



# SMART CONTRACT AUDIT REPORT

for

AYNI Token



Prepared By: Xiaomi Huang

PeckShield  
May 22, 2025

## Document Properties

Client	AYNI
Title	Smart Contract Audit Report
Target	AYNI
Version	1.0
Author	Xuxian Jiang
Auditors	Matthew Jiang, Xuxian Jiang
Reviewed by	Xiaomi Huang
Approved by	Xuxian Jiang
Classification	Public

## Version Info

Version	Date	Author	Description
1.0	May 22, 2025	Xuxian Jiang	Final Release
1.0-rc	May 20, 2025	Xuxian Jiang	Release Candidate

## Contact

For more information about this document and its contents, please contact PeckShield Inc.

Name	Xiaomi Huang
Phone	+86 183 5897 7782
Email	contact@peckshield.com

# Contents

<b>1</b>	<b>Introduction</b>	<b>4</b>
1.1	About AYNi	4
1.2	About PeckShield	5
1.3	Methodology	5
1.4	Disclaimer	7
<b>2</b>	<b>Findings</b>	<b>8</b>
2.1	Summary	8
2.2	Key Findings	9
<b>3</b>	<b>ERC20 Compliance Checks</b>	<b>10</b>
<b>4</b>	<b>Detailed Results</b>	<b>13</b>
4.1	Revisited Role Assignment in AYNITimelockController	13
4.2	Improved Initialization And Input Validation in AYNIGovernor	14
4.3	Trust Issue of Admin Keys	15
<b>5</b>	<b>Conclusion</b>	<b>17</b>
	<b>References</b>	<b>18</b>

# 1 | Introduction

Given the opportunity to review the design document and related source code of the `AYNI` token contract, we outline in the report our systematic method to evaluate potential security issues in the smart contract implementation, expose possible semantic inconsistency between smart contract code and the documentation, and provide additional suggestions or recommendations for improvement. Our results show that the given version of the smart contract exhibits no ERC20 compliance issues or security concerns. This document outlines our audit results.

## 1.1 About `AYNI`

In the realm of cryptocurrencies, `AYNI` Token emerges as a pioneering asset, bridging the digital world with the tangible value of gold. Anchored to the real-world gold mining operations of `Minerales` in `Peru`, `AYNI` offers investors a unique opportunity to participate in the gold extraction industry, previously limited to large corporations. This audit focuses on its ERC20-compliance and security. The basic information of the audited contract is as follows:

Table 1.1: Basic Information of `AYNI` Token Contract

Item	Description
Name	<code>AYNI</code>
Type	Ethereum ERC20 Token Contract
Platform	Solidity
Audit Method	Whitebox
Audit Completion Date	May 22, 2025

In the following, we show the Git repository of reviewed files and the commit hash value used in this audit.

- <https://github.com/pixelette-technologies/ayni-token-contract.git> (29ae1c3)

And here is the commit ID after all fixes for the issues found in the audit have been checked in.

- <https://github.com/pixelette-technologies/ayni-token-contract.git> (b149f4f)

## 1.2 About PeckShield

PeckShield Inc. [6] is a leading blockchain security company with the goal of elevating the security, privacy, and usability of current blockchain ecosystem by offering top-notch, industry-leading services and products (including the service of smart contract auditing). We are reachable at Telegram (<https://t.me/peckshield>), Twitter (<http://twitter.com/peckshield>), or Email ([contact@peckshield.com](mailto:contact@peckshield.com)).

## 1.3 Methodology

To standardize the evaluation, we define the following terminology based on OWASP Risk Rating Methodology [5]:

- Likelihood represents how likely a particular vulnerability is to be uncovered and exploited in the wild;
- Impact measures the technical loss and business damage of a successful attack;
- Severity demonstrates the overall criticality of the risk;

Likelihood and impact are categorized into three ratings: *H*, *M* and *L*, i.e., *high*, *medium* and *low* respectively. Severity is determined by likelihood and impact and can be classified into four categories accordingly, i.e., *Critical*, *High*, *Medium*, *Low* shown in Table 1.2.

Table 1.2: Vulnerability Severity Classification

<i>High</i>	Critical	High	Medium
<i>Medium</i>	High	Medium	Low
<i>Low</i>	Medium	Low	Low
	<i>High</i>	<i>Medium</i>	<i>Low</i>
	<b>Likelihood</b>		

We perform the audit according to the following procedures:

- Basic Coding Bugs: We first statically analyze given smart contracts with our proprietary static code analyzer for known coding bugs, and then manually verify (reject or confirm) all the issues found by our tool.
- ERC20 Compliance Checks: We then manually check whether the implementation logic of the audited smart contract(s) follows the standard ERC20 specification and other best practices.
- Additional Recommendations: We also provide additional suggestions regarding the coding and development of smart contracts from the perspective of proven programming practices.

Table 1.3: The Full List of Check Items

Category	Check Item
<b>Basic Coding Bugs</b>	Constructor Mismatch
	Ownership Takeover
	Redundant Fallback Function
	Overflows & Underflows
	Reentrancy
	Money-Giving Bug
	Blackhole
	Unauthorized Self-Destruct
	Revert DoS
	Unchecked External Call
	Gasless Send
	Send Instead of Transfer
	Costly Loop
	(Unsafe) Use of Untrusted Libraries
	(Unsafe) Use of Predictable Variables
	Transaction Ordering Dependence
	Deprecated Uses
Approve / TransferFrom Race Condition	
<b>ERC20 Compliance Checks</b>	Compliance Checks (Section 3)
<b>Additional Recommendations</b>	Avoiding Use of Variadic Byte Array
	Using Fixed Compiler Version
	Making Visibility Level Explicit
	Making Type Inference Explicit
	Adhering To Function Declaration Strictly
	Following Other Best Practices

To evaluate the risk, we go through a list of check items and each would be labeled with a severity category. For one check item, if our tool does not identify any issue, the contract is considered safe

regarding the check item. For any discovered issue, we might further deploy contracts on our private testnet and run tests to confirm the findings. If necessary, we would additionally build a PoC to demonstrate the possibility of exploitation. The concrete list of check items is shown in Table 1.3.

## 1.4 Disclaimer

---

Note that this security audit is not designed to replace functional tests required before any software release, and does not give any warranties on finding all possible security issues of the given smart contract(s) or blockchain software, i.e., the evaluation result does not guarantee the nonexistence of any further findings of security issues. As one audit-based assessment cannot be considered comprehensive, we always recommend proceeding with several independent audits and a public bug bounty program to ensure the security of smart contract(s). Last but not least, this security audit should not be used as investment advice.



## 2 | Findings

### 2.1 Summary

Here is a summary of our findings after analyzing the `AYNI` token contract. During the first phase of our audit, we study the smart contract source code and run our in-house static code analyzer through the codebase. The purpose here is to statically identify known coding bugs, and then manually verify (reject or confirm) issues reported by our tool. We further manually review business logics, examine system operations, and place `ERC20`-related aspects under scrutiny to uncover possible pitfalls and/or bugs.

Severity	# of Findings	
Critical	0	
High	0	
Medium	1	■
Low	2	■ ■
Informational	0	
Total	3	

Moreover, we explicitly evaluate whether the given contracts follow the standard `ERC20` specification and other known best practices, and validate its compatibility with other similar `ERC20` tokens and current DeFi protocols. The detailed `ERC20` compliance checks are reported in Section 3. After that, we examine a few identified issues of varying severities that need to be brought up and paid more attention to. (The findings are categorized in the above table.) Additional information can be found in the next subsection, and the detailed discussions are in Section 4.

## 2.2 Key Findings

Overall, no ERC20 compliance issue was found and our detailed checklist can be found in Section 3. While there is no critical or high severity issue, the implementation can be improved by resolving the identified issues (shown in Table 2.1), including 1 medium-severity vulnerability and 2 low-severity vulnerabilities.

Table 2.1: Key AYNi Audit Findings

ID	Severity	Title	Category	Status
PVE-001	Low	Revisited Role Assignment in AYNITimelockController	Coding Practices	Resolved
PVE-002	Low	Improved Initialization And Input Validation in AYNIGovernor	Coding Practices	Resolved
PVE-003	Medium	Trust Issue Of Admin Keys	Security Features	Resolved

Besides recommending specific countermeasures to mitigate the above issue(s), we also emphasize that it is always important to develop necessary risk-control mechanisms and make contingency plans, which may need to be exercised before the mainnet deployment. The risk-control mechanisms need to kick in at the very moment when the contracts are being deployed in mainnet. Please refer to Section 3 for our detailed compliance checks and Section 4 for elaboration of reported issues.

## 3 | ERC20 Compliance Checks

The ERC20 specification defines a list of API functions (and relevant events) that each token contract is expected to implement (and emit). The failure to meet these requirements means the token contract cannot be considered to be ERC20-compliant. Naturally, as the first step of our audit, we examine the list of API functions defined by the ERC20 specification and validate whether there exist any inconsistency or incompatibility in the implementation or the inherent business logic of the audited contract(s).

Table 3.1: Basic `View-only` Functions Defined in The ERC20 Specification

Item	Description	Status
<b>name()</b>	Is declared as a public view function	✓
	Returns a string, for example "Tether USD"	✓
<b>symbol()</b>	Is declared as a public view function	✓
	Returns the symbol by which the token contract should be known, for example "USDT". It is usually 3 or 4 characters in length	✓
<b>decimals()</b>	Is declared as a public view function	✓
	Returns decimals, which refers to how divisible a token can be, from 0 (not at all divisible) to 18 (pretty much continuous) and even higher if required	✓
<b>totalSupply()</b>	Is declared as a public view function	✓
	Returns the number of total supplied tokens, including the total minted tokens (minus the total burned tokens) ever since the deployment	✓
<b>balanceOf()</b>	Is declared as a public view function	✓
	Anyone can query any address' balance, as all data on the blockchain is public	✓
<b>allowance()</b>	Is declared as a public view function	✓
	Returns the amount which the spender is still allowed to withdraw from the owner	✓

Our analysis shows that there is no ERC20 inconsistency or incompatibility issue found in the audited `AYNI` token contract. In the surrounding two tables, we outline the respective list of basic `view-only` functions (Table 3.1) and key `state-changing` functions (Table 3.2) according to the widely adopted ERC20 specification.

Table 3.2: Key State-Changing Functions Defined in The ERC20 Specification

Item	Description	Status
<b>transfer()</b>	Is declared as a public function	✓
	Returns a boolean value which accurately reflects the token transfer status	✓
	Reverts if the caller does not have enough tokens to spend	✓
	Allows zero amount transfers	✓
	Emits <code>Transfer()</code> event when tokens are transferred successfully (include 0 amount transfers)	✓
	Reverts while transferring to zero address	✓
<b>transferFrom()</b>	Is declared as a public function	✓
	Returns a boolean value which accurately reflects the token transfer status	✓
	Reverts if the spender does not have enough token allowances to spend	✓
	Updates the spender's token allowances when tokens are transferred successfully	✓
	Reverts if the from address does not have enough tokens to spend	✓
	Allows zero amount transfers	✓
	Emits <code>Transfer()</code> event when tokens are transferred successfully (include 0 amount transfers)	✓
	Reverts while transferring from zero address	✓
	Reverts while transferring to zero address	✓
<b>approve()</b>	Is declared as a public function	✓
	Returns a boolean value which accurately reflects the token approval status	✓
	Emits <code>Approval()</code> event when tokens are approved successfully	✓
	Reverts while approving to zero address	✓
<b>Transfer()</b> event	Is emitted when tokens are transferred, including zero value transfers	✓
	Is emitted with the from address set to <code>address(0x0)</code> when new tokens are generated	✓
<b>Approval()</b> event	Is emitted on any successful call to <code>approve()</code>	✓

In addition, we perform a further examination on certain features that are permitted by the ERC20 specification or even further extended in follow-up refinements and enhancements, but not required for implementation. These features are generally helpful, but may also impact or bring certain incompatibility with current DeFi protocols. Therefore, we consider it is important to highlight them as well. This list is shown in Table 3.3.

Table 3.3: Additional `opt-in` Features Examined in Our Audit

Feature	Description	Opt-in
<b>Deflationary</b>	Part of the tokens are burned or transferred as fee while on <code>transfer()/transferFrom()</code> calls	—
<b>Rebasing</b>	The <code>balanceOf()</code> function returns a re-based balance instead of the actual stored amount of tokens owned by the specific address	—
<b>Pausable</b>	The token contract allows the owner or privileged users to pause the token transfers and other operations	—
<b>Upgradable</b>	The token contract allows for future upgrades	✓
<b>Blacklistable</b>	The token contract allows the owner or privileged users to blacklist a specific address such that the related token transfers are dis-allowed	—
<b>Mintable</b>	The token contract allows the owner or privileged users to mint tokens to a specific address	✓
<b>Burnable</b>	The token contract allows the owner or privileged users to burn tokens of a specific address	—

## 4 | Detailed Results

### 4.1 Revisited Role Assignment in AYNITimelockController

- ID: PVE-001
- Severity: Low
- Likelihood: Low
- Impact: Low
- Target: AYNITimelockController
- Category: Coding Practices [4]
- CWE subcategory: CWE-1126 [1]

#### Description

To facilitate the role management, the AYN contract has an associated controller, i.e., `AYNITimelockController`, which is inherited from the `OpenZeppelin's AccessControlUpgradeable` contract. In the process of examining the role initialization and assignment, we notice current implementation can be improved.

In the following, we show the implementation of current initialization routine. We notice the contract has designed two different roles `EXECUTOR_ROLE` and `PROPOSER_ROLE`. While these two roles are assigned to the given account `admin`, there is still a need to set up their respective role admins, i.e., `_setRoleAdmin(EXECUTOR_ROLE, DEFAULT_ADMIN_ROLE)` and `_setRoleAdmin(PROPOSER_ROLE, DEFAULT_ADMIN_ROLE)`.

```
25     function initialize(uint256 minDelay, address[] memory proposers, address[] memory
        executors, address admin) public override initializer {
26         __UUPSUpgradeable_init();
27         __TimelockController_init(minDelay, proposers, executors, admin);
28         _grantRole(DEFAULT_ADMIN_ROLE, admin);
29         _grantRole(EXECUTOR_ROLE, address(0));
30         _grantRole(EXECUTOR_ROLE, admin);
31         _grantRole(PROPOSER_ROLE, admin);
32     }
```

Listing 4.1: `AYNITimelockController::initialize()`

Moreover, the above initialization logic also grants the role of `EXECUTOR_ROLE` to `address(0)`. This specific role assignment should be removed if not intended.

**Recommendation** Improve the above-mentioned initialization routine. Note another contract `AYNIGovernor` shares the same issue.

**Status** The issue has been fixed by this commit: `b149f4f`.

## 4.2 Improved Initialization And Input Validation in AYNIGovernor

- ID: PVE-002
- Severity: Low
- Likelihood: Low
- Impact: Low
- Target: `AYNIGovernor`
- Category: Coding Practices [4]
- CWE subcategory: CWE-1126 [1]

### Description

DeFi protocols typically have a number of system-wide parameters that can be dynamically configured on demand. The `AYNI` token contract is no exception. Specifically, if we examine the `AYNIGovernor` contract, it has defined a number of protocol-wide risk parameters, such as `_votingDelay`, `_votingPeriod`, and `_proposalThreshold`. In the following, we show the related routine that allows for their changes.

```

64     function initialize(
65         IVotes _ayniToken,
66         TimelockControllerUpgradeable _timelock,
67         uint48 _initialVotingDelay,
68         uint32 _initialVotingPeriod,
69         uint256 _initialProposalThreshold,
70         uint256 _quorumPercentage,
71         address _admin
72     ) public initializer {
73         __Governor__init("AYNIGovernor");
74         __GovernorSettings__init(_initialVotingDelay, _initialVotingPeriod,
75             _initialProposalThreshold);
76         __GovernorCountingSimple__init();
77         __GovernorVotes__init(_ayniToken);
78         __GovernorVotesQuorumFraction__init(_quorumPercentage);
79         __GovernorTimelockControl__init(_timelock);
80         __UUPSUpgradeable__init();
81         _grantRole(DEFAULT_ADMIN_ROLE, _admin);
82     }

```

Listing 4.2: `AYNIGovernor::initialize()`

These parameters define various aspects of the protocol operation and maintenance and need to exercise extra care when configuring or updating them. Our analysis shows the update logic on these parameters can be improved by applying more rigorous sanity checks. Based on the current

implementation, certain corner cases may lead to an undesirable consequence. For example, the above initialization logic can be improved by validating the given `_initialVotingDelay`, `_initialVotingPeriod`, and `_initialProposalThreshold` against respective permitted ranges.

In the meantime, the above routine can also be improved by also initializing the inherited parent contract, i.e., `__AccessControl_init()`;

**Recommendation** Validate any changes regarding these system-wide parameters to ensure they fall in an appropriate range.

**Status** The issue has been fixed by this commit: [b149f4f](#).

## 4.3 Trust Issue of Admin Keys

- ID: PVE-003
- Severity: Medium
- Likelihood: Medium
- Impact: Medium
- Target: Multiple Contracts
- Category: Security Features [3]
- CWE subcategory: CWE-287 [2]

### Description

In the `AYNI` token contract, there is a privileged account (with the `DEFAULT_ADMIN_ROLE` role) that plays a critical role in governing and regulating the system-wide operations (e.g., assign roles, configure parameters, and upgrade contracts). Our analysis shows that the privileged account needs to be scrutinized. In the following, we examine the privileged account and the related privileged accesses in current contract.

```
83     function _authorizeUpgrade(address newImplementation)
84     internal onlyAdmin override {}
85
86     // setter functions
87     /**
88     * @notice Admin function for setting the voting delay
89     * @param newVotingDelay new voting delay, in seconds
90     */
91     function setVotingDelay(uint48 newVotingDelay) public virtual override {
92
93         if (newVotingDelay < MIN_VOTING_DELAY || newVotingDelay > MAX_VOTING_DELAY) {
94             revert Errors.INVALID_VOTING_DELAY();
95         }
96
97         super.setVotingDelay(newVotingDelay);
98     }
99
100    /**
```

```
101     * @notice Admin function for setting the voting period
102     * @param newVotingPeriod new voting period, in seconds
103     */
104
105     function setVotingPeriod(uint32 newVotingPeriod) public virtual override {
106
107         if (newVotingPeriod < MIN_VOTING_PERIOD || newVotingPeriod > MAX_VOTING_PERIOD)
108             {
109                 revert Errors.INVALID_VOTING_PERIOD();
110             }
111
112         super.setVotingPeriod(newVotingPeriod);
113     }
```

Listing 4.3: Example Privileged Operations in `AYNIGovernor`

We emphasize that the privilege assignment may be necessary and consistent with the token design. However, it would be worrisome if the privileged account is a plain EOA account. Note that a multi-sig account could greatly alleviate this concern, though it is still far from perfect. Specifically, a better approach is to eliminate the administration key concern by transferring the role to a community-governed DAO. In the meantime, a timelock-based mechanism can also be considered as mitigation.

In the meantime, the token contract makes use of the proxy contract to allow for future upgrades. The upgrade is a privileged operation, which also falls in this trust issue on the admin key.

**Recommendation** Promptly transfer the privileged account to the intended DAO-like governance contract. All changed to privileged operations may need to be mediated with necessary timelocks. Eventually, activate the normal on-chain community-based governance life-cycle and ensure the intended trustless nature and high-quality distributed governance.

**Status** mitigated as the team plans to use a governance to have the `DEFAULT_ADMIN_ROLE` role.

## 5 | Conclusion

In this security audit, we have examined the `AYNI` contract design and implementation. During our audit, we first checked all respects related to the compatibility of the ERC20 specification and other known ERC20 pitfalls/vulnerabilities and found no issue in these areas. We then proceeded to examine other areas such as coding practices and business logics. Overall, no major issue was found in these areas, and the current deployment follows the best practice. Meanwhile, as disclaimed in Section 1.4, we appreciate any constructive feedbacks or suggestions about our findings, procedures, audit scope, etc.



## References

- [1] MITRE. CWE-1126: Declaration of Variable with Unnecessarily Wide Scope. <https://cwe.mitre.org/data/definitions/1126.html>.
- [2] MITRE. CWE-287: Improper Authentication. <https://cwe.mitre.org/data/definitions/287.html>.
- [3] MITRE. CWE CATEGORY: 7PK - Security Features. <https://cwe.mitre.org/data/definitions/254.html>.
- [4] MITRE. CWE CATEGORY: Bad Coding Practices. <https://cwe.mitre.org/data/definitions/1006.html>.
- [5] OWASP. Risk Rating Methodology. [https://www.owasp.org/index.php/OWASP\\_Risk\\_Rating\\_Methodology](https://www.owasp.org/index.php/OWASP_Risk_Rating_Methodology).
- [6] PeckShield. PeckShield Inc. <https://www.peckshield.com>.