

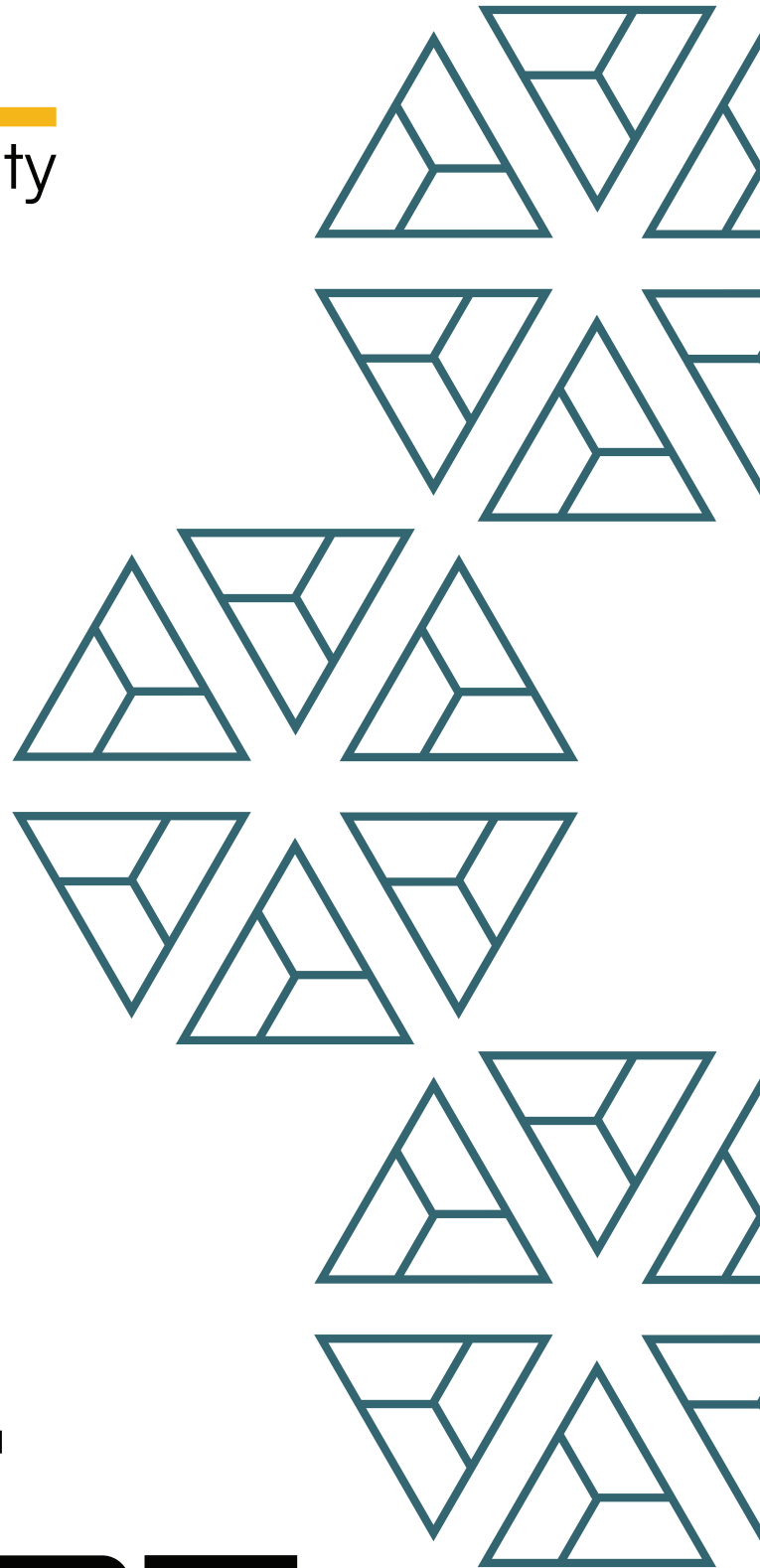


BAIL
security

Symbiotic
Bailsec Vanguard CISO
Pre Audit Report

FINAL REPORT

May '2025



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Bailsec Vanguard CISO

Bailsec will assign two senior security professionals to this engagement, providing ongoing support tailored to your project's needs.

Security requirements shift dramatically as a product evolves. In the early phases, strong architectural decisions lay the groundwork for safety and resilience. Once core features are locked in, establishing thorough test coverage becomes critical for maintaining quality and minimizing risk.

At every stage, having a neutral, expert voice helps ensure that core security principles are being properly applied. The Bailsec Vanguard CISO service offers exactly that, providing independent, high-impact guidance designed to enhance your protocol's defenses regardless of its maturity or complexity.

Why Choose Bailsec Vanguard CISO

Engaging an external security lead is a strategic move for teams aiming to become truly audit ready. Audit readiness goes far beyond having clean code. It involves proactively organizing your architecture, documentation, internal coordination, and team workflows in a way that enables effective, efficient, and thorough security reviews.

What the Vanguard CISO Delivers

Bailsec's Vanguard CISO service provides hands-on strategic direction across your development lifecycle. Whether refining your system architecture, advising on scalability and maintainability, or aligning engineering efforts with security best practices, we help teams make smart decisions early before problems become costly.

By embedding strong security fundamentals into the foundation of your product, you save time, avoid rework, and reduce the likelihood of critical vulnerabilities later in the process.

Conclusion

Security is not a layer you add at the end. It is a discipline that must inform decisions from day one. With Bailsec's Vanguard CISO, you gain access to dedicated, top-tier advisors who align security planning with your current development stage. This leads to smarter architectural choices, accelerated audit readiness, and more effective use of your security budget, ultimately helping your project scale securely and confidently.

1. Project Details

Important:

Please ensure that the deployed contract matches the source-code of the last commit hash.

| Project | Bailsec Vanguard CISO - Symbiotic Pre Audit Report |
|-------------------|---|
| Website | symbiotic.fi |
| Language | Solidity |
| Methods | Manual Analysis |
| Github repository | https://github.com/symbioticfi/middleware-sdk-mirror/tree/5c801a099f95591e676adb7bf3eb4cf17d83b063 |
| Resolution 1 | https://github.com/symbioticfi/middleware-sdk-mirror/tree/70114f97dc49cff884c067b8d080419c7bf38f38 |

2. Detection Overview

| Severity | Found | Resolved | Partially Resolved | Acknowledged (no change made) | Failed resolution |
|---------------|-------|----------|--------------------|----------------------------------|-------------------|
| High | 2 | 2 | | | |
| Medium | 2 | 1 | | 1 | |
| Low | 3 | 1 | | 2 | |
| Informational | 4 | 2 | | 2 | |
| Governance | | | | | |
| Total | 11 | 6 | | 5 | |

2.1 Detection Definitions

| Severity | Description |
|---------------|--|
| High | The problem poses a significant threat to the confidentiality of a considerable number of users' sensitive data. It also has the potential to cause severe damage to the client's reputation or result in substantial financial losses for both the client and the affected users. |
| Medium | While medium level vulnerabilities may not be easy to exploit, they can still have a major impact on the execution of a smart contract. For instance, they may allow public access to critical functions, which could lead to serious consequences. |
| Low | Poses a very low-level risk to the project or users. Nevertheless the issue should be fixed immediately |
| Informational | Effects are small and do not post an immediate danger to the project or users |
| Governance | Governance privileges which can directly result in a loss of funds or other potential undesired behavior |

3. Detection

Introduction

Between the 28th of May and 11th of June, Symbiotic engaged Bailsec to review the security of their new middleware SDK. Bailsec conducted a pre audit security review over 2 weeks with 2 engineers.

The first week was spent gaining a high level understanding of the core concepts in symbiotic as well as the start of manual review of the contracts.

In the second week we reviewed the codebase in depth and reported a total of 11 findings. Additionally we provided short risk assessments for the main features of the SDK, with the goal of protecting implementing users from potential pitfalls.

Overall the project follows good code practices, is well structured, and the architecture is designed to minimize risks. However due to the extensive size, some risks are still present.

Bailsec recommends Symbiotic to complete the following:

- extend unit testing
- implement integration testing
- carefully consider all external integration, even with symbiotic core
- conduct a security review after large codebase changes

Risk Assessment

Permissions

The permissions feature is a set of smart contracts that act as a wrapper for Openzeppelin's access control contracts.

These are modified to fit the overall architecture of Symbiotic, and allow for easier integration. These contracts require careful consideration when implementing.

Users should make sure that:

- correct access control contracts are used for intended purpose
- all privileges are configured correctly for example the revoke role

Key Registries

The key registry is a smart contract deployed on the most secure chain, providing data on operator keys at specific points in time.

All smart contracts that are part of this feature are fairly simple, only providing set / get functions without complex logic.

When implementing with these users should make sure that:

- keys are fetched correctly using correct hints and time points
- the underlying hint system is not broken

Settlement

The settlement contract is an essential part of the Symbiotic SDK.

It implements a basic settlement flow for a decentralized network.

Settlement of the network state is done in epochs, where anyone can commit a valid network header [state].

This state has to be signed by the majority of validators and this is checked via ZK proof. Settlement has 4 states, these include idle, commit, prolonged, and failed.

Users implementing settlement flows should consider:

- data about the current state should only be fetched from the settlement contract
- all permissioned functions should be examined carefully, they might lead to centralization risks
- it should be made sure which signature verifier system is being used and examine the security of it independently

Sig verifiers

The sig verifiers are part of the settlement flow, allowing to verify if the majority has voted on the submitted header.

There are different ZK verifier contracts, which are generated automatically by gnark.

Users integrating with the sig verifiers should make sure that:

- the ZK circuits are audited, they were not part of the scope
- correct verifiers are used to verify provided proofs

Voting Power Providers / Vault

The Self Register Voting Power Provider is currently the only provided implementation of the vault manager. This contract as the name suggests allows operators to self register and provides their voting power based on hints.

Hints are used to read data faster, read more in symbiotic core docs.

Users implementing these contracts should make sure that:

- Slashing and reward distribution is correctly implemented
- Access control is used when required
- Correct data is fetched using correct hints

Settlement/SettlementLogic

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| Issue_01 | <code>setEpochDuration</code> does not include the <code>checkPermission</code> modifier |
| Severity | High |
| Description | <p>The function <code>setEpochDuration</code> is a setter function that sets the duration of the epoch. However the function does not include any access control allowing anyone to change the value of the epoch duration.</p> <pre>function setEpochDuration(uint48 epochDuration) public virtual override {</pre> |
| Recommendations | Consider adding the <code>checkPermission</code> modifier to the <code>setEpochDuration</code> function. |
| Comments / Resolution | <p>Fixed,</p> <p>https://github.com/symbioticfi/middleware-sdk-mirror/commit/f498f825457a8958b944f343061c4859bb3213aa</p> |

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| Issue_02 | Insufficient validation in <code>setCommitDuration</code> |
| Severity | Low |
| Description | <p>in <code>settlementLogic</code> we are not allowed to set the epoch duration to be < the commit duration.</p> <pre> function setEpochDuration(uint48 epochDuration) public { if (epochDuration <= _getSettlementStorage()._commitDuration.latest()) { revert ISettlement.Settlement_EpochDurationTooShort(); } EpochManagerLogic.setEpochDuration(epochDuration); } </pre> <p>However when setting the <code>commitDuration</code>, we do not check that the <code>commitDuration</code> is not > the <code>epochDuration</code>. Seeing as we want to ensure that <code>epochDuration</code> is always longer than <code>commitDuration</code>, it's important to add checks to ensure that the <code>commitDuration</code> cannot be longer than the <code>epochDuration</code>.</p> |
| Recommendations | Consider adding a check to <code>setCommitDuration</code> that ensures that the <code>commitDuration</code> is not > <code>epochDuration</code> . |
| Comments / Resolution | <p>Fixed,</p> <p>https://github.com/symbioticfi/middleware-sdk-mirror/commit/a0ad3a0e76434411dbcbcb11c40cc44cd6aae6ef</p> |

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| Issue_03 | The <code>setValSetHeader()</code> function of SettlementLogic.sol should be marked as internal |
| Severity | Low |
| Description | <pre>function setValSetHeader(ISettlement.ValSetHeader calldata header, ISettlement.ExtraData[] calldata extraData) public {</pre> <p>The <code>setValSetHeader()</code> function should be marked as internal. Because the function is located in a library this does not pose any immediate risks, but exposing this by incorrect implementation can lead to wrong settlement of network state, therefore this should be marked as internal.</p> |
| Recommendations | Change visibility from public to internal |
| Comments / Resolution | Acknowledged, It is intended to decrease the bytecode size of the implementation contract. |

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| Issue_04 | inability to change <code>prolongDuration</code> |
| Severity | Informational |
| Description | <pre> \$._prolongDuration = settlementInitParams.prolongDuration; \$._commitDuration.push(Time.timestamp(), settlementInitParams.commitDuration); \$._requiredKeyTag.push(Time.timestamp(), settlementInitParams.requiredKeyTag); \$._sigVerifier.push(Time.timestamp(), uint160(settlementInitParams.sigVerifier)); </pre> <p>Unlike the other state variables, the <code>prolongDuration</code> does not have a setter and thus cannot be updated. Due to changing circumstances such as a change in epoch length, it's important to be able to update the <code>prolongDuration</code>.</p> |
| Recommendations | Consider adding the ability to change the <code>prolongDuration</code> . |
| Comments / Resolution | Fixed, https://github.com/symbioticfi/middleware-sdk-mirror/commit/a579da08c85dd12d78767a575681a5ca7cbc45cf |

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| Issue_05 | Important setter functions do not protect against the 0 value |
| Severity | Informational |
| Description | Functions such as <code>setCommitDuration</code> , <code>setRequiredKeyTag</code> , <code>setSigVerifier</code> , and <code>setGenesis</code> do not have checks for the 0 value. |
| Recommendations | Consider adding 0 value checks to these functions. |
| Comments / Resolution | Fixed, https://github.com/symbioticfi/middleware-sdk-mirror/commit/707ca4907c6405bddbe9ad1e4fe31368eacd65cb |

EpochManager/EpochManagerLogic

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| Issue_06 | Incorrect epoch validation in <code>setEpochDuration</code> |
| Severity | Medium |
| Description | <pre>function setEpochDuration(uint48 epochDuration, uint48 epochDurationTimestamp, uint48 epochDurationIndex) public { if (epochDurationIndex < getCurrentEpoch()) { revert } !EpochManager.EpochManager_InvalidEpochDurationIndex(); setEpochDurationInternal(epochDuration, epochDurationTimestamp, epochDurationIndex); }</pre> <p>The function above sets the <code>epochDuration</code> to a new value, however the <code>if</code> statement incorrectly compares the <code>epochDurationIndex</code> with the <code>currentEpoch</code> using <code><</code>. This allows changes in duration to the current epoch.</p> <p>Looking at the other function it can be noted that changing <code>epochDuration</code> should only change the duration of the subsequent epoch not the current epoch.</p> <pre>function setEpochDuration(uint48 epochDuration) public { setEpochDuration(epochDuration, getNextEpochStart(), getNextEpoch()); }</pre> <p>as we can see the third argument which is <code>epochDurationIndex</code> is set to <code>getNextEpoch</code>.</p> |
| Recommendations | Consider changing <code><</code> to <code><=</code> in the first comparison. |
| Comments / Resolution | Fixed, https://github.com/symbioticfi/middleware-sdk-mirror/commit/70114f97dc49cff884c067b8d080419c7bf38f38 |

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| Issue_07 | <code>_setEpochDuration</code> is unused |
| Severity | Low |
| Description | <p>The internal function <code>_setEpochDuration</code> is not called by any public function in EpochManager.</p> <pre>function _setEpochDuration(uint48 epochDuration, uint48 epochDurationTimestamp, uint48 epochDurationIndex) internal virtual { EpochManagerLogic.setEpochDuration(epochDuration, epochDurationTimestamp, epochDurationIndex); }</pre> |
| Recommendations | Given that the function is not used, consider removing the function or adding a Public function which calls it. |
| Comments / Resolution | <p>Acknowledged,</p> <p>The internal function inside the contract doesn't increase the bytecode size if not used; it is left here to be possible to use it conveniently</p> |

VaultManager/VaultManagerLogic

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| Issue_08 | The Reward Distribution will fail due to lack of token approval |
| Severity | High |
| Description | <p>the <code>distributeStakerRewards()</code> function of <code>VaultManagerLogic.sol</code> includes a call to the <code>stakerRewards</code> contract. This contract however transfers tokens from the sender to the contract. This transfer requires approval, which is not granted during the call:</p> <pre> function distributeStakerRewards(address stakerRewards, address token, uint256 amount, bytes memory data) public virtual override { IStakerRewards[stakerRewards].distributeRewards(NetworkManagerLogic.NETWORK(), token, amount, data); } </pre> <p>This will make every <code>distributeStakerRewards</code> call revert.</p> |
| Recommendations | Add token approval. |
| Comments / Resolution | Fixed, https://github.com/symbioticfi/middleware-sdk-mirror/commit/b594d24195cbd35745008450a28d00156b12f523 |

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| Issue_09 | <code>epochDuration</code> check is incorrect when comparing with <code>slashingWindow</code> |
| Severity | Medium |
| Description | <p>in the internal function <code>_validateVaultEpochDuration</code>, there is a check that compares the <code>slashingWindow</code> with the <code>vaultEpochDuration</code>.</p> <pre>return slashingWindow <= vaultEpochDuration;</pre> <p>However the check is inclusive and this is flawed given that if the <code>slashingWindow</code> were to <code>== vaultEpochDuration</code>, we would now be in the next epoch not the current epoch. This can be observed by how the epoch is calculated</p> <pre>function currentEpoch() public view returns (uint256) { return (Time.timestamp() - epochDurationInit) / epochDuration; }</pre> <p>assuming we are in epoch 0, if the result of the timestamp-<code>epochDurationInit</code> is equal to <code>epochDuration</code>, we are considered to be in epoch 1 now instead of epoch 0.</p> |
| Recommendations | Consider changing the check to not be inclusive. |
| Comments / Resolution | Acknowledged. |

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| Issue_10 | <code>slashingWindow</code> cannot be increased |
| Severity | Informational |
| Description | <pre>function setSlashingWindow(uint48 slashingWindow) public { if (slashingWindow >= getSlashingWindow()) { revert } IVaultManager.VaultManager_SlashingWindowTooLarge(); _getVaultManagerStorage()._slashingWindow = slashingWindow; }</pre> <p>The <code>slashingWindow</code> can only be decreased and never increased from the init value,</p> |
| Recommendations | If this is intended behavior, acknowledge the issue or consider allowing <code>slashingWindow</code> to be increased. |
| Comments / Resolution | Acknowledged, It is an intended behavior. |

OZAccessControl

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| Issue_11 | The <code>OZAccessControl.sol</code> contract does not implement the by default public <code>revokeRole</code> function |
| Severity | Informational |
| Description | <p>Openzeppelins access control contracts allow any user to revoke his role using the revoke function. Because the SDK is meant to override these functions, there is no good way for an implementation to override this on their own.</p> <p>This can lead to potential issues when for example implementing a blacklist.</p> |
| Recommendations | Consider adding an override for revoke role that can be overridden. |
| Comments / Resolution | Acknowledged. |