

SMART CONTRACT AUDIT

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PREPARED FOR

MOON BASE



INTRODUCTION

Auditing Firm	InterFi Network
Client Firm	Moon Base
Methodology	Automated Analysis, Manual Code Review
Language	Solidity
Contract	0x870fBd8EDe55849b7C33177C720DED8f8F488304
Blockchain	Base Explorer
Centralization	Active ownership
Commit F INT	8065fab5e519f1d600bb79d365c9c5250bf2639d INTERF INTERF
Website	https://moonbasevip.com/
Telegram	https://t.me/M00NBASECHAIN/
X (Twitter)	https://twitter.com/moon_base_chain/
Report Date	May 06, 2024

I Verify the authenticity of this report on our website: https://www.github.com/interfinetwork



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	Major 🛑	Medium 🖯	Minor	Unknown
Open	0	0	0	6	0
Acknowledged	0	1	0	2	1
Resolved	0	0	0	2	0
Major Privileges	Blacklist, Freeze Contract				
Important Privileges	·				

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.

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 Moon Base 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:

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

Public Contract Link				
https://basescan.org/address/0x870fbd8ede55849b7c33177c720ded8f8f488304#code				
Contract Name TERF	MoonBase_Token			
Compiler Version	0.8.19			
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:

	o Token Supply Manipulation
	o Access Control and Authorization
	 Assets Manipulation
Controlized Evaluita	o Ownership Control
Centralized Exploits	o Liquidity Access
	 Stop and Pause Trading
	 Ownable Library Verification



	0	Integer Overflow
	0	Lack of Arbitrary limits
	0	Incorrect Inheritance Order
	0	Typographical Errors
	0	Requirement Violation
	0	Gas Optimization
	0	Coding Style Violations
Common Contract Vulnerabilities	0	Re-entrancy
	0	Third-Party Dependencies
	0	Potential Sandwich Attacks
	0	Irrelevant Codes
	0	Divide before multiply
	0	Conformance to Solidity Naming Guides
	RFI INT	Compiler Specific Warnings
	0	Language Specific Warnings

REPORT

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

PUBLISH

- o 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 INTERE II AUDIT REPORT CO	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 reentrancy-related vulnerabilities should be fixed to deter exploits. 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:

- o 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.

- o The client can lower centralization-related risks by implementing below mentioned practices:
- o Privileged role's private key must be carefully secured to avoid any potential hack.
- o 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.
- o 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
Es	Function is payable
	Function is internal
	Function is private
Ţ	Function is important

```
| **IERC20** | Interface | |||
| L | totalSupply | External ! | NO! |
| L | balanceOf | External ! | NO! |
| └ | transfer | External ! | 🔴 |NO! |
| L | allowance | External ! | NO! | CONFIDENT
| └ | approve | External ! | ● |NO! |
| L | transferFrom | External ! | 🔴 |NO! |
| **IERC20Metadata** | Interface | IERC20 |||
| L | name | External ! | NO! |
| L | symbol | External ! | NO! |
| L | decimals | External ! | NO! |
\Pi\Pi\Pi\Pi
| **Context** | Implementation | |||
| └ | _msgData | Internal 🔒 | | |
| **ERC20** | Implementation | Context, IERC20, IERC20Metadata |||
| └ | <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! |
| └ | decreaseAllowance | Public ! | ● |NO! |
| └ | _transfer | Internal 🍙 | 🔴 | |
| L | _mint | Internal 🗎 | 🛑 | |
| L | _approve | Internal 🗎 | 🛑 | |
| L | _spendAllowance | Internal 🍙 | 🔴 | |
| └ | _beforeTokenTransfer | Internal 🗎 | ● | |
| └ | _afterTokenTransfer | Internal 🗎 | 🛑 | |
\Pi\Pi\Pi\Pi
| **Ownable** | Implementation | Context |||
| L | <Constructor> | Public ! | • | NO! |
| L | owner | Public ! | NO! |
| └ | renounceOwnership | Public ! | ● | onlyOwner |
| L | transferOwnership | Public ! | Gentlement | onlyOwner |
| └ | _transferOwnership | Internal 🗎 | 🔴 | |
\Pi\Pi\Pi\Pi
| **iFactory** | Interface | ||| | |
| L | createPair | External ! | 🔎 |NO! |
| | | | | | | |
| **iRouter** | Interface | |||
| L | WETH | External ! | NO! |
```



```
| L | factory | External ! | NO! | |
| L | swapExactTokensForETHSupportingFeeOnTransferTokens | External ! | @ |NO! |
| **iRwdDistrib** | Interface | |||
| L | setShare | External ! | WO! |
| L | process | External ! | • |NO! |
| **MoonBase_Token** | Implementation | ERC20, Ownable |||
| L | <Receive Ether> | External ! | 💹 |NO! |
| L | takeFee | Internal 🗎 | 🛑 | |
| <sup>L</sup> | swapBack | Internal 🔒 | 🛑 | |
| L | clearStuckBNB | External ! | 

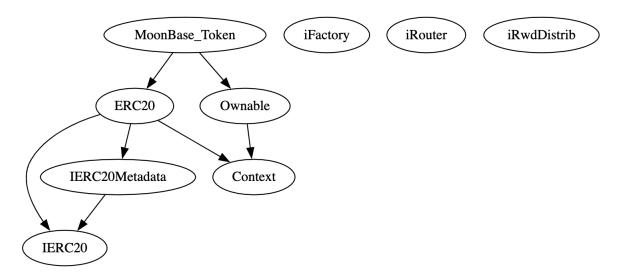
| onlyOwner |
| L | freezeContract | External ! | • | onlyOwner |
| └ | setIsFreezeExempt | External ! | ● | onlyOwner |
| L | setIsFeeExempt | External ! | • | onlyOwner |
| L | setIsProcessExempt | External ! | OnlyOwner |
| L | updateRouter | External ! | 📦 | onlyOwner |
| └ | setIsRewardExempt | External ! | ● | onlyOwner |
| L | setIsBlacklisted | External ! | 🔎 | onlyOwner |
| L | addPair | External ! | 🛑 | onlyOwner |
| └ | removeLastPair | External ! | ● | onlyOwner |
| L | setOpsFee | External ! | ● | onlyOwner |
| L | setRwdFee | External ! | 🔎 | onlyOwner |
| L | setfeeReceiver | External ! | • | onlyOwner |
| L | setSwapEnabled | External ! | 🔴 | onlyOwner |
```



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INHERITANCE GRAPH







MANUAL REVIEW

Identifier	Definition	Severity
CEN-01	Centralized privileges	
CEN-03	Privileged role can blacklist accounts and contracts	Major 🛑
CEN-05	Privileged role can freeze contract operations	Major •
CEN-06	Privileged role can remove LP pair	

Important only0wner centralized privileges are listed below:

renounceOwnership()

transferOwnership()

clearStuckBNB()

clearStuckTokens()

freezeContract()

setIsFreezeExempt()

setIsFeeExempt()

setIsProcessExempt()

updateRouter()

setIsRewardExempt()

setIsBlacklisted()

addPair()

removeLastPair()

setOpsFee()

setRwdFee()

setfeeReceiver()

setSwapEnabled()

setSwapModifier()

setManualThreshold()

setRewardDistrib()







RECOMMENDATION

Deployers', owners', administrators', and all other privileged roles' private-keys/access-keys/admin-keys should be secured carefully. These entities can have a single point of failure that compromises the security of the project. Manage centralized and privileged roles carefully. It is recommended to:

Implement multi-signature wallets: Require multiple signatures from different parties to execute certain sensitive functions within contracts. This spreads control and reduces the risk of a single party having complete authority.

Use a decentralized governance model: Implement a governance model that enables token holders or other stakeholders to participate in decision-making processes. This can include voting on contract upgrades, parameter changes, or any other critical decisions that impact the contract's functioning.

ACKNOWLEDGEMENT

MoonBase acknowledged to secure deployer and contract owners' private keys carefully. MoonBase acknowledged to use multi-signature validation approach to manage centralization roles whenever possible.



Identifier	Definition	Severity
CEN-02	Initial asset distribution	Minor •

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

```
uint256 contractSupply = 420_000_000 * (10 ** 18);
_mint(owner(), contractSupply);
```

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RECOMMENDATION

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

ACKNOWLEDGEMENT

MoonBase project will distribute tokens after acquiring broader consensus, as per their predetermined tokenomics.



Identifier	Definition	Severity
LOG-01	Lack of appropriate input validation	Minor •

Below mentioned functions are set without adequate input validation:

clearStuckTokens()
setManualThreshold()

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RECOMMENDATION

Validate input to make sure manualThreshold is above pre-determined limit. Contract owner should not be able to remove native token from smart contract.



Identifier	Definition	Severity
LOG-02	Potential front-running	Minor •

Potential front-running also classified as – 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. Below mentioned function is called without setting restrictions on slippage or minimum output:

swapExactTokensForETHSupportingFeeOnTransferTokens()

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RECOMMENDATION

This function should be provided reasonable minimum output amounts, instead of zero.

ACKNOWLEDGEMENT

MoonBase project argued that front-running is unavoidable on EVM blockchains. Features like transaction tax, should lower front-running profitability and viability.



Identifier	Definition	Severity
LOG-03	Re-entrancy	Unknown

Below mentioned function is used without re-entrancy guard:

swapBack()

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RECOMMENDATION

Use Checks Effects Interactions pattern when handing over the flow to an external entity and guard functions against re-entrancy attacks.

ACKNOWLEDGEMENT

swapBack() function makes external call to router contract. Router contract is considered secured, and well-audited.



Identifier	Definition	Severity
COD-02	Timestamp manipulation via block.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.

RESOLUTION

MoonBase team commented that timestamp of the block is not used to generate random numbers.

Miner manipulation should be minimal.



Identifier	Definition	Severity
COD-03	Note regarding swap threshold	Minor •

Dynamic calculation of swapThreshold based on transaction amounts may lead to unpredictable behavior. manualThreshold and conditions in shouldSwapBack that rely on contract balance checks may potentially be manipulated by users to trigger or prevent swaps.

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RECOMMENDATION

Ensure that swapBack() function cannot be manipulated in highly volatile conditions.



Identifier	Definition	Severity
COD-05	Missing zero address validation	Minor •

Below mentioned functions are missing zero address input validation:

setIsBlacklisted()
addPair()
setfeeReceiver()
setRewardDistrib()
updateRouter()

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RECOMMENDATION

Validate if the input address is dead(0) or not.



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.

feeReceiver = 0x94766F785e54ce8b29d22e0BC07CdFffc0B3bbb4;

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RECOMMENDATION

Private keys of externally owned accounts must be secured carefully.



Identifier	Definition	Severity
COD-12	Lack of event-driven architecture	Minor •

Smart contract uses function calls to update state, which can make it difficult to track and analyze changes to the contract over time.

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RECOMMENDATION

Use events to track state changes. Events improve transparency and provide a more granular view of contract activity.



Identifier	Definition	Severity
COM-03	Hardcoded gas amount	Minor •

Gas amount is set to:

rwdDistribGas = 500000;

Hardcoding a gas limit means that if the actual gas required for the rwdDistrib.process() function changes due to contract upgrades or network conditions, hardcoded value might not be sufficient or may be excessively high, leading to failed transactions or unnecessary expenditure of gas.

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RECOMMENDATION

Use flexible gas limits.



Identifier	Definition	Severity
VOL-02	Assembly code	Minor •

Inline assembly is a way to access the Ethereum Virtual Machine (EVM) at low level. <u>This bypasses</u> several important safety features and checks of Solidity. Moreover, automated and manual checks are not confidently possible for inline assembly codes.

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RECOMMENDATION

Use high level Solidity constructs instead of assembly.

RESOLUTION

MoonBase team has commented that – main assembly code is used for gas savings in byte manipulation and was written by *Consensys*, and is considered safe.



DISCLAIMERS

InterFi Network provides the easy-to-understand audit of solidity source codes (commonly known as smart contracts).

The smart contract for this particular audit was analyzed for common contract vulnerabilities, and centralization exploits. This audit report makes no statements or warranties on the security of the code. This audit report does not provide any warranty or guarantee regarding the absolute bug-free nature of the smart contract analyzed, nor do they provide any indication of the client's business, business model or legal compliance. This audit report does not extend to the compiler layer, any other areas beyond the programming language, or other programming aspects that could present security risks. Cryptographic tokens are emergent technologies, they carry high levels of technical risks and uncertainty. You agree that your access and/or use, including but not limited to any services, reports, and materials, will be at your sole risk on an as-is, where-is, and as-available basis. This audit report could include false positives, false negatives, and other unpredictable results.

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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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SMART CONTRACT AUDITS | SOLIDITY DEVELOPMENT AND TESTING RELENTLESSLY SECURING PUBLIC AND PRIVATE BLOCKCHAINS