InterFi NETWORK

SMART CONTRACT AUDIT

interfinetwork

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PREPARED FOR

MAGIKAL AI

INTRODUCTION

Auditing Firm	InterFi Network
Client Firm	Magikal AI
Methodology	Automated Analysis, Manual Code Review
Language	Solidity
Binance Smart Chain	Proxy: 0x8aBfa6a4F4B9865b0e7ACfDCe1839A2584636d06
	Implementation: 0x51F160320794eDbc200e1E2f3C53C08A43Fc34E7
Ethereum Chain	Proxy: 0x6a26ee7755d939b96cdCd8A0370630D48902FD7C
	Implementation: 0x45125ab97219f9F6E7653E4231e16DEDF3944605
Arbitrum Chain	Proxy: 0x8aBfa6a4F4B9865b0e7ACfDCe1839A2584636d06 Implementation: 0x45125ab97219f9F6E7653E4231e16DEDF3944605
Centralization	Active ownership
Commit	5476fa74a4e226e1f4e25e7972ef54e7e9b2b9bd
Website	https://www.magikal.ai/
Telegram	https://t.me/magikalnft/
Twitter	https://twitter.com/magikalnft/
Discord	https://discord.gg/BAhSPGTS/
Report Date	March 25, 2023

ℹ️ 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	1	0
Acknowledged	0	1	1	2	1
Resolved	1	0	1	0	0
Noteworthy Functions	Initialize, Mint, Burn, Set Fees, Set Pair and Router, Create and Modify Whitelists				

ℹ️ 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.

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

TABLE OF CONTENTS

SCOPE OF WORK

InterFi was consulted by Magikal AI 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:

- MGKL.sol

ℹ️ 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
https://bscscan.com/address/0x51f160320794edbc200e1e2f3c53c08a43fc34e7#code

Contract Name	MGKL
Compiler Version	0.6.12
License	MIT

Public Contract Link
https://etherscan.io/address/0x45125ab97219f9f6e7653e4231e16dedf3944605#code

Contract Name	MGKL
Compiler Version	0.6.12
License	MIT

Public Contract Link	
https://arbiscan.io/address/0x45125ab97219f9f6e7653e4231e16dedf3944605#code	
Contract Name	MGKL
Compiler Version	0.6.12
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	○ Token Supply Manipulation ○ Access Control and Authorization ○ Assets Manipulation ○ Ownership Control ○ Liquidity Access ○ Stop and Pause Trading ○ Ownable Library Verification

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.

ℹ️ 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.

ℹ️ 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

SafeCast	Library			
└	toUint128	Internal 🔒		
└	toUint64	Internal 🔒		
└	toUint32	Internal 🔒		
└	toUint16	Internal 🔒		
└	toUint8	Internal 🔒		
└	toUint256	Internal 🔒		
└	toInt256	Internal 🔒		
Initializable	Implementation			
└	isConstructor	Private 🔐		
ContextUpgradeSafe	Implementation	Initializable		
└	__Context_init	Internal 🔒	🛑	initializer
└	__Context_init_unchained	Internal 🔒	🛑	initializer
└	_msgSender	Internal 🔒		
└	_msgData	Internal 🔒		

| **OwnableUpgradeSafe** | Implementation | Initializable, ContextUpgradeSafe |||

| └ | __Ownable_init | Internal 🔒 | 🛑 | initializer |

| └ | __Ownable_init_unchained | Internal 🔒 | 🛑 | initializer |

| └ | owner | Public ❗ | | NO❗ |

| └ | renounceOwnership | Public ❗ | 🛑 | onlyOwner |

| └ | transferOwnership | Public ❗ | 🛑 | onlyOwner |

||||||

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

| └ | add | Internal 🔒 | | |

| └ | sub | Internal 🔒 | | |

| └ | sub | Internal 🔒 | | |

| └ | mul | Internal 🔒 | | |

| └ | div | Internal 🔒 | | |

| └ | div | Internal 🔒 | | |

| └ | mod | Internal 🔒 | | |

| └ | mod | Internal 🔒 | | |

||||||

| **Address** | Library | |||

| └ | isContract | Internal 🔒 | | |

| └ | sendValue | Internal 🔒 | 🛑 | |

||||||

| **IERC20** | Interface | |||

| └ | totalSupply | External ❗ | | NO❗ |

| └ | decimals | External ❗ | | NO❗ |

| └ | symbol | External ❗ | | NO❗ |

| └ | name | External ❗ | | NO❗ |

| └ | balanceOf | External ❗ | | NO❗ |

| └ | transfer | External ❗ | 🛑 | NO❗ |

└	allowance	External ❗		NO❗
└	approve	External ❗	🛑	NO❗
└	transferFrom	External ❗	🛑	NO❗
IUniswapV2Factory	Interface			
└	feeTo	External ❗		NO❗
└	feeToSetter	External ❗		NO❗
└	getPair	External ❗		NO❗
└	allPairs	External ❗		NO❗
└	allPairsLength	External ❗		NO❗
└	createPair	External ❗	🛑	NO❗
└	setFeeTo	External ❗	🛑	NO❗
└	setFeeToSetter	External ❗	🛑	NO❗
IUniswapV2Router01	Interface			
└	factory	External ❗		NO❗
└	WETH	External ❗		NO❗
└	addLiquidity	External ❗	🛑	NO❗
└	addLiquidityETH	External ❗	💵	NO❗
└	removeLiquidity	External ❗	🛑	NO❗
└	removeLiquidityETH	External ❗	🛑	NO❗
└	removeLiquidityWithPermit	External ❗	🛑	NO❗
└	removeLiquidityETHWithPermit	External ❗	🛑	NO❗
└	swapExactTokensForTokens	External ❗	🛑	NO❗
└	swapTokensForExactTokens	External ❗	🛑	NO❗
└	swapExactETHForTokens	External ❗	💵	NO❗
└	swapTokensForExactETH	External ❗	🛑	NO❗
└	swapExactTokensForETH	External ❗	🛑	NO❗

| └ | swapETHForExactTokens | External ❗ | 💵 |NO❗ |

| └ | quote | External ❗ | |NO❗ |

| └ | getAmountOut | External ❗ | |NO❗ |

| └ | getAmountIn | External ❗ | |NO❗ |

| └ | getAmountsOut | External ❗ | |NO❗ |

| └ | getAmountsIn | External ❗ | |NO❗ |

||||||

| **IUniswapV2Router02** | Interface | IUniswapV2Router01 |||

| └ | removeLiquidityETHSupportingFeeOnTransferTokens | External ❗ | 🛑 |NO❗ |

| └ | removeLiquidityETHWithPermitSupportingFeeOnTransferTokens | External ❗ | 🛑 |NO❗ |

| └ | swapExactTokensForTokensSupportingFeeOnTransferTokens | External ❗ | 🛑 |NO❗ |

| └ | swapExactETHForTokensSupportingFeeOnTransferTokens | External ❗ | 💵 |NO❗ |

| └ | swapExactTokensForETHSupportingFeeOnTransferTokens | External ❗ | 🛑 |NO❗ |

||||||

| **LGEWhitelisted** | Implementation | ContextUpgradeSafe |||

| └ | __LGEWhitelisted_init | Internal 🔒 | 🛑 | initializer |

| └ | __LGEWhitelisted_init_unchained | Internal 🔒 | 🛑 | initializer |

| └ | renounceWhitelister | External ❗ | 🛑 | onlyWhitelister |

| └ | transferWhitelister | External ❗ | 🛑 | onlyWhitelister |

| └ | _transferWhitelister | Internal 🔒 | 🛑 | |

| └ | createLGEWhitelist | External ❗ | 🛑 | onlyWhitelister |

| └ | modifyLGEWhitelist | External ❗ | 🛑 | onlyWhitelister |

| └ | getLGEWhitelistRound | Public ❗ | |NO❗ |

| └ | _applyLGEWhitelist | Internal 🔒 | 🛑 | |

||||||

| **MGKL** | Implementation | IERC20, OwnableUpgradeSafe, LGEWhitelisted |||

| └ | initialize | Public ❗ | 🛑 | initializer |

| └ | setRouter | Public ❗ | 🛑 | onlyOwner |

| └ | setFees | Public ❗ | 🛑 | onlyOwner |

| └ | setPair | Public ❗ | 🛑 | onlyOwner |

| └ | setFeeExcluded | Public ❗ | 🛑 | onlyOwner |

| └ | mint | Public ❗ | 🛑 | onlyOwner |

| └ | burn | External ❗ | 🛑 | NO❗ |

| └ | _beforeTokenTransfer | Internal 🔒 | 🛑 | |

| └ | _transfer | Internal 🔒 | 🛑 | |

| └ | name | Public ❗ | | NO❗ |

| └ | symbol | Public ❗ | | NO❗ |

| └ | cap | Public ❗ | | NO❗ |

| └ | decimals | Public ❗ | | NO❗ |

| └ | totalSupply | Public ❗ | | NO❗ |

| └ | balanceOf | Public ❗ | | NO❗ |

| └ | transfer | Public ❗ | 🛑 | NO❗ |

| └ | allowance | Public ❗ | | NO❗ |

| └ | approve | Public ❗ | 🛑 | NO❗ |

| └ | transferFrom | Public ❗ | 🛑 | NO❗ |

| └ | increaseAllowance | Public ❗ | 🛑 | NO❗ |

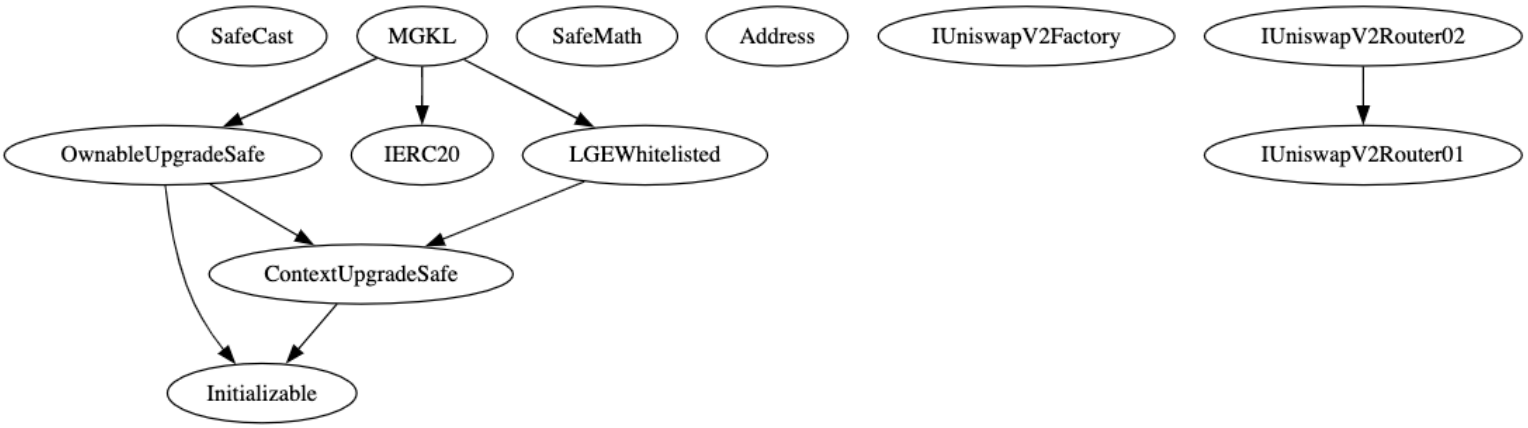
| └ | decreaseAllowance | Public ❗ | 🛑 | NO❗ |

| └ | _mint | Internal 🔒 | 🛑 | |

| └ | _burn | Internal 🔒 | 🛑 | |

| └ | _approve | Internal 🔒 | 🛑 | |

INHERITANCE GRAPH



MANUAL REVIEW

Identifier	Definition	Severity
CEN-01	Centralized privileges	Major 🟠
CEN-06	Privileged role modifying pair and router	
CEN-11	Privileged role performing mint	

`onlyWhitelister` access control is attributed to below mentioned functions:

```
renounceWhitelister()
transferWhitelister()
createLGEWhitelist()
modifyLGEWhitelist()
```

`onlyOwner` centralized privileges are listed below:


```
setRouter()
setFees()
setPair()
setFeeExcluded()
mint()
```

RECOMMENDATION

Deployer, contract owner, and privileged roles' private keys should be secured carefully. Please refer to PAGE-09 CENTRALIZED PRIVILEGES for a detailed understanding.

Identifier	Definition	Severity
CEN-09	Use of proxy and upgradeable contracts	Critical 🔴

Privileged role can initiate contract implementation. Contract upgradeability allows privileged roles to change current contract implementation.

RECOMMENDATION

Test and validate current contract thoroughly before deployment. Future contract upgradeability negatively elevates centralization risk.

RESOLUTION

Magikal AI team will use contract upgradeability to introduce new features, optimize code over time, and mitigate future exploitability without the need of re-deployment.

Identifier	Definition	Severity
LOG-01	Lack of appropriate arbitrary boundaries	Medium 🟡

Below mentioned functions are set without any or high arbitrary boundaries.

```
setFees()
mint()
```


RECOMMENDATION

These functions should be provided appropriate upper and lower boundaries.

RESOLUTION

Magikal.ai team has provided threshold for aforementioned functions.

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 functions are called without setting restrictions on slippage or minimum output:

`swapExactTokensForTokensSupportingFeeOnTransferTokens()`

RECOMMENDATION

These functions should be provided reasonable minimum output amounts, instead of zero.

ACKNOWLEDGEMENT

Magikal.ai team had acknowledged this finding, and agreed the code keep as-is.

Identifier	Definition	Severity
COD-05	Missing zero address validation	Minor

Below mentioned functions are missing zero address input validation:

`renounceWhitelister()`
`transferWhitelister()`
`setRouter()`
`setPair()`
`mint()`

RECOMMENDATION

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

ACKNOWLEDGEMENT

Magikal.ai team had acknowledged this finding, and agreed the code keep as-is.

Identifier	Definition	Severity
COD-08	Lack of fallback function	Minor

Fallback functions are usually executed in one of the following cases: If a function identifier doesn't match any of the available functions in a smart contract. If there was no data supplied along with the function call.

RECOMMENDATION

Use fallback function with empty data, and mark it external, and payable.

ACKNOWLEDGEMENT

Magikal.ai team had acknowledged this finding, and agreed the code keep as-is.

Identifier	Definition	Severity
COD-10	Third Party Dependencies	Unknown

Smart contract is interacting with third party protocols e.g., Market Makers, Open Zeppelin tools. 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.

RECOMMENDATION

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

Identifier	Definition	Severity
COM-02	Outdated compiler version	Medium 🟡
COM-01	Floating compiler status	

Compiler is set an outdated version.

RECOMMENDATION

Set Compiler to version 0.8.12 or above.

ACKNOWLEDGEMENT

Magikal.ai team had acknowledged this finding, and agreed the code keep as-is.

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