BEOSIN
Web3 Security & Compliance

One click sender

Smart Contract Security Audit

No. 202409131830

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SECURING BLOCKCHAIN ECOSYSTEM

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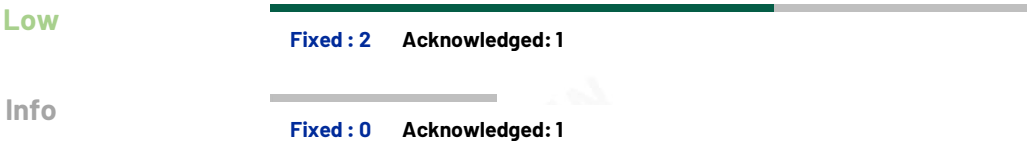
Contents

Summary of Audit Results

After auditing, 3 Low risk,1 info item was identified in the One click sender project. Specific audit details will be presented in the Findings section. Users should pay attention to the following aspects when interacting with this project:



- **Project Description:**

The main functionality of this project's contracts is to enable batch transfers of ERC20 tokens and ETH, with a fee policy mechanism that calculates costs based on the number of users, total transaction amount, and type ID. The project also introduces a whitelist feature, allowing specific users to be exempt from these fees. The contracts are designed to be upgradeable and include role-based access control to ensure secure and efficient transaction processing.

1 Overview

1.1 Project Overview

Project Name	One click sender
Project Language	Solidity
Platform	Ethereum, BNB Chain, Polygon, Cypress
Code base	https://github.com/ModoriLabs/One click sender-contract
Commit	ea0393d0a2bfe5de8caea93a710a789660b4e7a3(initial) 6d2426dc598c8c0bd5b656c048f23972485828a3 ae9fdaf86224c8ba2416a32a63ecfa8eefd05e9f(final)

1.2 Audit Overview

Audit work duration: Sep 6, 2024 – Sep 13, 2024

Audit team: Beosin Security Team

1.3 Audit Method

The audit methods are as follows:

1. Formal Verification

Formal verification is a technique that uses property-based approaches for testing and verification. Property specifications define a set of rules using Beosin's library of security expert rules. These rules call into the contracts under analysis and make various assertions about their behavior. The rules of the specification play a crucial role in the analysis. If the rule is violated, a concrete test case is provided to demonstrate the violation.

2. Manual Review

Using manual auditing methods, the code is read line by line to identify potential security issues. This ensures that the contract's execution logic aligns with the client's specifications and intentions, thereby safeguarding the accuracy of the contract's business logic.

The manual audit is divided into three groups to cover the entire auditing process:

The Basic Testing Group is primarily responsible for interpreting the project's code and conducting comprehensive functional testing.

The Simulated Attack Group is responsible for analyzing the audited project based on the collected historical audit vulnerability database and security incident attack models. They identify potential attack vectors and collaborate with the Basic Testing Group to conduct simulated attack tests.

The Expert Analysis Group is responsible for analyzing the overall project design, interactions with third parties, and security risks in the on-chain operational environment. They also conduct a review of the entire audit findings.

3. Static Analysis

Static analysis is a method of examining code during compilation or static analysis to detect issues. Beosin-VaaS can detect more than 100 common smart contract vulnerabilities through static analysis, such as reentrancy and block parameter dependency. It allows early and efficient discovery of problems to improve code quality and security.

2 Findings

Index	Risk description	Severity level	Status
One click sender-01	Lack of permission checking	Low	Fixed
One click sender-02	Users can bypass charges by specifying typeId	Low	Acknowledged
One click sender-03	Quantity consistency not checked	Low	Fixed
One click sender-04	Redundant code	Info	Acknowledged

Finding Details:

[One click sender-01] Lack of permission checking

Severity Level	Low
Lines	ERC20BatchSender.sol#L105-114,ERC20BatchSenderV2#L105-114
Type	Business Security
Description	Since the `_sendETH` function in ERC20BatchSender and ERC20BatchSenderV2 contracts has a modifier visibility of public, this may result in anyone being able to call the function and transfer funds.
Recommendation	It is recommended that the public modifier of the function be changed to private.
Status	**Fixed.** The project side changed public to private in the function.

[One click sender-02] Users can bypass charges by specifying typeId

Severity Level	Low
Lines	ERC20BatchSenderV2.sol, ERC20BatchSender.sol
Type	Business Security
Description	In the `send` function, the user can specify `_typeId` at will, which may result in the `calculateCost` function calculating a different fee than it actually does. In particular, when the `calculateCost` function charges different rates for `typeId` 0 and `typeId` 1, the user may choose the lower rate to pay the fee, thus avoiding the higher fee.
Recommendation	It is recommended to reorganize the logic in the ERC20BatchSenderV2.sol and ERC20BatchSender.sol contracts so that the `typeId` cannot be specified by the user. Instead, the contracts should automatically set the corresponding `typeId` according to whether the user chooses to transfer ERC20 tokens or ETH to ensure that the calculation of the fee matches the actual transfer method and to prevent the user from avoiding the fee by choosing a lower rate.
Status	**Acknowledged.**

[One click sender-03] Quantity consistency not checked

Severity Level	Low
Lines	ERC20BatchSender.sol,ERC20BatchSenderV2
Type	Business Security
Description	In the `send` function, there is no consistency check between `_totalAmount` and the sum of the actual transferred amounts. If the `_totalAmount` paid by the user exceeds the actual transferred amounts, the excess funds will be retained in the contract and will not be automatically returned to the user. A similar problem also exists in the `sendETH` function.
Recommendation	It is recommended to add checking logic in the function to ensure that the sum of amounts is consistent with `_totalAmount`.
Status	**Fixed.**The project side adds the `_checkTotalAmount` function for checking.

[One click sender-04] Redundant code

Severity Level	Info
Lines	BasicCostPolicy.sol#29,31,WhitelistCostPolicy.sol#33,36
Type	Coding Conventions
Description	In the BasicCostPolicy and WhitelistCostPolicy contracts, the following parameters are not used and are redundant codes.
Recommendation	It is recommended to delete redundant code or add logic to the `calculateCost` function, for example: setting corresponding prices for different tokens.
Status	**Acknowledged.**

```
function calculateCost(
    address sender,
    uint256 userCount,
    uint256 totalAmount,
    uint256 typeId
)
function calculateCost(
    address token,
    address sender,
    uint256 userCount,
    uint256 totalAmount,
    uint256 typeId
)
```

3 Appendix

3.1 Vulnerability Assessment Metrics and Status in Smart Contracts

3.1.1 Metrics

In order to objectively assess the severity level of vulnerabilities in blockchain systems, this report provides detailed assessment metrics for security vulnerabilities in smart contracts with reference to CVSS 3.1(Common Vulnerability Scoring System Ver 3.1).

According to the severity level of vulnerability, the vulnerabilities are classified into four levels: "critical", "high", "medium" and "low". It mainly relies on the degree of impact and likelihood of exploitation of the vulnerability, supplemented by other comprehensive factors to determine of the severity level.

Likelihood \ Impact	Severe	High	Medium	Low
Probable	Critical	High	Medium	Low
Possible	High	Medium	Medium	Low
Unlikely	Medium	Medium	Low	Info
Rare	Low	Low	Info	Info

3.1.2 Degree of impact

- **Severe**

Severe impact generally refers to the vulnerability can have a serious impact on the confidentiality, integrity, availability of smart contracts or their economic model, which can cause substantial economic losses to the contract business system, large-scale data disruption, loss of authority management, failure of key functions, loss of credibility, or indirectly affect the operation of other smart contracts associated with it and cause substantial losses, as well as other severe and mostly irreversible harm.

- **High**

High impact generally refers to the vulnerability can have a relatively serious impact on the confidentiality, integrity, availability of the smart contract or its economic model, which can cause a greater economic loss, local functional unavailability, loss of credibility and other impact to the contract business system.

- **Medium**

Medium impact generally refers to the vulnerability can have a relatively minor impact on the confidentiality, integrity, availability of the smart contract or its economic model, which can cause a small amount of economic loss to the contract business system, individual business unavailability and other impact.

- **Low**

Low impact generally refers to the vulnerability can have a minor impact on the smart contract, which can pose certain security threat to the contract business system and needs to be improved.

3.1.3 Likelihood of Exploitation

- **Probable**

Probable likelihood generally means that the cost required to exploit the vulnerability is low, with no special exploitation threshold, and the vulnerability can be triggered consistently.

- **Possible**

Possible likelihood generally means that exploiting such vulnerability requires a certain cost, or there are certain conditions for exploitation, and the vulnerability is not easily and consistently triggered.

- **Unlikely**

Unlikely likelihood generally means that the vulnerability requires a high cost, or the exploitation conditions are very demanding and the vulnerability is highly difficult to trigger.

- **Rare**

Rare likelihood generally means that the vulnerability requires an extremely high cost or the conditions for exploitation are extremely difficult to achieve.

3.1.4 Fix Results Status

Status	Description
Fixed	The project party fully fixes a vulnerability.
Partially Fixed	The project party did not fully fix the issue, but only mitigated the issue.
Acknowledged	The project party confirms and chooses to ignore the issue.

3.2 Audit Categories

No.	Categories	Subitems
1	Coding Conventions	Compiler Version Security
		Deprecated Items
		Redundant Code
		require/assert Usage
		Gas Consumption
2	General Vulnerability	Integer Overflow/Underflow
		Reentrancy
		Pseudo-random Number Generator (PRNG)
		Transaction-Ordering Dependence
		DoS (Denial of Service)
		Function Call Permissions
		call/delegatecall Security
		Returned Value Security
		tx.origin Usage
		Replay Attack
		Overriding Variables
		Third-party Protocol Interface Consistency
3	Business Security	Business Logics
		Business Implementations
		Manipulable Token Price
		Centralized Asset Control
		Asset Tradability
		Arbitrage Attack

Beosin classified the security issues of smart contracts into three categories: Coding Conventions, General Vulnerability, Business Security. Their specific definitions are as follows:

- **Coding Conventions**

Audit whether smart contracts follow recommended language security coding practices. For example, smart contracts developed in Solidity language should fix the compiler version and do not use deprecated keywords.

- **General Vulnerability**

General Vulnerability include some common vulnerabilities that may appear in smart contract projects. These vulnerabilities are mainly related to the characteristics of the smart contract itself, such as integer overflow/underflow and denial of service attacks.

- **Business Security**

Business security is mainly related to some issues related to the business realized by each project, and has a relatively strong pertinence. For example, whether the lock-up plan in the code match the white paper, or the flash loan attack caused by the incorrect setting of the price acquisition oracle.

*Note that the project may suffer stake losses due to the integrated third-party protocol. This is not something Beosin can control. Business security requires the participation of the project party. The project party and users need to stay vigilant at all times.

3.3 Disclaimer

The Audit Report issued by Beosin is related to the services agreed in the relevant service agreement. The Project Party or the Served Party (hereinafter referred to as the "Served Party") can only be used within the conditions and scope agreed in the service agreement. Other third parties shall not transmit, disclose, quote, rely on or tamper with the Audit Report issued for any purpose.

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The Audit Report issued by Beosin in no way provides investment advice on any project, nor should it be utilized as investment suggestions of any type. This report represents an extensive evaluation process designed to help our customers improve code quality while mitigating the high risks in blockchain.

3.4 About Beosin

Beosin is the first institution in the world specializing in the construction of blockchain security ecosystem. The core team members are all professors, postdocs, PhDs, and Internet elites from world-renowned academic institutions. Beosin has more than 20 years of research in formal verification technology, trusted computing, mobile security and kernel security, with overseas experience in studying and collaborating in project research at well-known universities. Through the security audit and defense deployment of more than 2,000 smart contracts, over 50 public blockchains and wallets, and nearly 100 exchanges worldwide, Beosin has accumulated rich experience in security attack and defense of the blockchain field, and has developed several security products specifically for blockchain.

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