CERTIK

Security Assessment

Macaron Bridge

Nov 3rd, 2021

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Summary

This report has been prepared for MacaronSwap to discover issues and vulnerabilities in the source code of the Macaron Bridge project as well as any contract dependencies that were not part of an officially recognized library. A comprehensive examination has been performed, utilizing Static Analysis and Manual Review techniques.

The auditing process pays special attention to the following considerations:

- Testing the smart contracts against both common and uncommon attack vectors.
- Assessing the codebase to ensure compliance with current best practices and industry standards.
- Ensuring contract logic meets the specifications and intentions of the client.
- Cross referencing contract structure and implementation against similar smart contracts produced by industry leaders.
- Thorough line-by-line manual review of the entire codebase by industry experts.

The security assessment resulted in findings that ranged from critical to informational. We recommend addressing these findings to ensure a high level of security standards and industry practices. We suggest recommendations that could better serve the project from the security perspective:

- Enhance general coding practices for better structures of source codes;
- Add enough unit tests to cover the possible use cases;
- Provide more comments per each function for readability, especially contracts that are verified in public;
- Provide more transparency on privileged activities once the protocol is live.

Overview

Project Summary

Project Name	Macaron Bridge
Platform	BSC
Language	Solidity
Codebase	https://github.com/macaronswap/macaron-contracts/blob/main/contracts/MacaronBridge.sol
Commit	b53b9b41cdaec8c1fac68eedeaf18608bf36f95e

Audit Summary

Delivery Date	Nov 03, 2021
Audit Methodology	Static Analysis, Manual Review
Key Components	

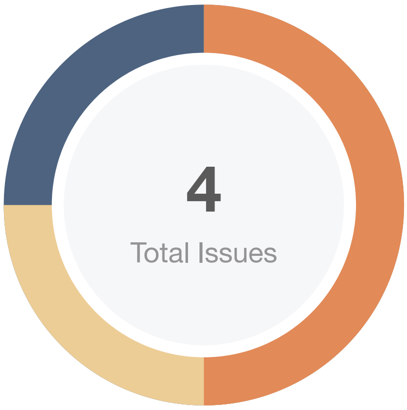
Vulnerability Summary

Vulnerability Level	Total	Pending	Declined	Acknowledged	Partially Resolved	Resolved
Critical	0	0	0	0	0	0
Major	2	0	0	2	0	0
Medium	0	0	0	0	0	0
Minor	1	0	0	1	0	0
Informational	1	0	0	1	0	0
Discussion	0	0	0	0	0	0

Audit Scope

ID	File	SHA256 Checksum
MBP	contracts/MacaronBridge.sol	8f03fa78e550e91b3bf668e022456b45fe508b7850efeb80efd69f075c9804d5

Findings



Critical	**0** (0.00%)
Major	**2** (50.00%)
Medium	**0** (0.00%)
Minor	**1** (25.00%)
Informational	**1** (25.00%)
Discussion	**0** (0.00%)

ID	Title	Category	Severity	Status
MBP-01	Requisite Value of ERC-20 `transferFrom()` / `transfer()` Call	Logical Issue	Minor	Acknowledged
MBP-02	Centralization Risk	**Centralization / Privilege**	**Major**	Acknowledged
MBP-03	Third Party API Dependencies	Volatile Code	Major	Acknowledged
MBP-04	Unlocked Compiler Version	Language Specific	Informational	Acknowledged

MBP-01 | Requisite Value of ERC-20 `transferFrom()` / `transfer()` Call

Category	Severity	Location	Status
Logical Issue	Minor	contracts/MacaronBridge.sol: 467, 501~510	Acknowledged

Description

While the ERC-20 implementation does necessitate that the `transferFrom()` / `transfer()` function returns a `bool` variable yielding `true`, many token implementations do not return anything i.e. Tether (USDT) leading to unexpected halts in code execution.

```
467    token.transferFrom(msg.sender, address(this), _amount);
```

Recommendation

We advise that the `SafeERC20.sol` library is utilized by OpenZeppelin to ensure that the `transferFrom()` / `transfer()` function is safely invoked in all circumstances.

MBP-02 | Centralization Risk

Category	Severity	Location	Status
Centralization / Privilege	**Major**	contracts/MacaronBridge.sol: 520~525	Acknowledged

Description

In the contract `MacaronBridge.sol`, the role `owner` has the authority over the following function:

- setValidator()
- setFeeRatio()
- migrateBridgeContract()

Any compromise to the `owner` and `validator` accounts may allow the hacker to take advantage of this and drain the fund inside of the bridge contract.

Recommendation

We advise the client to carefully manage the `owner` and `validator` accounts' private keys to avoid any potential risks of being hacked. In general, we strongly recommend centralized privileges or roles in the protocol to be improved via a decentralized mechanism or smart-contract-based accounts with enhanced security practices, e.g., Multisignature wallets.

Indicatively, here is some feasible suggestions that would also mitigate the potential risk at the different level in term of short-term and long-term:

- Time-lock with reasonable latency, e.g., 48 hours, for awareness on privileged operations;
- Assignment of privileged roles to multi-signature wallets to prevent a single point of failure due to the private key;
- Introduction of a DAO/governance/voting module to increase transparency and user involvement.

MBP-03 | Third Party API Dependencies

Category	Severity	Location	Status
Volatile Code	Major	contracts/MacaronBridge.sol	Acknowledged

Description

The contract is serving as the underlying entity to interact with third-party API(Event listener). The scope of the audit treats 3rd party entities as black boxes and assume their functional correctness. However, in the real world, third-party API can be compromised and this may lead to lost or stolen assets.

Recommendation

We understand that the business logic of MacaronBridge requires interaction with third-party API (Event Listener). We encourage the team to constantly monitor the statuses of 3rd parties to mitigate the side effects when unexpected activities are observed.

MBP-04 | Unlocked Compiler Version

Category	Severity	Location	Status
Language Specific	Informational	contracts/MacaronBridge.sol: 14	Acknowledged

Description

The contract has unlocked compiler version. An unlocked compiler version in the source code of the contract permits the user to compile it at or above a particular version. This, in turn, leads to differences in the generated bytecode between compilations due to differing compiler version numbers. This can lead to an ambiguity when debugging as compiler specific bugs may occur in the codebase that would be hard to identify over a span of multiple compiler versions rather than a specific one.

Recommendation

"We advise that the compiler version is instead locked at the lowest version possible that the contract can be compiled at. For example, for version `v0.8.0` the contract should contain the following line:

````
pragma solidity 0.8.0;
```"
````
````

Appendix

Finding Categories

Centralization / Privilege

Centralization / Privilege findings refer to either feature logic or implementation of components that act against the nature of decentralization, such as explicit ownership or specialized access roles in combination with a mechanism to relocate funds.

Logical Issue

Logical Issue findings detail a fault in the logic of the linked code, such as an incorrect notion on how block.timestamp works.

Volatile Code

Volatile Code findings refer to segments of code that behave unexpectedly on certain edge cases that may result in a vulnerability.

Language Specific

Language Specific findings are issues that would only arise within Solidity, i.e. incorrect usage of private or delete.

Checksum Calculation Method

The "Checksum" field in the "Audit Scope" section is calculated as the SHA-256 (Secure Hash Algorithm 2 with digest size of 256 bits) digest of the content of each file hosted in the listed source repository under the specified commit.

The result is hexadecimal encoded and is the same as the output of the Linux "sha256sum" command against the target file.

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