InterFi NETWORK

SMART CONTRACT AUDIT

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PREPARED FOR

DROPS LOCK MARKETPLACE CONTRACT

INTRODUCTION

Auditing Firm	InterFi Network
Client Firm	Drops Lock Marketplace
Methodology	Automated Analysis, Manual Code Review
Language	Solidity
Contract	0x13de9d300739918F3AB95649177a2d2E7d8eFc20
Blockchain	Ethereum Chain
Centralization	Active ownership
Commit	1c6736dc68c1d606820e2294127cea29b9f79c0e
Website	https://drops.site/
Telegram	https://t.me/DropsERC/
X (Twitter)	https://twitter.com/dropserc/
Report Date	March 09, 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	2	1
Acknowledged	0	1	2	0	1
Resolved	0	0	1	6	0
Important Privileges	Set ETH Fee, Set Drops Token, Set Fee Wallet, Set Locker Address				
Important Functions	Buy Lock With ETH, Buy Lock With Drops, Initiate Listing, Activate Listing, Withdraw Listing, Change Price In ETH, Change Price In Drops				

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.

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SCOPE OF WORK

InterFi was consulted by Drops Lock Marketplace 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:

- DropsLockMarketplace.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://etherscan.io/address/0x13de9d300739918f3ab95649177a2d2e7d8efc20#code	
Contract Name	DropsLockMarketplace
Compiler Version	0.8.24
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

IUniswapV2Locker	Interface			
└	getUserLockForTokenAtIndex	External !		NO !
└	tokenLocks	External !		NO !
└	transferLockOwnership	External !	🛑	NO !
└	getUserNumLocksForToken	External !		NO !
DropsLockMarketplace	Implementation	Ownable, ReentrancyGuard		
└	<Constructor>	Public !	🛑	Ownable
└	setETHFee	External !	🛑	onlyOwner
└	setDropsToken	External !	🛑	onlyOwner
└	setFeeWallet	External !	🛑	onlyOwner
└	setLockerAddress	External !	🛑	onlyOwner
└	initiateListing	External !	🛑	NO !
└	activateListing	External !	🛑	NO !
└	fetchListing	External !		NO !
└	buyLockWithETH	External !	💵	nonReentrant

| └ | buyLockWithDrops | External ❗ | 💵 | nonReentrant |

| └ | _getIndex | Internal 🔒 | 🛑 | |

| └ | _getIndexForUserLock | Internal 🔒 | 🛑 | |

| └ | withdrawListing | External ❗ | 🛑 | nonReentrant |

| └ | changePriceInETH | External ❗ | 🛑 | nonReentrant |

| └ | changePriceInDrops | External ❗ | 🛑 | nonReentrant |

||||||

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

| └ | _msgSender | Internal 🔒 | | |

| └ | _msgData | Internal 🔒 | | |

| └ | _contextSuffixLength | Internal 🔒 | | |

||||||

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

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

| └ | balanceOf | External ❗ | |NO❗ |

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

| └ | allowance | External ❗ | |NO❗ |

| └ | approve | External ❗ | 🛑 |NO❗ |

| └ | transferFrom | External ❗ | 🛑 |NO❗ |

||||||

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

| └ | <Constructor> | Public ❗ | 🛑 |NO❗ |

| └ | owner | Public ❗ | |NO❗ |

| └ | _checkOwner | Internal 🔒 | | |

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

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

| └ | _transferOwnership | Internal 🔒 | 🛑 | | |

||||||

| **ReentrancyGuard** | Implementation | ||| |

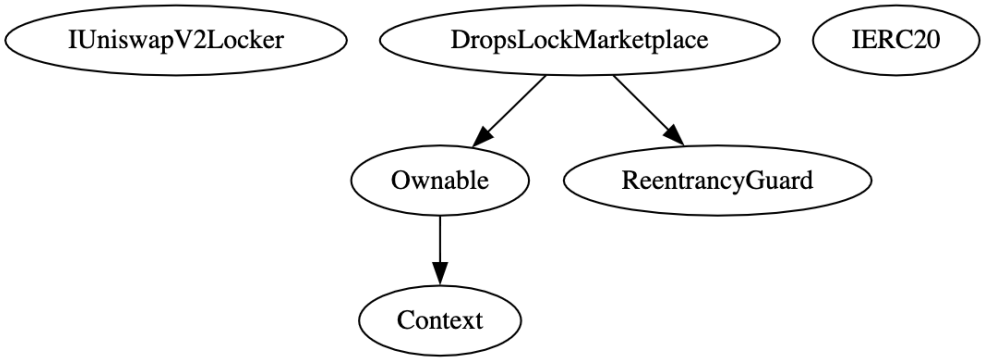
| └ | <Constructor> | Public ❗ | 🛑 | NO❗ |

| └ | _nonReentrantBefore | Private 🔐 | 🛑 | | |

| └ | _nonReentrantAfter | Private 🔐 | 🛑 | | |

| └ | _reentrancyGuardEntered | Internal 🔒 | | | |

INHERITANCE GRAPH



MANUAL REVIEW

Identifier	Definition	Severity
CEN-01	Centralized privileges	Major 🟠

Important `onlyOwner` centralized privileges are listed below:

```
setETHFee()
setDropsToken()
setFeeWallet()
setLockerAddress()
renounceOwnership()
transferOwnership()
```

RECOMMENDATION

Deployers, contract owners, operators', access controlled, 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.

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

Drops team argued that centralized privileged are required by the design. Drops team will implement multi-signature wallet approach whenever possible.

Identifier	Definition	Severity
LOG-02	Potential front-running	Medium 🟡

Potential front-running happens when an 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.

Front-running risk in `withdrawListing()` involves an attacker seeing a withdrawal transaction pending and trying to buy the lock before the withdrawal is processed, especially if lock is underpriced.

Actions like listing activations and purchases may also be susceptible to front-running, where a malicious actor observes an upcoming transaction and tries to get their own transaction mined first by paying a higher gas fee.

Mentioned functions are vulnerable to front running:


```
initiateListing()
activateListing()
buyLockWithETH()
buyLockWithDrops()
withdrawListing()
changePriceInETH()
changePriceInDrops()
```

RECOMMENDATION

Use mechanisms like commit-reveal schemes to mitigate front-running risk in sensitive functions.

ACKNOWLEDGEMENT

Drops team has recognized this finding, and argued that front-running is an inherent issue on Ethereum, due to public nature of pending transactions. While we strive to mitigate its impact through careful design, complete prevention within the current Ethereum framework is not feasible.

Identifier	Definition
LOG-03	Re-entrancy

Below mentioned functions are used with `nonReentrant` modifier to lower re-entrancy risks:

`buyLockWithETH()`
`buyLockWithDrops()`
`withdrawListing()`
`changePriceInETH()`
`changePriceInDrops()`

Identifier	Definition	Severity
LOG-04	Inadequate access control	Medium 🟡

Below mentioned functions should be provided adequate access control to stop unauthorized state changes:

```
activateListing()
initiateListing()
withdrawListing()
```


RECOMMENDATION

Implement adequate role-based access control (RBAC) to mentioned functions.

RESOLUTION

Drops team argued that above mentioned functions check for appropriate owner of the lock in function bodies. Explicit access control is not required.

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.

RECOMMENDATION

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

Identifier	Definition	Severity
COD-04	Missing or inaccurate error messages	Minor

Below mentioned functions have missing or inaccurate error messages:

`setDropsToken()`
`setLockerAddress()`

RECOMMENDATION

Provide accurate information strings for `require` related errors.

RESOLUTION

Drops team has added error messages for `require` statements.

Identifier	Definition	Severity
COD-05	Missing zero address validation	Minor

Below mentioned functions are missing zero address input validation:

`setDropsToken()`
`setFeeWallet()`
`setLockerAddress()`

RECOMMENDATION

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

RESOLUTION

Drops team has added `dead(0)` address validation in mentioned functions.

Identifier	Definition	Severity
COD-06	Unchecked return values	Minor 🟢

`transferFrom` call in `buyLockWithDrops()` does not explicitly check the return value.

RECOMMENDATION

Ensure that token transfer calls return a boolean success value.

RESOLUTION

Drops team commented that Solidity 0.8.0 will revert on failure due to require statement, hence explicit return value check isn't necessary.

Identifier	Definition	Severity
COD-07	Division before multiplication	Minor

Division before multiplication may throw unexpected results in `feeForReferral`:

```
uint256 feeForReferral = feeAmount * referralBonus / ethFee;
```


RECOMMENDATION

Adjust formula to perform multiplication before division.

Identifier	Definition	Severity
COD-10	Direct and indirect dependencies	Unknown
COD-11	Reliance on *OpenZeppelin* libraries	

Smart contract is interacting with third party protocols e.g., DEX Routers, Drops Token Contract, External Contracts, Web 3 Applications, *OpenZeppelin* tools. The scope of the audit treats these entities as black boxes and assumes their functional correctness. However, in the real world, all of them can be compromised, and exploited. Moreover, upgrades in these entities 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.

ACKNOWLEDGEMENT

Drops team will inspect third party dependencies regularly, and push updates as required.

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.

RECOMMENDATION

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

RESOLUTION

Drops team has added events to track and analyze changes to the contract over time.

Identifier	Definition	Severity
COD-13	Consider pull over push for payments	Minor

Current implementation pushes payments to sellers and fee wallet. This pattern is susceptible to re-entrancy and can fail if the receiving contract does not accept ETH. A better alternative is the pull pattern, where recipients withdraw their funds.

RECOMMENDATION

Use pull pattern to allow recipients to withdraw their funds.

RESOLUTION

Drops team commented that smart contract now employs `ReentrancyGuard`, hence, direct vulnerability to re-entrancy attacks is mitigated, addressing the primary concern with push pattern.

Identifier	Definition	Severity
COD-14	Impact of price volatility in **`Drops`** token	Unknown 🟤

Smart contract allows listings to be priced in both ETH and the Drops token.

Price manipulation risk is higher in **`Drops`** token, as its value could be more volatile compared to ETH.

RECOMMENDATION

Ensure timely updates of prices in response to market movements to maintain trust and prevent exploitation.

Identifier	Definition	Severity
COD-15	Changing price of listings	Medium 🟡

Allowing sellers to change the price of their listings with `changePriceInETH()` and `changePriceInDrops()` introduces flexibility. This flexibility introduces mentioned risk:

Sellers may frequently change prices in response to market fluctuations or to manipulate perceived value, which may lead to instability or unfair practices.

RECOMMENDATION

Implement cooldown period between price changes can help mitigate rapid price manipulation.

ACKNOWLEDGEMENT

Drops team has recognized this finding, and kept the code as-is. No changes to original source code have been made.

Identifier	Definition	Severity
COM-01	Floating compiler status	Minor

Compiler is set to `^0.8.0.`

RECOMMENDATION

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

RESOLUTION

Drops team has deployed smart contract with stable compiler.

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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