



SMART CONTRACT AUDIT

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PREPARED FOR

XFOOD TOKEN



INTRODUCTION

Auditing Firm	InterFi Network
Client Firm	XFood Token
Methodology	Automated Analysis, Manual Code Review
Language	Solidity
Contract	0x803a968846d03377716Ae9b24745abd5b67681ef
Centralization	Limited owner privileges
Centralization	Active ownership
Commit	c56916d9e94dd986930df1512c3bfeeff7f6f77e
Website	https://xfood.io/
X (Twitter)	https://twitter.com/xfoodtoken/
Report Date	May 12, 2024


 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	0	0
Acknowledged	0	0	2	1	1
Resolved	0	0	0	3	0

 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.


 XFood is running presale on its platform. It is critical that the funds raised during this phase are managed with responsibility (recommended to use third party escrow services to hold funds). Historical trends indicate that projects without transparent verification processes are susceptible to risks, like 'rugpull'. In 'rugpull' situation, token contract audit is not effective.



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SCOPE OF WORK

InterFi was consulted by XFood Token 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:

- XFoodToken.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	
https://bscscan.com/address/0x803a968846d03377716ae9b24745abd5b67681ef#code	
Contract Name	XFoodToken
Compiler Version	0.8.20
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">○ Token Supply Manipulation○ Access Control and Authorization○ Assets Manipulation○ Ownership Control○ Liquidity Access○ Stop and Pause Trading○ Ownable Library Verification
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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.



MANUAL REVIEW

Identifier	Definition	Severity
CEN-01	Centralized privileges	Medium ●
CEN-12	Access to contract pause	

Important onLy0wner centralized privileges are listed below:

```
renounce0wnership()  
transfer0wnership()  
pause()  
unpause()
```

pause() and unpause() functions are callable by owner. This is a required pattern for emergency contract pause, ensure that the use of these functions is explained to the community.

RECOMMENDATION

Deployers', owners', 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.

- Consider using multi-signature wallets. Multi-sig wallet requires multiple parties to agree on transactions before execution, reducing the risk that a single compromised account could perform unauthorized actions.
- Time-lock sensitive functions: Introduce time-locks for critical functions so that any changes have a mandatory delay period during which users can review and react to proposed actions.



ACKNOWLEDGEMENT

XFood team explained that contract design intentionally requires centralized access to enhance security measures. Privileged role is designated to pause the contract during emergencies, ensuring operational safety and risk management.

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

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. Standard ERC20 transfer and approve functions can be front-run. For example, if a user is trying to approve a spender for a certain amount, a front-runner could see this and try to transfer tokens from the user if they already have an allowance.

RECOMMENDATION

Use commit-reveal scheme or private transactions.

ACKNOWLEDGEMENT

XFoood team argued that front-running is a known concern in blockchain environments, particularly on public blockchains like Ethereum. There's no one full-proof way to deter front-runners.



Identifier	Definition	Severity
COD-02	Timestamp manipulation via <code>block.timestamp</code> and <code>block.chainid</code>	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.

`permit()`

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RECOMMENDATION

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

ACKNOWLEDGEMENT

XFood project uses widely accepted *OpenZeppelin* imports in smart contract.



Identifier	Definition
COD-09	Lack of contract balance withdraw

Smart contract may collect tokens, and ethers from external addresses. Add `withdraw()` function to take out tokens and ethers from the contract.

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Identifier	Definition	Severity
COD-10	Direct and indirect dependencies	Unknown 🟤

Smart contract is interacting with third party protocols e.g., DEX routers, external contracts, web3 applications, *OpenZeppelin* upgradeable and ERC20 libraries. 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.

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RECOMMENDATION

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

ACKNOWLEDGEMENT

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



Identifier	Definition	Severity
COD-11	Possible signature replay attack	Minor 

permit() function follows the EIP-2612 standard which is good as it allows for gasless transactions, however **ECDSA** must be implemented properly prevent possible signature replay attacks.


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COMMENT

Checks are set in permit() function to validate signature.

```
address signer = ECDSA.recover(hash, v, r, s);  
if (signer != owner) {  
    revert ERC2612InvalidSigner(signer, owner);  
}
```



Identifier	Definition	Severity
COD-12	Note regarding keccak256 secure hashing	Minor 

Note that the keccak256 function is not collision-resistant, and therefore there is a possibility of two different messages producing the same hash. Generating strong random input data, and properly securing and managing keys is recommended for fortification of keccak256.

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COMMENT

XFood team comments that the keccak256 collision has little effect on the functionality as it's related to signed data, except for the storage layout that can be solved by creating test files to check storage slot collisions. keccak256 function is widely adapted in cryptography, and its use is relatively safe.



Identifier	Definition	Severity
COM-01	Floating pragma	Minor ●
COM-02	Multiple pragma directives	

Compiler is set to ^0.8.20

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RECOMMENDATION

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

RESOLUTION

XFood smart contract will be deployed using 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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