naming Conventions

<b>Criticality</b>	Minor / Informative
<b>Location</b>	contracts/LotteryToken.sol#L126,149,253,266,277,287,304,305,306,330,340,353,908,909,1178,1280,1400,1427,1428,1481,1491,1500,1537,1555,1579,1588,1597,1612,1616,1623,1627,1631,1635,1640,1644 contracts/interfaces/IPancakeRouter01.sol#L8 contracts/interfaces/IPancakePair.sol#L30,32,58 contracts/interfaces/IPancakeFactory.sol#L24
<b>Status</b>	Acknowledged

### 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.

```
uint256 private constant _tTotal = 20_000_000_000 * 1e18
VRFCoordinatorV2Interface private _COORDINATOR
address _account
address _recipient
uint256 _amount
address _spender
address _owner
address _sender
uint256 _addedValue
uint256 _subtractedValue
uint256 _rAmount
uint256 _requestId
uint256[] memory _randomWords
recipient

...
```

## 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>.

## L07 - Missing Events Arithmetic

<b>Criticality</b>	Minor / Informative
<b>Location</b>	contracts/LotteryToken.sol#L1620,1632
<b>Status</b>	Acknowledged

### Description

Events are a way to record and log information about changes or actions that occur within a contract. They are often used to notify external parties or clients about events that have occurred within the contract, such as the transfer of tokens or the completion of a task.

It's important to carefully design and implement the events in a contract, and to ensure that all required events are included. It's also a good idea to test the contract to ensure that all events are being properly triggered and logged.

```
maxBuyPercent = _maxBuyPercent  
feeSupplyThreshold = _amount
```

### Recommendation

By including all required events in the contract and thoroughly testing the contract's functionality, the contract ensures that it performs as intended and does not have any missing events that could cause issues with its arithmetic.

## L13 - Divide before Multiply Operation

<b>Criticality</b>	Minor / Informative
<b>Location</b>	contracts/lib/ConstantsAndTypes.sol#L118,119,120,121,135,137,138,139,140,141
<b>Status</b>	Acknowledged

### Description

It is important to be aware of the order of operations when performing arithmetic calculations. This is especially important when working with large numbers, as the order of operations can affect the final result of the calculation. Performing divisions before multiplications may cause loss of precision.

```
prize = (accumulated * uint32(val)) / PRECISION  
first = (prize * uint32(val >> 32)) / PRECISION
```

### Recommendation

To avoid this issue, it is recommended to carefully consider the order of operations when performing arithmetic calculations in Solidity. It's generally a good idea to use parentheses to specify the order of operations. The basic rule is that the multiplications should be prior to the divisions.

## L15 - Local Scope Variable Shadowing

<b>Criticality</b>	Minor / Informative
<b>Location</b>	contracts/LotteryToken.sol#L194,196,292,569 contracts/lib/configs/Configuration.sol#L28,30
<b>Status</b>	Acknowledged

### Description

Local scope variable shadowing occurs when a local variable with the same name as a variable in an outer scope is declared within a function or code block. When this happens, the local variable "shadows" the outer variable, meaning that it takes precedence over the outer variable within the scope in which it is declared.

```
ConsumerConfig memory _consumerConfig  
LotteryConfig memory _lotteryConfig  
address _owner
```

### Recommendation

It's important to be aware of shadowing when working with local variables, as it can lead to confusion and unintended consequences if not used correctly. It's generally a good idea to choose unique names for local variables to avoid shadowing outer variables and causing confusion.

## L17 - Usage of Solidity Assembly

Criticality	Minor / Informative
Location	contracts/LotteryToken.sol#L896,1154,1178,1279,1280
Status	Acknowledged

### 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 {  
    _words := add(_array, ONE_WORD)  
}  
  
assembly {  
    idx := mod(idx, 100)  
}  
  
function transfer_unsafe(recipient, amount) {  
    pop(call(gas(), recipient, amount, 0, 0, 0, 0))  
}  
  
...
```

### 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.

## Functions Analysis

Contract	Type	Bases		
	Function Name	Visibility	Mutability	Modifiers
<b>TestZ</b>	Implementation	VRFConsumerBaseV2, PancakeAdapter, Configuration		
		Public	✓	VRFConsumerBaseV2 PancakeAdapter Configuration
	name	External		-
	symbol	External		-
	totalSupply	External		-
	balanceOf	Public		-
	transfer	External	✓	-
	allowance	External		-
	approve	External	✓	-
	transferFrom	External	✓	-
	increaseAllowance	External	✓	-
	decreaseAllowance	External	✓	-
	tokenFromReflection	Public		-
		External	Payable	-
	_reflectFee	Private	✓	
	_getValues	Private		



	_getTValues	Private		
	_getRValues	Private		
	_getRate	Private		
	_getCurrentSupply	Private		
	_takeLiquidity	Private	✓	
	_approve	Private	✓	
	_antiAbuse	Private		
	_transfer	Private	✓	swapLockOnPairCall
	_distributeFees	Private	✓	lockTheSwap
	_distributeFeeToAddress	Private	✓	
	_checkForHoldersLotteryEligibility	Private	✓	
	_holdersEligibilityThreshold	Private		
	_checkForHoldersLotteryEligibilities	Private	✓	
	_convertSmashTimeLotteryPrize	Private	✓	
	_convertDonationLotteryPrize	Private	✓	
	_lotteryOnTransfer	Private	✓	
	_requestRandomWords	Private	✓	
	_toRandomWords	Private		
	fulfillRandomWords	Internal	✓	
	_swapAndLiquify	Private	✓	lockTheSwap
	_tokenTransfer	Private	✓	
	_transferStandard	Private	✓	
	_transferToExcluded	Private	✓	

	_transferFromExcluded	Private	✓	
	_transferBothExcluded	Private	✓	
	totalFeePercent	External		-
	_finishRound	Private	✓	
	_calculateSmashTimeLotteryPrize	Private		
	_seedTicketsArray	Private		
	_finishSmashTimeLottery	Private	✓	
	_finishHoldersLottery	Private	✓	
	_finishDonationLottery	Private	✓	
	_smashTimeLottery	Private	✓	
	_triggerHoldersLottery	Private	✓	
	_addDonationsLotteryTickets	Private	✓	
	_donationsLottery	Private	✓	
	transferDonationTicket	External	✓	-
	mintDonationTickets	External	✓	onlyOwner
	holdersLotteryTickets	External		-
	donationLotteryTickets	External		-
	donationLotteryTicketsAmountPerDonat or	External		-
	donate	External	✓	-
	availableHoldersLotteryTickets	External		-
	claimHoldersLotteryTickets	External	✓	-
	updateHolderList	External	✓	onlyOwner
	excludeFromReward	Public	✓	onlyOwner

	includeInReward	External	✓	onlyOwner
	setWhitelist	External	✓	onlyOwner
	setMaxBuyPercent	External	✓	onlyOwner
	setSwapAndLiquifyEnabled	External	✓	onlyOwner
	setLiquiditySupplyThreshold	External	✓	onlyOwner
	setFeeSupplyThreshold	External	✓	onlyOwner
	setThreeDaysProtection	External	✓	onlyOwner
	withdraw	External	✓	onlyOwner
	withdrawBNB	External	✓	onlyOwner
<b>TypesHelpers</b>	Library			
	getPrizes	Internal		
	getPrizes	Internal		
	compact	Internal		
	burnFeePercent	Internal		
	liquidityFeePercent	Internal		
	distributionFeePercent	Internal		
	treasuryFeePercent	Internal		
	devFeePercent	Internal		
	smashTimeLotteryPrizeFeePercent	Internal		
	holdersLotteryPrizeFeePercent	Internal		
	donationLotteryPrizeFeePercent	Internal		
	allTickets	Internal		

	addFirst	Internal	✓	
	removeFirst	Internal	✓	
	existsFirst	Internal		
	addSecond	Internal	✓	
	removeSecond	Internal	✓	
	existsSecond	Internal		
	addThird	Internal	✓	
	existsThird	Internal		
	removeThird	Internal	✓	
<b>VRFConsumerConfig</b>	Implementation			
		Public	✓	-
	_setConfig	Internal	✓	
	_setSubscriptionId	Internal	✓	
	_setCallbackGasLimit	Internal	✓	
	_setRequestConfirmations	Internal	✓	
	_setGasPriceKey	Internal	✓	
<b>ProtocolConfig</b>	Implementation			
		Public	✓	-
	_setHolderLotteryPrizePoolAddress	Internal	✓	
	_setSmashTimeLotteryPrizePoolAddress	Internal	✓	
	_setDonationLotteryPrizePoolAddress	Internal	✓	

	_setTeamAddress	Internal	✓	
	_setTeamAccumulationAddress	Internal	✓	
	_setTreasuryAccumulationAddress	Internal	✓	
	_setTreasuryAddress	Internal	✓	
	_setFeeConfig	Internal	✓	
	_setTreasuryPlainTokenPercent	Internal	✓	
	_setSignificantAmountForTransfer	Internal	✓	
<b>LotteryEngineConfig</b>	Implementation			
		Public	✓	-
	_setSmashTimePrizePercent	Internal	✓	
	_setHoldersLotteryPrizePercent	Internal	✓	
	_setDonationLotteryPrizePercent	Internal	✓	
	_switchSmashTimeLotteryFlag	Internal	✓	
	_switchHoldersLotteryFlag	Internal	✓	
	_setHoldersLotteryTxTrigger	Internal	✓	
	_setHoldersLotteryMinPercent	Internal	✓	
	_setDonationAddress	Internal	✓	
	_switchDonationsLotteryFlag	Internal	✓	
	_setMinimanDonation	Internal	✓	
	_setMinimumDonationEntries	Internal	✓	

Configuration	Implementation	IConfiguration, VRFConsumerConfig, ProtocolConfig, LotteryEngineConfig, Ownable		
		Public	✓	VRFConsumerConfig ProtocolConfig LotteryEngineConfig
	_calcFeePercent	Internal		
	setConsumerConfig	External	✓	onlyOwner
	setSubscriptionId	External	✓	onlyOwner
	setCallbackGasLimit	External	✓	onlyOwner
	setRequestConfirmations	External	✓	onlyOwner
	setGasPriceKey	External	✓	onlyOwner
	setHolderLotteryPrizePoolAddress	External	✓	onlyOwner
	setSmashTimeLotteryPrizePoolAddress	External	✓	onlyOwner
	setDonationLotteryPrizePoolAddress	External	✓	onlyOwner
	setTeamAddress	External	✓	onlyOwner
	setTeamAccumulationAddress	External	✓	onlyOwner
	setTreasuryAddress	External	✓	onlyOwner
	setTreasuryAccumulationAddress	External	✓	onlyOwner
	setFeeConfig	External	✓	onlyOwner
	switchSmashTimeLotteryFlag	External	✓	onlyOwner
	switchHoldersLotteryFlag	External	✓	onlyOwner
	switchDonationsLotteryFlag	External	✓	onlyOwner

	excludeFromFee	External	✓	onlyOwner
	includeInFee	External	✓	onlyOwner
	setHoldersLotteryTxTrigger	External	✓	onlyOwner
	setHoldersLotteryMinPercent	External	✓	onlyOwner
	setDonationAddress	External	✓	onlyOwner
	setMinimalDonation	External	✓	onlyOwner
	setFee	External	✓	onlyOwner
	setMinimumDonationEntries	External	✓	onlyOwner
	setSmashTimePrizePercent	External	✓	onlyOwner
	setHoldersLotteryPrizePercent	External	✓	onlyOwner
	setDonationLotteryPrizePercent	External	✓	onlyOwner
	setTreasuryPlainTokenPercent	External	✓	onlyOwner
	setSignificantAmountForTransfer	External	✓	onlyOwner
	burnFeePercent	External		-
	liquidityFeePercent	External		-
	distributionFeePercent	External		-
	treasuryFeePercent	External		-
	devFeePercent	External		-
	smashTimeLotteryPrizeFeePercent	Public		-
	holdersLotteryPrizeFeePercent	Public		-
	donationLotteryPrizeFeePercent	Public		-
	isExcludedFromFee	External		-
	isExcludedFromReward	External		-

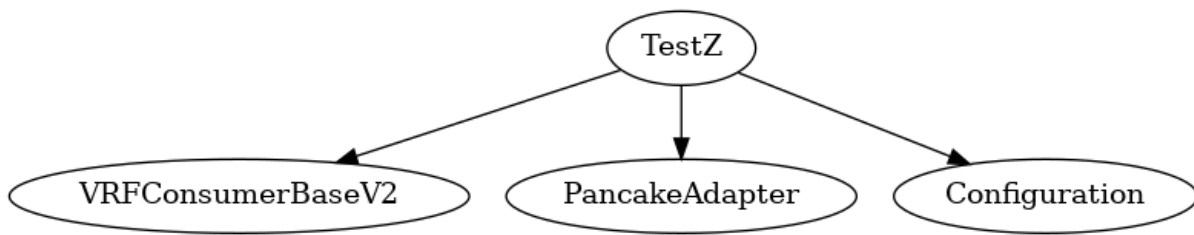
	smashTimeLotteryEnabled	External		-
	holdersLotteryEnabled	External		-
	holdersLotteryTxTrigger	External		-
	holdersLotteryMinPercent	External		-
	donationAddress	External		-
	donationsLotteryEnabled	External		-
	minimumDonationEntries	External		-
	minimalDonation	External		-
	subscriptionId	External		-
	callbackGasLimit	External		-
	requestConfirmations	External		-
	gasPriceKey	External		-
<b>IConfiguration</b>	Interface			
	setConsumerConfig	External	✓	-
	setSubscriptionId	External	✓	-
	setCallbackGasLimit	External	✓	-
	setRequestConfirmations	External	✓	-
	setGasPriceKey	External	✓	-
	setTeamAddress	External	✓	-
	setTeamAccumulationAddress	External	✓	-
	setTreasuryAddress	External	✓	-
	setTreasuryAccumulationAddress	External	✓	-



	setFeeConfig	External	✓	-
	switchSmashTimeLotteryFlag	External	✓	-
	switchHoldersLotteryFlag	External	✓	-
	switchDonationsLotteryFlag	External	✓	-
	excludeFromFee	External	✓	-
	includeInFee	External	✓	-
	setHoldersLotteryTxTrigger	External	✓	-
	setHoldersLotteryMinPercent	External	✓	-
	setDonationAddress	External	✓	-
	setMinimalDonation	External	✓	-
	setFee	External	✓	-
	setMinimumDonationEntries	External	✓	-
	burnFeePercent	External		-
	liquidityFeePercent	External		-
	distributionFeePercent	External		-
	treasuryFeePercent	External		-
	devFeePercent	External		-
	smashTimeLotteryPrizeFeePercent	External		-
	holdersLotteryPrizeFeePercent	External		-
	donationLotteryPrizeFeePercent	External		-
	isExcludedFromFee	External		-
	isExcludedFromReward	External		-
	smashTimeLotteryEnabled	External		-

	holdersLotteryEnabled	External		-
	holdersLotteryTxTrigger	External		-
	holdersLotteryMinPercent	External		-
	donationAddress	External		-
	donationsLotteryEnabled	External		-
	minimumDonationEntries	External		-
	minimalDonation	External		-
	subscriptionId	External		-
	callbackGasLimit	External		-
	requestConfirmations	External		-
	gasPriceKey	External		-

## Inheritance Graph



## Flow Graph

See the detailed images in the github repository.

## Summary

Cultiv8 is an interesting project that has a friendly and growing community. This audit investigates security issues, business logic concerns and potential improvements.

## Disclaimer

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# 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>