



# SMART CONTRACT AUDIT



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PREPARED FOR

**PULSINATOR & PULSINATORBOOST**



# INTRODUCTION

Auditing Firm	InterFi Network
Client Firm	Pulsinator
Methodology	Automated Analysis, Manual Code Review
Language	Solidity
Pulsinator Contract	0xaEc98d2e60CD5FDf577cEc7A62f92580B1F89Ae6
PulsinatorBoost Contract	0x872e002bb606DFD6990Dd54461ad513009C1777f
Blockchain	Binance Smart Chain
Centralization	Active ownership
Pulsinator Commit	ca7a71ed8575dda75ab1b090d2e6021455fd9a71
PulsinatorBoost Commit	715a16cc8714c7febfe46149fa152c8af55d54c5
Website	<a href="https://pulsinator.io/">https://pulsinator.io/</a>   <a href="http://www.boost.pulsinator.io/">http://www.boost.pulsinator.io/</a>
Telegram	<a href="https://t.me/PulsinatorBSC/">https://t.me/PulsinatorBSC/</a>
Report Date	January 10, 2023

 Verify the authenticity of this report on our website: <https://www.interfi.network/audits>



## EXECUTIVE SUMMARY

InterFi has performed the automated and manual analysis of solidity codes. Solidity codes were reviewed for common contract vulnerabilities and centralized exploits. Here's a quick audit summary:

Status	Critical <span style="color: red;">●</span>	Major <span style="color: orange;">●</span>	Medium <span style="color: yellow;">●</span>	Minor <span style="color: green;">●</span>	Unknown <span style="color: brown;">●</span>
Open	0	1	1	5	1
Acknowledged	0	0	0	4	0
Resolved	0	0	0	0	0
Noteworthy Privileges	Set Can Transfer Before, Update Fees, Set Max Wallet, Update Payout Token, Airdrop, Multi Send, Toggle Staking, Set Cooldown, Set Limits, Pause Dividends				

**i** Please note that smart contracts deployed on blockchains aren't resistant to exploits, vulnerabilities and/or hacks. Blockchain and cryptography assets utilize new and emerging technologies. These technologies present a high level of ongoing risks. For a detailed understanding of risk severity, source code vulnerability, and audit limitations, kindly review the audit report thoroughly.

**i** Please note that centralization privileges regardless of their inherited risk status - constitute an elevated impact on smart contract safety and security.



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## SCOPE OF WORK

InterFi was consulted by Pulsinator to conduct the smart contract audit of their solidity source codes.

The audit scope of work is strictly limited to mentioned solidity file(s) only:

- Pulsinator.sol
- PulsinatorBoost.sol

 If source codes are not deployed on the main net, they can be modified or altered before main-net deployment. Verify the contract's deployment status below:

Public Contract Link	
<a href="https://bscscan.com/token/0xaec98d2e60cd5fdf577cec7a62f92580b1f89ae6#code">https://bscscan.com/token/0xaec98d2e60cd5fdf577cec7a62f92580b1f89ae6#code</a>	
Contract Name	Pulsinator
Compiler Version	0.8.15
License	MIT

Public Contract Link	
<a href="https://bscscan.com/token/0x872e002bb606dfd6990dd54461ad513009c1777f#code">https://bscscan.com/token/0x872e002bb606dfd6990dd54461ad513009c1777f#code</a>	
Contract Name	PulsinatorBoost
Compiler Version	0.8.15
License	MIT



# AUDIT METHODOLOGY

Smart contract audits are conducted using a set of standards and procedures. Mutual collaboration is essential to performing an effective smart contract audit. Here's a brief overview of InterFi's auditing process and methodology:

## CONNECT

- The onboarding team gathers source codes, and specifications to make sure we understand the size, and scope of the smart contract audit.

## AUDIT

- Automated analysis is performed to identify common contract vulnerabilities. We may use the following third-party frameworks and dependencies to perform the automated analysis:
  - Remix IDE Developer Tool
  - Open Zeppelin Code Analyzer
  - SWC Vulnerabilities Registry
  - DEX Dependencies, e.g., Pancakeswap, Uniswap
- Simulations are performed to identify centralized exploits causing contract and/or trade locks.
- A manual line-by-line analysis is performed to identify contract issues and centralized privileges.

We may inspect below mentioned common contract vulnerabilities, and centralized exploits:

Centralized Exploits	<ul style="list-style-type: none"><li>○ Token Supply Manipulation</li><li>○ Access Control and Authorization</li><li>○ Assets Manipulation</li><li>○ Ownership Control</li><li>○ Liquidity Access</li><li>○ Stop and Pause Trading</li><li>○ Ownable Library Verification</li></ul>
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## Common Contract Vulnerabilities

- Integer Overflow
- Lack of Arbitrary limits
- Incorrect Inheritance Order
- Typographical Errors
- Requirement Violation
- Gas Optimization
- Coding Style Violations
- Re-entrancy
- Third-Party Dependencies
- Potential Sandwich Attacks
- Irrelevant Codes
- Divide before multiply
- Conformance to Solidity Naming Guides
- Compiler Specific Warnings
- Language Specific Warnings

**REPORT**

- The auditing team provides a preliminary report specifying all the checks which have been performed and the findings thereof.
- The client's development team reviews the report and makes amendments to solidity codes.
- The auditing team provides the final comprehensive report with open and unresolved issues.

**PUBLISH**

- The client may use the audit report internally or disclose it publicly.

 It is important to note that there is no pass or fail in the audit, it is recommended to view the audit as an unbiased assessment of the safety of solidity codes.



## RISK CATEGORIES

Smart contracts are generally designed to hold, approve, and transfer tokens. This makes them very tempting attack targets. A successful external attack may allow the external attacker to directly exploit. A successful centralization-related exploit may allow the privileged role to directly exploit. All risks which are identified in the audit report are categorized here for the reader to review:

Risk Type	Definition
Critical 	These risks could be exploited easily and can lead to asset loss, data loss, asset, or data manipulation. They should be fixed right away.
Major 	These risks are hard to exploit but very important to fix, they carry an elevated risk of smart contract manipulation, which can lead to high-risk severity.
Medium 	These risks should be fixed, as they carry an inherent risk of future exploits, and hacks which may or may not impact the smart contract execution. Low-risk re-entrancy-related vulnerabilities should be fixed to deter exploits.
Minor 	These risks do not pose a considerable risk to the contract or those who interact with it. They are code-style violations and deviations from standard practices. They should be highlighted and fixed nonetheless.
Unknown 	These risks pose uncertain severity to the contract or those who interact with it. They should be fixed immediately to mitigate the risk uncertainty.

All statuses which are identified in the audit report are categorized here for the reader to review:

Status Type	Definition
Open	Risks are open.
Acknowledged	Risks are acknowledged, but not fixed.
Resolved	Risks are acknowledged and fixed.





## CENTRALIZED PRIVILEGES

Centralization risk is the most common cause of cryptography asset loss. When a smart contract has a privileged role, the risk related to centralization is elevated.

There are some well-intended reasons have privileged roles, such as:

- Privileged roles can be granted the power to pause( ) the contract in case of an external attack.
- Privileged roles can use functions like, `include()`, and `exclude()` to add or remove wallets from fees, swap checks, and transaction limits. This is useful to run a presale and to list on an exchange.

Authorizing privileged roles to externally-owned-account (EOA) is dangerous. Lately, centralization-related losses are increasing in frequency and magnitude.

- The client can lower centralization-related risks by implementing below mentioned practices:
- Privileged role's private key must be carefully secured to avoid any potential hack.
- Privileged role should be shared by multi-signature (multi-sig) wallets.
- Authorized privilege can be locked in a contract, user voting, or community DAO can be introduced to unlock the privilege.
- Renouncing the contract ownership, and privileged roles.
- Remove functions with elevated centralization risk.

 Understand the project's initial asset distribution. Assets in the liquidity pair should be locked. Assets outside the liquidity pair should be locked with a release schedule.





































## AUTOMATED ANALYSIS

Symbol	Definition
	Function modifies state
	Function is payable
	Function is internal
	Function is private
	Function is important

### Pulsinator

```

| **Context** | Implementation |   | | |
|  L  | _msgSender | Internal  |   |
|  L  | _msgData | Internal  |   |
|  L  |   |   |   |
|  L  |   |   |   |
| **IUniswapV2Pair** | Interface |   |
|  L  | name | External  | |NO  |
|  L  | symbol | External  | |NO  |
|  L  | decimals | External  | |NO  |
|  L  | totalSupply | External  | |NO  |
|  L  | balanceOf | External  | |NO  |
|  L  | allowance | External  | |NO  |
|  L  | approve | External  |  |NO  |
|  L  | transfer | External  |  |NO  |
|  L  | transferFrom | External  |  |NO  |
|  L  | DOMAIN_SEPARATOR | External  | |NO  |
|  L  | PERMIT_TYPEHASH | External  | |NO  |
|  L  | nonces | External  | |NO  |
|  L  | permit | External  |  |NO  |
|  L  | MINIMUM_LIQUIDITY | External  | |NO  |

```



```

|  L | factory | External ! | |NO ! |
|  L | token0 | External ! | |NO ! |
|  L | token1 | External ! | |NO ! |
|  L | getReserves | External ! | |NO ! |
|  L | price0CumulativeLast | External ! | |NO ! |
|  L | price1CumulativeLast | External ! | |NO ! |
|  L | kLast | External ! | |NO ! |
|  L | mint | External ! | ● |NO ! |
|  L | burn | External ! | ● |NO ! |
|  L | swap | External ! | ● |NO ! |
|  L | skim | External ! | ● |NO ! |
|  L | sync | External ! | ● |NO ! |
|  L | initialize | External ! | ● |NO ! |
|||||

```

```

| **IUniswapV2Factory** | Interface | |||
|  L | feeTo | External ! | |NO ! |
|  L | feeToSetter | External ! | |NO ! |
|  L | getPair | External ! | |NO ! |
|  L | allPairs | External ! | |NO ! |
|  L | allPairsLength | External ! | |NO ! |
|  L | createPair | External ! | ● |NO ! |
|  L | setFeeTo | External ! | ● |NO ! |
|  L | setFeeToSetter | External ! | ● |NO ! |
|||||

```

```

| **IERC20** | Interface | |||
|  L | totalSupply | External ! | |NO ! |
|  L | balanceOf | External ! | |NO ! |
|  L | transfer | External ! | ● |NO ! |
|  L | allowance | External ! | |NO ! |
|  L | approve | External ! | ● |NO ! |
|  L | transferFrom | External ! | ● |NO ! |
|||||

```



```

| **IERC20Metadata** | Interface | IERC20 | |||
| L | name | External ! | | NO ! |
| L | symbol | External ! | | NO ! |
| L | decimals | External ! | | NO ! |
|||||
| **ERC20** | Implementation | Context, IERC20, IERC20Metadata | |||
| L | <Constructor> | Public ! | 🚫 | NO ! |
| L | name | Public ! | | NO ! |
| L | symbol | Public ! | | NO ! |
| L | decimals | Public ! | | NO ! |
| L | totalSupply | Public ! | | NO ! |
| L | balanceOf | Public ! | | NO ! |
| L | transfer | Public ! | 🚫 | NO ! |
| L | allowance | Public ! | | NO ! |
| L | approve | Public ! | 🚫 | NO ! |
| L | transferFrom | Public ! | 🚫 | NO ! |
| L | increaseAllowance | Public ! | 🚫 | NO ! |
| L | decreaseAllowance | Public ! | 🚫 | NO ! |
| L | _transfer | Internal 🔒 | 🚫 | |
| L | _mint | Internal 🔒 | 🚫 | |
| L | _burn | Internal 🔒 | 🚫 | |
| L | _approve | Internal 🔒 | 🚫 | |
| L | _beforeTokenTransfer | Internal 🔒 | 🚫 | |
|||||
| **DividendPayingTokenOptionalInterface** | Interface | | |||
| L | withdrawableDividendOf | External ! | | NO ! |
| L | withdrawnDividendOf | External ! | | NO ! |
| L | accumulativeDividendOf | External ! | | NO ! |
|||||
| **DividendPayingTokenInterface** | Interface | | |||
| L | dividendOf | External ! | | NO ! |
| L | distributeDividends | External ! | 🚫 | NO ! |

```



| L | withdrawDividend | External ! | 🚫 | NO ! |

|||||

| **\*\*SafeMath\*\*** | Library | |||

| L | add | Internal 🔒 | | |

| L | sub | Internal 🔒 | | |

| L | sub | Internal 🔒 | | |

| L | mul | Internal 🔒 | | |

| L | div | Internal 🔒 | | |

| L | div | Internal 🔒 | | |

| L | mod | Internal 🔒 | | |

| L | mod | Internal 🔒 | | |

|||||

| **\*\*Ownable\*\*** | Implementation | Context |||

| L | <Constructor> | Public ! | 🚫 | NO ! |

| L | owner | Public ! | | NO ! |

| L | renounceOwnership | Public ! | 🚫 | onlyOwner |

| L | transferOwnership | Public ! | 🚫 | onlyOwner |

|||||

| **\*\*SafeMathInt\*\*** | Library | |||

| L | mul | Internal 🔒 | | |

| L | div | Internal 🔒 | | |

| L | sub | Internal 🔒 | | |

| L | add | Internal 🔒 | | |

| L | abs | Internal 🔒 | | |

| L | toUint256Safe | Internal 🔒 | | |

|||||

| **\*\*SafeMathUint\*\*** | Library | |||

| L | toInt256Safe | Internal 🔒 | | |

|||||

| **\*\*IUniswapV2Router01\*\*** | Interface | |||

| L | factory | External ! | | NO ! |

| L | WETH | External ! | | NO ! |



```

| L | addLiquidity | External ! | 🚫 |NO! |
| L | addLiquidityETH | External ! | 🚫 |NO! |
| L | removeLiquidity | External ! | 🚫 |NO! |
| L | removeLiquidityETH | External ! | 🚫 |NO! |
| L | removeLiquidityWithPermit | External ! | 🚫 |NO! |
| L | removeLiquidityETHWithPermit | External ! | 🚫 |NO! |
| L | swapExactTokensForTokens | External ! | 🚫 |NO! |
| L | swapTokensForExactTokens | External ! | 🚫 |NO! |
| L | swapExactETHForTokens | External ! | 🚫 |NO! |
| L | swapTokensForExactETH | External ! | 🚫 |NO! |
| L | swapExactTokensForETH | External ! | 🚫 |NO! |
| L | swapETHForExactTokens | External ! | 🚫 |NO! |
| L | quote | External ! | |NO! |
| L | getAmountOut | External ! | |NO! |
| L | getAmountIn | External ! | |NO! |
| L | getAmountsOut | External ! | |NO! |
| L | getAmountsIn | External ! | |NO! |
|||||
| **IUniswapV2Router02** | Interface | IUniswapV2Router01 |||
| L | removeLiquidityETHSupportingFeeOnTransferTokens | External ! | 🚫 |NO! |
| L | removeLiquidityETHWithPermitSupportingFeeOnTransferTokens | External ! | 🚫 |NO! |
| L | swapExactTokensForTokensSupportingFeeOnTransferTokens | External ! | 🚫 |NO! |
| L | swapExactETHForTokensSupportingFeeOnTransferTokens | External ! | 🚫 |NO! |
| L | swapExactTokensForETHSupportingFeeOnTransferTokens | External ! | 🚫 |NO! |
|||||
| **DividendPayingToken** | Implementation | ERC20, DividendPayingTokenInterface,
DividendPayingTokenOptionalInterface |||
| L | <Constructor> | Public ! | 🚫 | ERC20 |
| L | <Receive Ether> | External ! | 🚫 |NO! |
| L | distributeDividends | Public ! | 🚫 |NO! |
| L | withdrawDividend | Public ! | 🚫 |NO! |
| L | _withdrawDividendOfUser | Internal 🚫 | 🚫 | |

```



```

| L | dividendOf | Public ! | |NO! |
| L | withdrawableDividendOf | Public ! | |NO! |
| L | withdrawnDividendOf | Public ! | |NO! |
| L | accumulativeDividendOf | Public ! | |NO! |
| L | _transfer | Internal 🔒 | 🔴 | |
| L | _mint | Internal 🔒 | 🔴 | |
| L | _burn | Internal 🔒 | 🔴 | |
| L | _setBalance | Internal 🔒 | 🔴 | |
|||||
| **Pulsinator** | Implementation | ERC20, Ownable |||
| L | <Constructor> | Public ! | 🔴 | ERC20 |
| L | decimals | Public ! | |NO! |
| L | <Receive Ether> | External ! | 🏧 |NO! |
| L | updateStakingAmounts | Public ! | 🔴 | onlyOwner |
| L | enableTrading | External ! | 🔴 | onlyOwner |
| L | setPresaleWallet | External ! | 🔴 | onlyOwner |
| L | setExcludeFees | Public ! | 🔴 | onlyOwner |
| L | setExcludeDividends | Public ! | 🔴 | onlyOwner |
| L | setIncludeDividends | Public ! | 🔴 | onlyOwner |
| L | setCanTransferBefore | External ! | 🔴 | onlyOwner |
| L | setLimitsInEffect | External ! | 🔴 | onlyOwner |
| L | setGasPriceLimit | External ! | 🔴 | onlyOwner |
| L | setcooldowntimer | External ! | 🔴 | onlyOwner |
| L | setmaxWallet | External ! | 🔴 | onlyOwner |
| L | enableStaking | Public ! | 🔴 | onlyOwner |
| L | stake | Public ! | 🔴 |NO! |
| L | setSwapTriggerAmount | Public ! | 🔴 | onlyOwner |
| L | enableSwapAndLiquify | Public ! | 🔴 | onlyOwner |
| L | setAutomatedMarketMakerPair | Public ! | 🔴 | onlyOwner |
| L | setAllowCustomTokens | Public ! | 🔴 | onlyOwner |
| L | setAllowAutoReinvest | Public ! | 🔴 | onlyOwner |

```



	└		_setAutomatedMarketMakerPair		Private	🔒		🔴		
	└		updateGasForProcessing		Public	!		🔴		onlyOwner
	└		transferAdmin		Public	!		🔴		onlyOwner
	└		updateTransferFee		Public	!		🔴		onlyOwner
	└		updateFees		Public	!		🔴		onlyOwner
	└		getStakingInfo		External	!			NO !	
	└		getTotalDividendsDistributed		External	!			NO !	
	└		isExcludedFromFees		Public	!			NO !	
	└		withdrawableDividendOf		Public	!			NO !	
	└		dividendTokenBalanceOf		Public	!			NO !	
	└		getAccountDividendsInfo		External	!			NO !	
	└		getAccountDividendsInfoAtIndex		External	!			NO !	
	└		processDividendTracker		External	!		🔴		NO !
	└		claim		External	!		🔴		NO !
	└		getLastProcessedIndex		External	!			NO !	
	└		getNumberOfDividendTokenHolders		External	!			NO !	
	└		setAutoClaim		External	!		🔴		NO !
	└		setReinvest		External	!		🔴		NO !
	└		setDividendsPaused		External	!		🔴		onlyOwner
	└		isExcludedFromAutoClaim		External	!			NO !	
	└		isReinvest		External	!			NO !	
	└		_transfer		Internal	🔒		🔴		
	└		getStakingBalance		Private	🔒				
	└		swapAndLiquify		Private	🔒		🔴		
	└		swapTokensForEth		Private	🔒		🔴		
	└		updatePayoutToken		Public	!		🔴		onlyOwner
	└		getPayoutToken		Public	!			NO !	
	└		setMinimumTokenBalanceForAutoDividends		Public	!		🔴		onlyOwner
	└		setMinimumTokenBalanceForDividends		Public	!		🔴		onlyOwner
	└		addLiquidity		Private	🔒		🔴		
	└		forceSwapAndSendDividends		Public	!		🔴		onlyOwner





```

| L | swapAndSendDividends | Private 🗝️ | 🔴 | |
| L | multiSend | Public ! | 🔴 | onlyOwner |
| L | airdropToWallets | External ! | 🔴 | onlyOwner |
|||||
| **PulsinatorDividendTracker** | Implementation | DividendPayingToken, Ownable |||
| L | <Constructor> | Public ! | 🔴 | DividendPayingToken |
| L | decimals | Public ! | | NO ! |
| L | name | Public ! | | NO ! |
| L | symbol | Public ! | | NO ! |
| L | _transfer | Internal 🗝️ | | |
| L | withdrawDividend | Public ! | | NO ! |
| L | isExcludedFromAutoClaim | External ! | | onlyOwner |
| L | isReinvest | External ! | | onlyOwner |
| L | setAllowCustomTokens | External ! | 🔴 | onlyOwner |
| L | setAllowAutoReinvest | External ! | 🔴 | onlyOwner |
| L | excludeFromDividends | External ! | 🔴 | onlyOwner |
| L | includeFromDividends | External ! | 🔴 | onlyOwner |
| L | setAutoClaim | External ! | 🔴 | onlyOwner |
| L | setReinvest | External ! | 🔴 | onlyOwner |
| L | setMinimumTokenBalanceForAutoDividends | External ! | 🔴 | onlyOwner |
| L | setMinimumTokenBalanceForDividends | External ! | 🔴 | onlyOwner |
| L | setDividendsPaused | External ! | 🔴 | onlyOwner |
| L | getLastProcessedIndex | External ! | | NO ! |
| L | getNumberOfTokenHolders | External ! | | NO ! |
| L | getAccount | Public ! | | NO ! |
| L | getAccountAtIndex | Public ! | | NO ! |
| L | setBalance | External ! | 🔴 | onlyOwner |
| L | process | Public ! | 🔴 | NO ! |
| L | processAccount | Public ! | 🔴 | onlyOwner |
| L | updateUniswapV2Router | Public ! | 🔴 | onlyOwner |
| L | updatePayoutToken | Public ! | 🔴 | onlyOwner |

```



```

|  L | getPayoutToken | Public ! | |NO ! |
|  L | _reinvestDividendOfUser | Private 🗝️ | 🔴 | |
|  L | _withdrawDividendOfUser | Internal 🗝️ | 🔴 | |
|||||
| **IterableMapping** | Library | |||
|  L | get | Internal 🗝️ | | |
|  L | getIndexOfKey | Internal 🗝️ | | |
|  L | getKeyAtIndex | Internal 🗝️ | | |
|  L | size | Internal 🗝️ | | |
|  L | set | Internal 🗝️ | 🔴 | |
|  L | remove | Internal 🗝️ | 🔴 | |

```

### PulsinatorBoost

```

| **Context** | Implementation | |||
|  L | _msgSender | Internal 🗝️ | | |
|  L | _msgData | Internal 🗝️ | | |
|||||
| **IUniswapV2Pair** | Interface | |||
|  L | name | External ! | |NO ! |
|  L | symbol | External ! | |NO ! |
|  L | decimals | External ! | |NO ! |
|  L | totalSupply | External ! | |NO ! |
|  L | balanceOf | External ! | |NO ! |
|  L | allowance | External ! | |NO ! |
|  L | approve | External ! | 🔴 |NO ! |
|  L | transfer | External ! | 🔴 |NO ! |
|  L | transferFrom | External ! | 🔴 |NO ! |
|  L | DOMAIN_SEPARATOR | External ! | |NO ! |
|  L | PERMIT_TYPEHASH | External ! | |NO ! |
|  L | nonces | External ! | |NO ! |
|  L | permit | External ! | 🔴 |NO ! |

```



```

| L | MINIMUM_LIQUIDITY | External ! | |NO ! |
| L | factory | External ! | |NO ! |
| L | token0 | External ! | |NO ! |
| L | token1 | External ! | |NO ! |
| L | getReserves | External ! | |NO ! |
| L | price0CumulativeLast | External ! | |NO ! |
| L | price1CumulativeLast | External ! | |NO ! |
| L | kLast | External ! | |NO ! |
| L | mint | External ! | ● |NO ! |
| L | burn | External ! | ● |NO ! |
| L | swap | External ! | ● |NO ! |
| L | skim | External ! | ● |NO ! |
| L | sync | External ! | ● |NO ! |
| L | initialize | External ! | ● |NO ! |

```

```

|||||

```

```

| **IUniswapV2Factory** | Interface | |||
| L | feeTo | External ! | |NO ! |
| L | feeToSetter | External ! | |NO ! |
| L | getPair | External ! | |NO ! |
| L | allPairs | External ! | |NO ! |
| L | allPairsLength | External ! | |NO ! |
| L | createPair | External ! | ● |NO ! |
| L | setFeeTo | External ! | ● |NO ! |
| L | setFeeToSetter | External ! | ● |NO ! |

```

```

|||||

```

```

| **IERC20** | Interface | |||
| L | totalSupply | External ! | |NO ! |
| L | balanceOf | External ! | |NO ! |
| L | transfer | External ! | ● |NO ! |
| L | allowance | External ! | |NO ! |
| L | approve | External ! | ● |NO ! |

```



```

| L | transferFrom | External ! | ● |NO! |
|||||
| **IERC20Metadata** | Interface | IERC20 |||
| L | name | External ! | |NO! |
| L | symbol | External ! | |NO! |
| L | decimals | External ! | |NO! |
|||||
| **ERC20** | Implementation | Context, IERC20, IERC20Metadata |||
| L | <Constructor> | Public ! | ● |NO! |
| L | name | Public ! | |NO! |
| L | symbol | Public ! | |NO! |
| L | decimals | Public ! | |NO! |
| L | totalSupply | Public ! | |NO! |
| L | balanceOf | Public ! | |NO! |
| L | transfer | Public ! | ● |NO! |
| L | allowance | Public ! | |NO! |
| L | approve | Public ! | ● |NO! |
| L | transferFrom | Public ! | ● |NO! |
| L | increaseAllowance | Public ! | ● |NO! |
| L | decreaseAllowance | Public ! | ● |NO! |
| L | _transfer | Internal 🔒 | ● | |
| L | _mint | Internal 🔒 | ● | |
| L | _burn | Internal 🔒 | ● | |
| L | _approve | Internal 🔒 | ● | |
| L | _beforeTokenTransfer | Internal 🔒 | ● | |
|||||
| **DividendPayingTokenOptionalInterface** | Interface | |||
| L | withdrawableDividendOf | External ! | |NO! |
| L | withdrawnDividendOf | External ! | |NO! |
| L | accumulativeDividendOf | External ! | |NO! |
|||||
| **DividendPayingTokenInterface** | Interface | |||

```



```

| L | dividendOf | External ! | NO ! |
| L | distributeDividends | External ! | NO ! |
| L | withdrawDividend | External ! | NO ! |

```

```

|||||

```

```

| **SafeMath** | Library | |||

```

```

| L | add | Internal | | |
| L | sub | Internal | | |
| L | sub | Internal | | |
| L | mul | Internal | | |
| L | div | Internal | | |
| L | div | Internal | | |
| L | mod | Internal | | |
| L | mod | Internal | | |

```

```

|||||

```

```

| **Ownable** | Implementation | Context |||

```

```

| L | <Constructor> | Public ! | NO ! |
| L | owner | Public ! | NO ! |
| L | renounceOwnership | Public ! | onlyOwner |
| L | transferOwnership | Public ! | onlyOwner |

```

```

|||||

```

```

| **SafeMathInt** | Library | |||

```

```

| L | mul | Internal | | |
| L | div | Internal | | |
| L | sub | Internal | | |
| L | add | Internal | | |
| L | abs | Internal | | |
| L | toUint256Safe | Internal | | |

```

```

|||||

```

```

| **SafeMathUint** | Library | |||

```

```

| L | toInt256Safe | Internal | | |

```

```

|||||

```

```

| **IUniswapV2Router01** | Interface | |||

```



```

| L | factory | External ! | |NO ! |
| L | WETH | External ! | |NO ! |
| L | addLiquidity | External ! | ● |NO ! |
| L | addLiquidityETH | External ! | 🚧 |NO ! |
| L | removeLiquidity | External ! | ● |NO ! |
| L | removeLiquidityETH | External ! | ● |NO ! |
| L | removeLiquidityWithPermit | External ! | ● |NO ! |
| L | removeLiquidityETHWithPermit | External ! | ● |NO ! |
| L | swapExactTokensForTokens | External ! | ● |NO ! |
| L | swapTokensForExactTokens | External ! | ● |NO ! |
| L | swapExactETHForTokens | External ! | 🚧 |NO ! |
| L | swapTokensForExactETH | External ! | ● |NO ! |
| L | swapExactTokensForETH | External ! | ● |NO ! |
| L | swapETHForExactTokens | External ! | 🚧 |NO ! |
| L | quote | External ! | |NO ! |
| L | getAmountOut | External ! | |NO ! |
| L | getAmountIn | External ! | |NO ! |
| L | getAmountsOut | External ! | |NO ! |
| L | getAmountsIn | External ! | |NO ! |
|||||
| **IUniswapV2Router02** | Interface | IUniswapV2Router01 |||
| L | removeLiquidityETHSupportingFeeOnTransferTokens | External ! | ● |NO ! |
| L | removeLiquidityETHWithPermitSupportingFeeOnTransferTokens | External ! | ● |NO ! |
| L | swapExactTokensForTokensSupportingFeeOnTransferTokens | External ! | ● |NO ! |
| L | swapExactETHForTokensSupportingFeeOnTransferTokens | External ! | 🚧 |NO ! |
| L | swapExactTokensForETHSupportingFeeOnTransferTokens | External ! | ● |NO ! |
|||||
| **DividendPayingToken** | Implementation | ERC20, DividendPayingTokenInterface,
DividendPayingTokenOptionalInterface |||
| L | <Constructor> | Public ! | ● | ERC20 |
| L | <Receive Ether> | External ! | 🚧 |NO ! |
| L | distributeDividends | Public ! | 🚧 |NO ! |

```



```

| L | withdrawDividend | Public ! | ● | NO ! |
| L | _withdrawDividendOfUser | Internal 🔒 | ● | |
| L | dividendOf | Public ! | | NO ! |
| L | withdrawableDividendOf | Public ! | | NO ! |
| L | withdrawnDividendOf | Public ! | | NO ! |
| L | accumulativeDividendOf | Public ! | | NO ! |
| L | _transfer | Internal 🔒 | ● | |
| L | _mint | Internal 🔒 | ● | |
| L | _burn | Internal 🔒 | ● | |
| L | _setBalance | Internal 🔒 | ● | |
|||||
| **PulsinatorBoost** | Implementation | ERC20, Ownable |||
| L | <Constructor> | Public ! | ● | ERC20 |
| L | decimals | Public ! | | NO ! |
| L | <Receive Ether> | External ! | ⚠️ | NO ! |
| L | updateStakingAmounts | Public ! | ● | onlyOwner |
| L | enableTrading | External ! | ● | onlyOwner |
| L | setPresaleWallet | External ! | ● | onlyOwner |
| L | setExcludeFees | Public ! | ● | onlyOwner |
| L | setExcludeDividends | Public ! | ● | onlyOwner |
| L | setIncludeDividends | Public ! | ● | onlyOwner |
| L | setCanTransferBefore | External ! | ● | onlyOwner |
| L | setLimitsInEffect | External ! | ● | onlyOwner |
| L | setGasPriceLimit | External ! | ● | onlyOwner |
| L | setcooldowntimer | External ! | ● | onlyOwner |
| L | setmaxWallet | External ! | ● | onlyOwner |
| L | enableStaking | Public ! | ● | onlyOwner |
| L | stake | Public ! | ● | NO ! |
| L | setSwapTriggerAmount | Public ! | ● | onlyOwner |
| L | enableSwapAndLiquify | Public ! | ● | onlyOwner |
| L | setAutomatedMarketMakerPair | Public ! | ● | onlyOwner |

```



	└		setAllowCustomTokens		Public	!		🔴		onlyOwner	
	└		setAllowAutoReinvest		Public	!		🔴		onlyOwner	
	└		_setAutomatedMarketMakerPair		Private	🔒		🔴			
	└		updateGasForProcessing		Public	!		🔴		onlyOwner	
	└		transferAdmin		Public	!		🔴		onlyOwner	
	└		updateTransferFee		Public	!		🔴		onlyOwner	
	└		updateFees		Public	!		🔴		onlyOwner	
	└		getStakingInfo		External	!				NO !	
	└		getTotalDividendsDistributed		External	!				NO !	
	└		isExcludedFromFees		Public	!				NO !	
	└		withdrawableDividendOf		Public	!				NO !	
	└		dividendTokenBalanceOf		Public	!				NO !	
	└		getAccountDividendsInfo		External	!				NO !	
	└		getAccountDividendsInfoAtIndex		External	!				NO !	
	└		processDividendTracker		External	!		🔴		NO !	
	└		claim		External	!		🔴		NO !	
	└		getLastProcessedIndex		External	!				NO !	
	└		getNumberOfDividendTokenHolders		External	!				NO !	
	└		setAutoClaim		External	!		🔴		NO !	
	└		setReinvest		External	!		🔴		NO !	
	└		setDividendsPaused		External	!		🔴		onlyOwner	
	└		isExcludedFromAutoClaim		External	!				NO !	
	└		isReinvest		External	!				NO !	
	└		_transfer		Internal	🔒		🔴			
	└		getStakingBalance		Private	🔒					
	└		swapAndLiquify		Private	🔒		🔴			
	└		swapTokensForEth		Private	🔒		🔴			
	└		updatePayoutToken		Public	!		🔴		onlyOwner	
	└		getPayoutToken		Public	!				NO !	
	└		setMinimumTokenBalanceForAutoDividends		Public	!		🔴		onlyOwner	
	└		setMinimumTokenBalanceForDividends		Public	!		🔴		onlyOwner	





```

| L | addLiquidity | Private 🔒 | 🔴 | |
| L | forceSwapAndSendDividends | Public ! | 🔴 | onlyOwner |
| L | swapAndSendDividends | Private 🔒 | 🔴 | |
| L | multiSend | Public ! | 🔴 | onlyOwner |
| L | airdropToWallets | External ! | 🔴 | onlyOwner |
|||||
| **PulsinatorBoostDividendTracker** | Implementation | DividendPayingToken, Ownable |||
| L | <Constructor> | Public ! | 🔴 | DividendPayingToken |
| L | decimals | Public ! | |NO! |
| L | name | Public ! | |NO! |
| L | symbol | Public ! | |NO! |
| L | _transfer | Internal 🔒 | | |
| L | withdrawDividend | Public ! | |NO! |
| L | isExcludedFromAutoClaim | External ! | | onlyOwner |
| L | isReinvest | External ! | | onlyOwner |
| L | setAllowCustomTokens | External ! | 🔴 | onlyOwner |
| L | setAllowAutoReinvest | External ! | 🔴 | onlyOwner |
| L | excludeFromDividends | External ! | 🔴 | onlyOwner |
| L | includeFromDividends | External ! | 🔴 | onlyOwner |
| L | setAutoClaim | External ! | 🔴 | onlyOwner |
| L | setReinvest | External ! | 🔴 | onlyOwner |
| L | setMinimumTokenBalanceForAutoDividends | External ! | 🔴 | onlyOwner |
| L | setMinimumTokenBalanceForDividends | External ! | 🔴 | onlyOwner |
| L | setDividendsPaused | External ! | 🔴 | onlyOwner |
| L | getLastProcessedIndex | External ! | |NO! |
| L | getNumberOfTokenHolders | External ! | |NO! |
| L | getAccount | Public ! | |NO! |
| L | getAccountAtIndex | Public ! | |NO! |
| L | setBalance | External ! | 🔴 | onlyOwner |
| L | process | Public ! | 🔴 |NO! |
| L | processAccount | Public ! | 🔴 | onlyOwner |

```



```

|  L | updateUniswapV2Router | Public ! |  | onlyOwner |
|  L | updatePayoutToken | Public ! |  | onlyOwner |
|  L | getPayoutToken | Public ! |  | NO ! |
|  L | _reinvestDividendOfUser | Private  |  |  |
|  L | _withdrawDividendOfUser | Internal  |  |  |
|||||
| **IterableMapping** | Library |  |
|  L | get | Internal  |  |
|  L | getIndex0fKey | Internal  |  |
|  L | getKeyAtIndex | Internal  |  |
|  L | size | Internal  |  |
|  L | set | Internal  |  |
|  L | remove | Internal  |  |

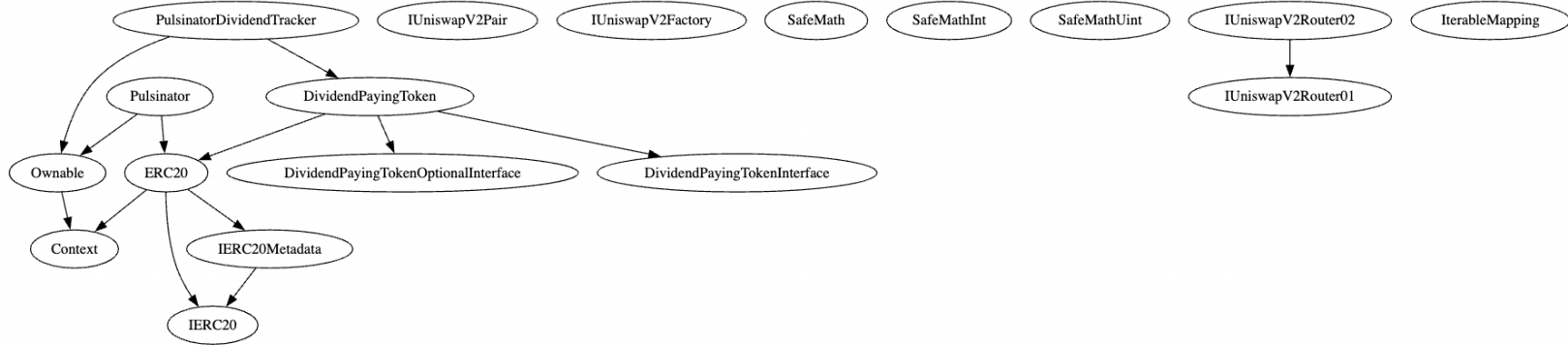
```

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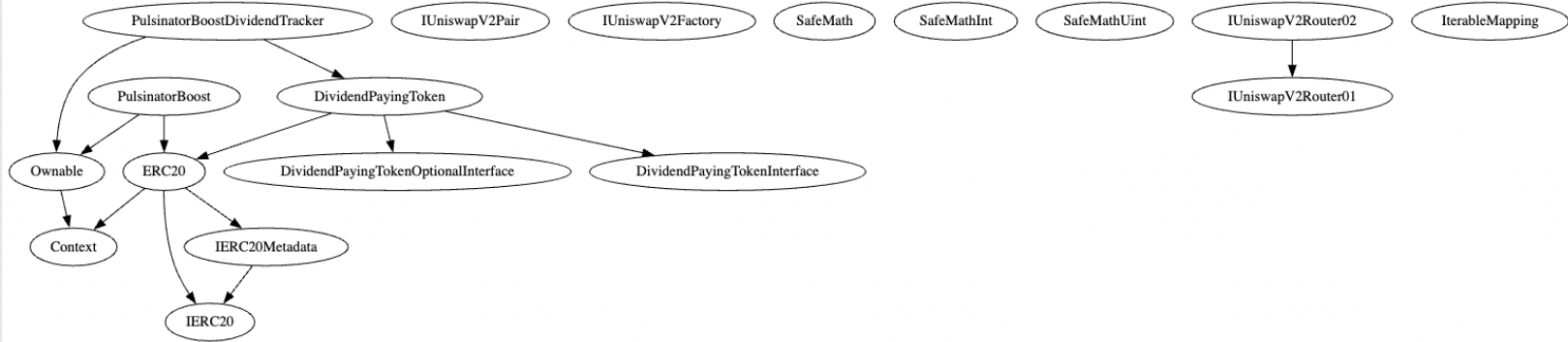


# INHERITANCE GRAPH

## Pulsinator



## PulsinatorBoost



# MANUAL REVIEW

Identifier	Definition	Severity
CEN-01	Centralization privileges of Pulsinator and PulsinatorBoost	Major 🟡
PSN-01	Privileged role allowing a wallet to trade before trading is enabled	

## Pulsinator

Important centralized privileges are listed below:

transferOwnership  
 updateStakingAmounts  
 enableTrading  
 setPresaleWallet  
 setExcludeFees  
 setExcludeDividends  
 setIncludeDividends  
 setCanTransferBefore  
 setLimitsInEffect  
 setGasPriceLimit  
 setcooldowntimer  
 setmaxWallet  
 enableStaking  
 setSwapTriggerAmount  
 enableSwapAndLiquify  
 setAutomatedMarketMakerPair  
 setAllowCustomTokens  
 setAllowAutoReinvest  
 updateGasForProcessing  
 transferAdmin  
 updateTransferFee  
 updateFees  
 setDividendsPaused  
 updatePayoutToken  
 setMinimumTokenBalanceForAutoDividends  
 setMinimumTokenBalanceForDividends  
 forceSwapAndSendDividends



multiSend  
airdropToWallets  
isExcludedFromAutoClaim  
setAllowCustomTokens  
setAllowAutoReinvest  
excludeFromDividends  
includeFromDividends  
setAutoClaim  
setReinvest  
setMinimumTokenBalanceForAutoDividends  
setMinimumTokenBalanceForDividends  
setDividendsPaused  
setBalance  
processAccount  
updateUniswapV2Router  
updatePayoutToken

### **PulsinatorBoost**

Important centralized privileges are listed below:

transferOwnership  
updateStakingAmounts  
enableTrading  
setPresaleWallet  
setExcludeFees  
setExcludeDividends  
setIncludeDividends  
setCanTransferBefore  
setLimitsInEffect  
setGasPriceLimit  
setcooldowntimer  
setMaxWallet  
enableStaking  
setSwapTriggerAmount  
enableSwapAndLiquify  
setAutomatedMarketMakerPair  
setAllowCustomTokens  
setAllowAutoReinvest  
updateGasForProcessing



transferAdmin  
updateTransferFee  
updateFees  
setDividendsPaused  
updatePayoutToken  
setMinimumTokenBalanceForAutoDividends  
setMinimumTokenBalanceForDividends  
forceSwapAndSendDividends  
multiSend  
airdropToWallets  
isExcludedFromAutoClaim  
setAllowCustomTokens  
setAllowAutoReinvest  
excludeFromDividends  
includeFromDividends  
setAutoClaim  
setReinvest  
setMinimumTokenBalanceForAutoDividends  
setMinimumTokenBalanceForDividends  
setDividendsPaused  
setBalance  
processAccount  
updateUniswapV2Router  
updatePayoutToken

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## RECOMMENDATION

Deployer and/or contract owner private keys must be secured carefully. Please refer to PAGE-09 CENTRALIZED PRIVILEGES for a detailed understanding.



Identifier	Definition	Severity
CEN-02	Initial asset distribution	Minor 

All of the initially minted assets are sent to the contract deployer when deploying the contract. This can be an issue as the deployer and/or contract owner can distribute tokens without consulting the community.

### Pulsinator

```
uint256 totalTokenSupply = (1_000_000_000) * (10**18);
_mint(owner(), totalTokenSupply); // only time internal mint function is ever called is to
create supply
```


### PulsinatorBoost

```
uint256 totalTokenSupply = (1_000_000) * (10**18);
_mint(owner(), totalTokenSupply); // only time internal mint function is ever called is to
create supply
```

## RECOMMENDATION

Project must communicate with stakeholders and obtain the community consensus while distributing assets.



Identifier	Definition	Severity
CEN-04	Privileged role receiving LP tokens	Minor 

In both contracts, function `addLiquidity()` sends liquidity to `owner()`


```
function addLiquidity(uint256 tokenAmount, uint256 ethAmount) private {
    // approve token transfer to cover all possible scenarios
    _approve(address(this), address(uniswapV2Router), tokenAmount);
    // add the liquidity
    uniswapV2Router.addLiquidityETH{value: ethAmount}(
        address(this),
        tokenAmount,
        0, // slippage is unavoidable
        0, // slippage is unavoidable
        owner(),
        block.timestamp
    );
}
```

## RECOMMENDATION

Send LP tokens to dead address or unreachable address.





Identifier	Definition	Severity
CEN-06	Privileged role modifying pair and router	Minor 

In both contracts, privileged role can call `setAutomatedMarketPair()`

```
function setAutomatedMarketMakerPair(address pair, bool value)
    public
    onlyOwner
{
    _setAutomatedMarketMakerPair(pair, value);
}
```

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## RECOMMENDATION

The current trading pair, e.g., Pancakeswap or Uniswap pair should not be removed from automated market makers.



Identifier	Definition	Severity
LOG-01	Lack of arbitrary limits	


In both contracts, below mentioned functions are set without any arbitrary limits.

```
setSwapTriggerAmount()  
setMinimumTokenBalanceForAutoDividends()  
setMinimumTokenBalanceForDividends()
```

## RECOMMENDATION

These functions should be provided arbitrary limits, e.g., put a **require** check that allows maximum tax change up to 25%.



Identifier	Definition	Severity
LOG-02	Potential sandwich attack	Minor 

Potential sandwich attack happens when an attacker observes a transaction swapping tokens or adding liquidity without setting restrictions on slippage or minimum output amount. The attacker can manipulate the exchange rate by front-running a transaction to purchase assets and make profits by back-running a transaction to sell assets. In both contracts, below mentioned functions are called without setting restrictions on slippage or minimum output:

`addLiquidityETH`

`swapExactTokensForETHSupportingFeeOnTransferTokens`

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## RECOMMENDATION

These functions should be provided reasonable minimum output amounts, instead of zero. Read more: <https://coinmarketcap.com/alexandria/article/what-are-sandwich-attacks-in-defi-and-how-can-you-avoid-them>



Identifier	Definition	Severity
LOG-03	Check Effect Interaction	Medium 🟡

In both contracts, below mentioned functions are used without check effect interaction verification:

`stake()`

`withdrawDividend()`

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## RECOMMENDATION

Verify check effect interaction for aforementioned functions or introduce re-entrancy guard. It is used to prevent re-entrant calls. Learn about re-entrancy guard: <https://consensys.github.io/smart-contract-best-practices/attacks/reentrancy/>



Identifier	Definition	Severity
COD-01	Authorization through tx.origin	Unknown 🟤

Using tx.origin for authorization could make the contract vulnerable as it refers to the original external account that started the transaction.

In both contracts, tx.origin is utilized.


Lines 1396, 1496, 1498, 1512, 1513, 1593.

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## RECOMMENDATION

Avoid authorizations via global variables wherever necessary.



Identifier	Definition	Severity
COD-02	Timestamp manipulation via <code>block.timestamp</code> Avoid using <code>block.number</code> as timestamp	Minor 

Be aware that the timestamp of the block can be manipulated by a miner. When the contract uses the timestamp to seed a random number, the miner can actually post a timestamp within 15 seconds of the block being validated, effectively allowing the miner to precompute an option more favorable to their chances.

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## RECOMMENDATION

To maintain block integrity, follow 15 seconds rule, and scale time dependent events accordingly.



Identifier	Definition	Severity
COD-06	Unknown externally owned account	Minor 

An externally owned account (EOA) has no code, and one can send messages from an externally owned account by creating and signing a transaction.

### Pulsinator

```
MarketingAndPulseTrading = payable(0xc7E51e4DfA4A039Bd3a3708022509c0D44022e9f);
devWallet = payable(0x1973Aef7dB46330e4187c29082bc327311886030);
```

### PulsinatorBoost

```
MarketingAndPulseBTrading = payable(0xc7E51e4DfA4A039Bd3a3708022509c0D44022e9f);
devWallet = payable(0x1973Aef7dB46330e4187c29082bc327311886030);
```

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## RECOMMENDATION

Private keys of externally owned accounts must be secured carefully.



Identifier	Definition	Severity
COD-09	Lack of contract balance withdraw	

Smart contract may collect tokens, and ethers from external addresses. Some swap, and liquidity-add events may accumulate residual ethers, and tokens.

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## RECOMMENDATION

Add `withdraw()` function to take out tokens and ethers from the contract.





Identifier	Definition	Severity
COD-10	Third Party Dependencies	Minor ●

In both contracts, contract logic is interacting with third party protocols e.g., Pancakeswap, Apeswap, Open Zeppelin imports. The scope of the audit treats third party entities as black boxes and assumes their functional correctness. However, in the real world, third parties can be compromised, and exploited. Moreover, upgrades in third parties can create severe impacts, e.g., increased transactional fees, deprecation of previous routers, etc.

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## RECOMMENDATION

Inspect third party dependencies regularly, and mitigate severe impacts whenever necessary.



Identifier	Definition	Severity
VOL-01	Redundant and non-conforming code in both contracts	Minor ●

Redundant code in SafeMath and multiSend.

Use of SafeMath is redundant after compiler 8.0.

multiSend declares redundant uint256 sumOfBalances = 0

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## RECOMMENDATION

Remove redundant code.



Identifier	Definition	Severity
COM-01	Floating compiler status in both contracts	

Compiler is set to ^0.8.15.


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## RECOMMENDATION

Pragma should be fixed to the version that you're indenting to deploy your contracts with.



Identifier	Definition	Severity
COM-03	Hardcoded gas amount in both contracts	Minor 

Gas amount is set to `gasForProcessing = 300000;`

```
function processDividendTracker(uint256 gas) external {
    (
        uint256 iterations,
        uint256 claims,
        uint256 lastProcessedIndex
    ) = dividendTracker.process(gas);
    emit ProcessedDividendTracker(
        iterations,
        claims,
        lastProcessedIndex,
        false,
        gas,
        tx.origin
    );
}
```

## RECOMMENDATION

Stop the `dividendTracker.process()` call in the `processDividendTracker()`. Users should claim their rewards manually through the function `claim()`.



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## ABOUT INTERFI NETWORK

InterFi Network provides intelligent blockchain solutions. We provide solidity development, testing, and auditing services. We have developed 150+ solidity codes, audited 1000+ smart contracts, and analyzed 500,000+ code lines. We have worked on major public blockchains e.g., Ethereum, Binance, Cronos, Doge, Polygon, Avalanche, Metis, Fantom, Bitcoin Cash, Velas, Oasis, etc.

InterFi Network is built by engineers, developers, UI experts, and blockchain enthusiasts. Our team currently consists of 4 core members, and 6+ casual contributors.

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