CERTIK

Security Assessment

DODO CrowdPooling V2

Dec 15th, 2021

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Summary

This report has been prepared for DODO CrowdPooling V2 to discover issues and vulnerabilities in the source code of the DODO CrowdPooling V2 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.

Additionally, this audit is based on a premise that all external smart contracts are safely implemented and all the mathematical formulas used in this project are correct.

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	DODO CrowdPooling V2
Platform	BSC, Ethereum, Polygon, Arbitrum, MoonRiver, Boba, Aurora
Language	Solidity
Codebase	https://github.com/DODOEX/contractV2/tree/starter/contracts/CrowdPooling
Commit	a0c7b5f72aa586f300f23e0344cdb3ed950d0659 d886097a1d9d4201f363cc9ecb08af34f966d484

Audit Summary

Delivery Date	Dec 15, 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	1	0	0	1	0	0
● Medium	0	0	0	0	0	0
● Minor	0	0	0	0	0	0
● Informational	3	0	0	1	0	2
● Discussion	0	0	0	0	0	0

Audit Scope

ID	File	SHA256 Checksum
CPD	CP.sol	351b6131bceb531dc3cf6cf4a9d32e0df1cbe4e1fabfcad170c62606f4f40687
CPF	CPFunding.sol	fa82634b681a7c1c6886a8d590a4672a5cb69f4e0f754c4741b2b1a9f405ee0a
CPS	CPStorage.sol	18178485ac8ee2395861f6c7b4644e344b5ad7ccd72d3dd97b86f365ae5a2dcc
CPV	CPVesting.sol	3534acf53df0a82ecaa04cdf597e040cb3cfb633a0e3e82b58c3413496e2de70

Understandings

Overview

DODOCrowdPooling is the project that provides a new liquidity offering method that issues such as frontrunning, high cost of attracting liquidity, and/or insufficient liquidity. The workflow of the Crowpooling campaign is as below:

- The token issuer supplies a number of issued tokens and sets a soft cap target. A portion of the issued tokens will be used for crowdfunding and the rest will be used for ask-side liquidity in the pool. After the initial offering price, start and end time of the Crowdpooling campaign are set, anyone can participate in the offering by staking their capital.
- Once the Crowdpooling campaign ends, participates can claim the tokens based on their stakes at the pre-defined initial offering price. If the crowded capital is over the soft cap target, then all participate claim the surplus based on their shares of the pool.
- At the end of the Crowdpooling campaign, a new public liquidity pool will be automatically set up with the capital raised and the tokens reserved for ask-side liquidity.

At the same time, the DODOCrowdPooling project provides a pre-deposit settlement mechanism, liquidity protection mechanism, and support for flexible fee configuration.

- Pre-deposit settlement

  When the token issuer launches a Crowdpooling campaign, they need to pre-deposit the settlement fee into the contract. At the end of the Crowdpooling campaign, anyone can send a transaction to create the liquidity pool. The person will receive the pre-deposited settlement fee.

- Liquidity Protection

  The initial liquidity belongs to the creator of the Crowdpooling campaign, but the liquidity can not be removed during the liquidity protection period. Anyone is able to provide liquidity to these pools AMM-style, with the added benefit of higher capital efficiency thanks to PMM. This resulting spot market follows the bonding curve method, when a trader buys tokens, the token price goes up; when a trade sells tokens, the token price goes down.

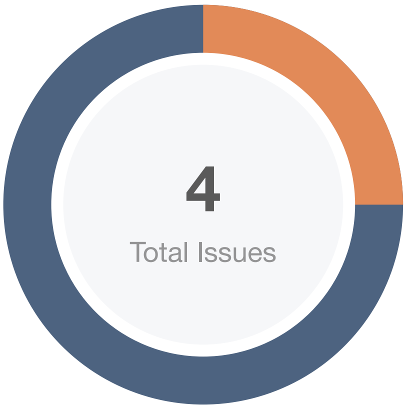
Privileged Functions

The contract contains the following privileged functions that are restricted by the `onlyOwner` modifier. They are used to modify the contract configurations and address attributes. We grouped these functions below:

The `onlyOwner` modifier:

- `claimLPToken()` in `CPVesting.sol`
- `forceStop()` in `CPStorage.sol`

Findings



🟥 **Critical**	**0** (0.00%)
🟧 **Major**	**1** (25.00%)
🟨 **Medium**	**0** (0.00%)
🟨 **Minor**	**0** (0.00%)
🟦 **Informational**	**3** (75.00%)
🟩 **Discussion**	**0** (0.00%)

ID	Title	Category	Severity	Status
GLOBAL-01	Centralization Risk	**Centralization / Privilege**	● **Major**	ⓘ Acknowledged
CPD-01	Boolean Equality	Coding Style	● Informational	ⓘ Acknowledged
CPD-02	Missing Input Validation	Volatile Code, Inconsistency	● Informational	✓ Resolved
CPS-01	Unreasonable Modifier Name	Coding Style, Inconsistency	● Informational	✓ Resolved

GLOBAL-01 | Centralization Risk

Category	Severity	Location	Status
Centralization / Privilege	● Major	Global	ⓘ Acknowledged

Description

The role `owner` has the authority over the listed functions:

- `claimLPToken()` in `CPVesting.sol`
- `forceStop()` in `CPStorage.sol`

Any compromise to the key role account may allow a potential hacker to take advantage of this and execute malicious acts.

Recommendation

We advise the client to carefully manage the key role account's private key 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 are some feasible suggestions that would also mitigate the potential risk at the different levels in terms of short-term and long-term scenarios:

- 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.

Alleviation

The client gave the following response:

`The new asset issuer, who uses the DODO platform, acts as the contract owner. The security of the owner depends on the security measures that taken by the new asset issuer, not DODO platform.`

CPD-01 | Boolean Equality

Category	Severity	Location	Status
Coding Style	● Informational	projects/DODO%20CrowdPooling%20V2/contracts/CP.sol (12a08a0): 27	ⓘ Acknowledged

Description

Detects the comparison to boolean constants. Boolean constants can be used directly and do not need to be compare to true or false.

Recommendation

We advise removing the equality to the boolean constant and referring to the following codes:

```
27  require(!_INITIALIZED_, "WE_NOT_SAVE_ETH_AFTER_INIT");
```

Alleviation

No alleviation.

CPD-02 | Missing Input Validation

Category	Severity	Location	Status
Volatile Code, Inconsistency	● Informational	projects/DODO%20CrowdPooling%20V2/contracts/CP.sol (12a08a0): 106~107	✓ Resolved

Description

The given input `switches` is missing the check for the length.

Recommendation

We advise adding the check for the passed-in values to prevent unexpected errors as below:

```
require(switches.length == 2, "CP: switches list length wrong");
```

Alleviation

The development team solved this issue at commit d886097a1d9d4201f363cc9ecb08af34f966d484.

CPS-01 | Unreasonable Modifier Name

Category	Severity	Location	Status
Coding Style, Inconsistency	● Informational	projects/DODO%20CrowdPooling%20V2/contracts/CPStorage.sol (12a08a0): 88	✓ Resolved

Description

According the usage logic of the linked modifier at L40, L74, and L115 in `CPFunding.sol`, the modified functions are allowed to execute if the vesting does not force to stop.

Recommendation

We advise that it's better to rename the modifier to `isNotForceStop()`.

Alleviation

The development team solved this issue at commit d886097a1d9d4201f363cc9ecb08af34f966d484.

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.

Volatile Code

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

Coding Style

Coding Style findings usually do not affect the generated byte-code but rather comment on how to make the codebase more legible and, as a result, easily maintainable.

Inconsistency

Inconsistency findings refer to functions that should seemingly behave similarly yet contain different code, such as a constructor assignment imposing different require statements on the input variables than a setter function.

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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