



TechRate
AUDIT COMPANY

EpicHero

Smart Contract Security Audit

Disclaimer

This is a limited report on our findings based on our analysis, in accordance with good industry practice as at the date of this report, in relation to cybersecurity vulnerabilities and issues in the framework and algorithms based on smart contracts, the details of which are set out in this report. In order to get a full view of our analysis, it is crucial for you to read the full report. While we have done our best in conducting our analysis and producing this report, it is important to note that you should not rely on this report and cannot claim against us on the basis of what it says or doesn't say, or how we produced it, and it is important for you to conduct your own independent investigations before making any decisions. We go into more detail on this in the below disclaimer below – please make sure to read it in full.

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The analysis of the security is purely based on the smart contracts alone. No applications or operations were reviewed for security. No product code has been reviewed.

Background

TechRate was commissioned by EpicHero to perform an audit of smart contracts:

- <https://bscscan.com/address/0x09eAf2a4bcE29796EE380Aae6a3D23B817Ad67EB#code>
- <https://bscscan.com/address/0xafDcB0eCaD1c8Cb22893dCA7D6c510dBFDa3BBeC#code>

The purpose of the audit was to achieve the following:

- Ensure that the smart contract functions as intended.
- Identify potential security issues with the smart contract.

The information in this report should be used to understand the risk exposure of the smart contract, and as a guide to improve the security posture of the smart contract by remediating the issues that were identified.

Issues Checking Status

Issue description		Checking status
1.	Compiler errors.	Passed
2.	Race conditions and Reentrancy. Cross-function race conditions.	Passed
3.	Possible delays in data delivery.	Passed
4.	Oracle calls.	Passed
5.	Front running.	Passed
6.	Timestamp dependence.	Passed
7.	Integer Overflow and Underflow.	Passed
8.	DoS with Revert.	Passed
9.	DoS with block gas limit.	Low issues
10.	Methods execution permissions.	Passed
11.	Economy model of the contract.	Passed
12.	The impact of the exchange rate on the logic.	Passed
13.	Private user data leaks.	Passed
14.	Malicious Event log.	Passed
15.	Scoping and Declarations.	Passed
16.	Uninitialized storage pointers.	Passed
17.	Arithmetic accuracy.	Passed
18.	Design Logic.	Passed
19.	Cross-function race conditions.	Passed
20.	Safe Open Zeppelin contracts implementation and usage.	Passed
21.	Fallback function security.	Passed

Security Issues

✓ High Severity Issues

No high severity issues found.

✓ Medium Severity Issues

No medium severity issues found.

✓ Low Severity Issues

1. Out of gas

Issue:

- The function `adminMintMultiple()` uses the loop to mint heroes by lists provided. Function will be aborted with `OUT_OF_GAS` exception if there will be a long lists.
- The function `_mintCardsOfPack()` uses the loop to mint heroes by `numOfCards` provided. Function will be aborted with `OUT_OF_GAS` exception if there will be a big `numOfCards` value.
- The function `initializeMints()` uses double loop to iterate through indexes. Function will be aborted with `OUT_OF_GAS` exception if there will be a big difference between `fromIndex` and `toIndex` values.
- The function `getAllUnrealizedRewards()`, `getRealizedRewards()`, `claimAllRewards()` uses the loop to iterate through users tokens. Function will be aborted with `OUT_OF_GAS` exception if there will be a huge number of tokens.
- The function `batchRegisterMints()` uses the loop to register mints by list provided. Function will be aborted with `OUT_OF_GAS` exception if there will be a long `tokenId`s list.

Recommendation:

Be careful about arrays length.

Owner privileges:

- **EpicHeroNFT:**
 - AdjustVariables permission addresses can change _baseUriExtended.
 - AdjustVariables permission addresses can change Thorem address.
 - AdjustVariables permission addresses can change EpicHero address.
 - AdjustVariables permission addresses can change reflect address.
 - AdjustVariables permission addresses can change maxLevel and maxRarity values.
 - ManagePacks permission addresses can add and edit packs.
 - ManagePacks permission addresses can change pack's saleRunning value.
 - ManagePacks permission addresses can add and edit card sets.
 - ManageAttributes permission addresses can add and edit attributes and levelUpPrices.
 - Mint permission addresses can mint and burn.
 - ManageAttributes permission addresses can change heroes' levels and rarity.
 - Withdraw permission addresses can withdraw BEP20 tokens and BNBs.
- **EpicHeroNFT:**
 - RegisterNewMints permission addresses can initialize mints.
 - RegisterNewMints permission addresses can register new mints and update burned tokens.
 - AdjustVariables permission addresses can change wbnbAddress and epicHeroNFTAddress.
 - AdjustVariables permission addresses can manually set dividends.
 - RetrieveTokens permission addresses can withdraw BEP20 tokens and BNBs.

Conclusion

Smart contracts contain low severity issues and owner privileges!

TechRate note:

Please check the disclaimer above and note, the audit makes no statements or warranties on business model, investment attractiveness or code sustainability. The report is provided for the only contract mentioned in the report and does not include any other potential contracts deployed by Owner.