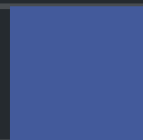




# Security Assessment

**Alyattes**

Oct 22nd, 2021



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# Summary

This report has been prepared for Alyattes to discover issues and vulnerabilities in the source code of the Alyattes 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	Alyattes
Platform	BSC
Language	Solidity
Codebase	<a href="https://bscscan.com/token/0x72690c447aa1ea53042899b7402d10a176819102">https://bscscan.com/token/0x72690c447aa1ea53042899b7402d10a176819102</a> <a href="https://bscscan.com/address/0x49a9f9a2271d8c5da44c57e7102aca79c222f4a9">https://bscscan.com/address/0x49a9f9a2271d8c5da44c57e7102aca79c222f4a9</a>
Commit	

## Audit Summary

Delivery Date	Oct 22, 2021
Audit Methodology	Static Analysis, Manual Review
Key Components	

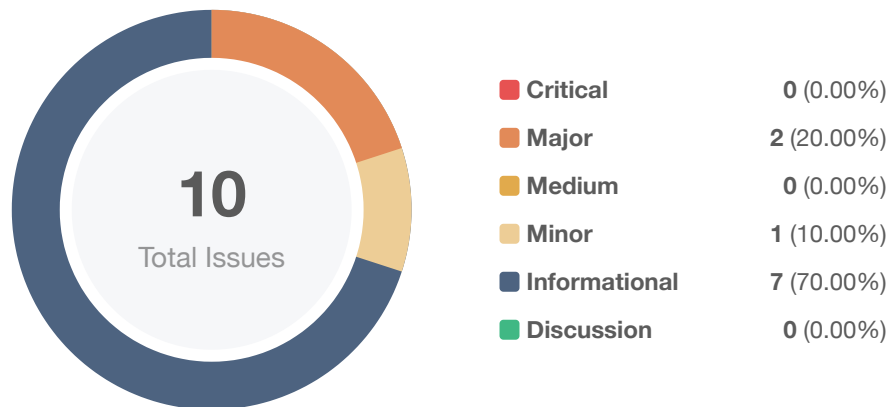
## Vulnerability Summary

Vulnerability Level	Total	⚠ Pending	⊗ Declined	ℹ Acknowledged	🔄 Partially Resolved	✅ Resolved
🔴 Critical	0	0	0	0	0	0
🟠 Major	2	0	0	1	0	1
🟡 Medium	0	0	0	0	0	0
🟠 Minor	1	0	0	0	0	1
🟡 Informational	7	0	0	2	1	4
🟢 Discussion	0	0	0	0	0	0

## Audit Scope

ID	File	SHA256 Checksum
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# Findings



ID	Title	Category	Severity	Status
<a href="#">GLOBAL-01</a>	Missing event emitting	Coding Style	● Informational	✓ Resolved
<a href="#">GLOBAL-02</a>	Declaration Naming Convention	Coding Style	● Informational	ⓘ Acknowledged
<a href="#">ATC-01</a>	Privileged ownership	Centralization / Privilege	● Major	✓ Resolved
<a href="#">ATC-02</a>	Redundant code	Logical Issue, Gas Optimization	● Informational	⌛ Partially Resolved
<a href="#">ATC-03</a>	Typos in the contract	Coding Style	● Informational	ⓘ Acknowledged
<a href="#">ATC-04</a>	Variable could be declared as <code>uint256</code>	Optimization	● Informational	✓ Resolved
<a href="#">ATC-05</a>	Variable could be declared as <code>constant</code>	Gas Optimization	● Informational	✓ Resolved
<a href="#">ATC-06</a>	Missing approval checks when calling <code>_transfer()</code>	Logical Issue	● Major	ⓘ Acknowledged
<a href="#">ATC-07</a>	<code>_isExcluded</code> excludes user from both fees and rewards	Logical Issue	● Informational	✓ Resolved
<a href="#">ATC-08</a>	Mining excludes you from reflections	Logical Issue	● Minor	✓ Resolved

## GLOBAL-01 | Missing event emitting

Category	Severity	Location	Status
Coding Style	● Informational	Global	✓ Resolved

### Description

In contract `AlyaToken`, there are a bunch of functions can change state variables. However, these function do not emit event to pass the changes out of chain.

### Recommendation

Recommend emitting events, for all the essential state variables that are possible to be changed during runtime.

### Alleviation

#### [Alyattes Team]:

We are aware about lots of variables but all of them are necessary for an efficient Proof of Active Mining and automated Exclude and Include Operations in advance of Staker's Benefits.

Since the contract has already been published and above described Issue doesn't cause a critical error, it is not necessary to perform any changes.

## GLOBAL-02 | Declaration Naming Convention

Category	Severity	Location	Status
Coding Style	● Informational	Global	ⓘ Acknowledged

### Description

Code does not conform to the [Solidity style guide](#) with regards to its naming convention.

Particularly:

- `camelCase`: Should be applied to function names, argument names, local and state variable names, modifiers
- `UPPER_CASE`: Should be applied to `constant` variables
- `CapWords`: Should be applied to contract names, struct names, event names and enums"

### Recommendation

We advise that the linked variable and function names are adjusted to properly conform to Solidity's naming convention.

### Alleviation

**[Alyattes Team]:** Missing Solidity Naming Conventions doesn't create a risk on Smart Contract or its Functions.

UPPERCASE, camelCase and CapWords are working as planned.

Since the contract has already been published and above described Issue doesn't cause a critical error, it is not necessary to perform any changes.



## ATC-01 | Privileged ownership

Category	Severity	Location	Status
Centralization / Privilege	● Major	projects/alyattes/contracts/AlyaToken.sol (7b0f6da): 607~642	✓ Resolved

### Description

The owner of contract `AlyaToken` has the permission to:

- `setAsCharityAccount`
- `updateFee`
- `excludeAccount`
- `includeAccount` without obtaining the consensus of the community.

### Recommendation

We advise the client to carefully manage the `Owner` 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 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.

### Alleviation

**[Alyattes Team]:** Alya Team is aware of this Privileged Ownership. Owner Wallet is already a Gnosis Multisig Wallet which requires the approval of the CEO, CTO and CFO. (at least 2 of them).

Ownership may be transferred to 0x0000dead after all transactions and processes are settled in the future.

## ATC-02 | Redundant code

Category	Severity	Location	Status
Logical Issue, Gas Optimization	● Informational	projects/alyattes/contracts/AlyaToken.sol (7b0f6da): 963, 962, 919~922, 861~865, 901~911, 671~672, 1043~1115	🔄 Partially Resolved

### Description

1. (L671 - L672) The condition `!_isExcluded[sender] && !_isExcluded[recipient]` is included in `else`.
2. (L901 - L911) The logic in `stakerStatus` can be replaced with its condition.
3. (L861 - L865) The struct `activeMiners` is not needed if it only stores one primitive value.
4. (L919 - L922) `Else` can be removed from the 2nd return statement.
5. (L1043 - L1115) Memo system already exists in the Binance Smart Chain.
6. (L962 - L963) Remove casting to `uint256` when the given variable is already of type `uint256`.

### Recommendation

1. The following code can be removed:

```

1     else if (!_isExcluded[sender] && !_isExcluded[recipient]) {
2         _transferStandard(sender, recipient, amount);
3     }

```

2. The following code can be replaced:

```

1     function stakerStatus(address _addr) view public returns(bool){
2
3         if(nStockDetails[_addr]._stocktime == 0)
4         {
5             return false;
6         }
7         else
8         {
9             return true;
10        }
11    }

```

with this:

```
1     function stakerStatus(address _addr) view public returns(bool){
2         return nStockDetails[_addr]._stocktime != 0;
3     }
```

3. The following code can be replaced:

```
1     struct activeMiners {
2         address bUser;
3     }
4
5     mapping(uint256 => activeMiners[]) aMiners;
```

with this:

```
1     mapping(uint256 => address[]) aMiners;
```

and all calls of `activeMiners()` can be removed.

4. Remove the `else` wrapping in the following lines of code:

```
1         else
2         {
3             return nStockDetails[_addr]._stockamount;
4         }
```

5. We recommend removing parts of the contract that are related to creating/getting memos.

6. We advise to remove the redundant casting to `uint256` on the aforementioned lines to save gas cost associated with it.

## Alleviation

### [Alyattes Team]:

3. Proof of Active Consensus needs this Code because there could be active stakers who are not signing the Reward Blocks. Recording Active Miners is vital to keep Reward Distribution fair.
4. „else“ command is necessary because Contract needs a Result if `stakeamount` is not 0.

Generally, Certik's recommendations which reduce some lines on the contract may optimize Transfer Fee's but this optimization will be about 0,0001% less on each Transfer.

Since the contract has already been published and above described Issues don't cause a critical error or make a huge Optimisation on Gas Fee's, it is not necessary to perform any changes.

## ATC-03 | Typos in the contract

Category	Severity	Location	Status
Coding Style	● Informational	projects/alyattes/contracts/AlyaToken.sol (7b0f6da): 887, 483	ⓘ Acknowledged

### Description

There are several typos in the code.

1. In the following code snippet, `nRearMod` should be `nRewardMod`.

```
1 uint256 public nRearMod;
```

2. In the following code snippet, `addressHashs` should be `addressHashes`.

```
1 function addressHashs() view public returns (uint256) {
```

### Recommendation

We recommend correcting all typos in the contract.

### Alleviation

#### [Alyattes Team]:

Typos are not causing major issues on functionality of contract and variables may have any random definitions/names.

Since the contract has already been published and above Typos don't cause a critical error, it is not necessary to perform any changes.

## ATC-04 | Variable could be declared as `uint256`

Category	Severity	Location	Status
Optimization	● Informational	projects/alyattes/contracts/AlyaToken.sol (7b0f6da): 842	✓ Resolved

### Description

Variables `totalminers` could be declared as `uint256` since this state variable is read only for its length and only pushes miners into the array.

### Recommendation

We recommend declaring those variables as `uint256` and replace all instances with `totalminers.push(...)` with `totalminers += 1`.

### Alleviation

#### [Alyattes Team]:

Existing Contract reaches same Result as Recommendation.

## ATC-05 | Variable could be declared as `constant`

Category	Severity	Location	Status
Gas Optimization	● Informational	projects/alyattes/contracts/AlyaToken.sol (7b0f6da): 465, 463	✓ Resolved

### Description

Variables `_MAX` and `_GRANULARITY` could be declared as `constant` since these state variables are never to be changed.

### Recommendation

We recommend declaring those variables as `constant`.

### Alleviation

#### [Alyattes Team]:

Existing Contract reaches same Result as Recommendation.

## ATC-06 | Missing approval checks when calling `_transfer()`

Category	Severity	Location	Status
Logical Issue	● Major	projects/alyattes/contracts/AlyaToken.sol (7b0f6da): 1060, 1054, 954	ⓘ Acknowledged

### Description

In the mining/staking functions that call `_transfer()` where the tokens are going from `msg.sender` to `address(this)`, they do not check the `msg.sender`'s allowance for `address(this)`.

### Recommendation

We recommend calling the `_approve` function with the spender being `address(this)` and the sender being `_msgSender()`.

### Alleviation

**[Alyattes Team]:** Because there are 4 different versions under the transfer command implemented, using only `transferFrom` code may cause an error.

Since this issue don't affect contracts functionality, it is not necessary to perform any changes.



## ATC-07 | `_isExcluded` excludes user from both fees and rewards

Category	Severity	Location	Status
Logical Issue	● Informational	projects/alyattes/contracts/AlyaToken.sol (7b0f6da): 660~662	🟢 Resolved

### Description

User is excluded from both rewards and fees.

### Alleviation

**[Alyattes Team]:**

`_isExcluded` is necessary for the fairness of Reward Distribution due to Team Wallets.

Otherwise Team Wallets are going to be Whales and get most of the Rewards due to their higher holding Amounts.

ALYA is planning to work Basic Users oriented and excluded its own wallets from distribution.

For further Information of Excluded Wallets, we refer to our Whitepaper.

Whitepaper Link : <https://github.com/Alyattes/WhitePaper/blob/main/EN.pdf>

## ATC-08 | Mining excludes you from reflections

Category	Severity	Location	Status
Logical Issue	● Minor	projects/alyattes/contracts/AlyaToken.sol (7b0f6da): 951	✓ Resolved

### Description

Once a non-excluded user successfully calls the `startMining` function, they will be excluded from reflections, even on the tokens they kept before mining.

### Alleviation

**[Alyattes Team]:** After using `_startmining` command, existing Wallet is going to be excluded from all Rewards and Fee's even if it has coins before excluding. First reason for that Excluding is to be able to provide entire Mining Rewards to the Stakers and second reason is providing refunding entire Staked Amount tot he Miners back.

As soon as a Miner use `payback` function to end Mining Period, Stake Wallet is going to be Included again.

# 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.

### Gas Optimization

Gas Optimization findings do not affect the functionality of the code but generate different, more optimal EVM opcodes resulting in a reduction on the total gas cost of a transaction.

### 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.

### 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.

## 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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