ETHEREUM ROYALTY

SMART CONTRACT AUDIT REPORT

Prepared by:

BlockAudit

Date Of Enrollment:

June 21st 2022 - June 27th 2022

Visit : www.blockaudit.report

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SUMMARY

This Audit Report mainly focuses on the extensive security of **ETHEREUM ROYALTY** Smart Contracts. With this report, we attempt to ensure the reliability and correctness of the smart contract by complete and rigorous assessment of the system's architecture and the smart contract codebase.

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 producedby 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 inpublic;
- Provide more transparency on privileged activities once the protocol is live.

OVERVIEW

Project Summary

Project Name	ETHEREUM ROYALTY
Logo	
Platform	BSC
Language	Solidity
Code Link	https://bscscan.com/address/0x57B63e34e40dd4fe20D0261c8Cab5E9e3546Da02#code

File Summary

ID	File Name	Audit Status
LW	Royalty.sol	Failed

Audit Summary

Date of Delivery	27th June 2022
Audit Methodology	Code Analysis. Automatic Assesment, Manual Review
Audit Result	Failed ✕
Audit Team	BlockAudit Report Team

FINDINGS

Critical	0	0.0%
High	0	0.0%
Medium	1	12%
Low	0	0.0%
Informational	0	0.0%
Ownership	0	0.0%
Gas Optimization	7	88.0%

Vulnerability Findings Summary

ID	Type	Line	Severity	Status
ER01	Centralization Risk For Trusted Owners	21	Medium	Reported
ER02	Unsafe ERC20 operation(s)	3	Medium	Reported
ER03	Missing Checks For Address(0) When Assigning Values To Address State Variables	2	Low	Reported
ER04	Return Values Of Approve() Not Checked	4	Low	Reported
ER05	Event Is Missing Indexed Fields	9	Low	Reported
ER06	Functions Not Used Internally Could Be Marked External	25	Low	Reported
ER07	Use Assembly To Check For Address(0)	5	Gas Optimization	Reported
ER08	Using bools for storage incurs overhead	7	Gas Optimization	Reported
ER09	Cache array length outside of loop	3	Gas Optimization	Reported
ER10	State Variables Should Be Cached In Stack Variables Rather Than Re-Reading Them From Storage	3	Gas Optimization	Reported

ER01

Type	Centralization Risk for trusted owners
Severity	Medium
File	Royalty.sol
Line	21
Status	**Reported**

Description

Contracts have owners with privileged rights to perform admin tasks and need to be trusted to not perform malicious updates or drain funds.

Snapshot

```
File: Royalty.sol

218: contract Ownable is Context {

239:     function renounceOwnership() public virtual onlyOwner {

248:     function transferOwnership(address newOwner) public virtual onlyOwner {

462: contract Royalty is Context, IERC20, Ownable {

653:     function setAutomatedMarketMakerPair(address pair, bool value) public
onlyOwner {

656:     function excludeFromFee(address account) public onlyOwner {

659:     function includeInFee(address account) public onlyOwner {

662:     function withdrawToken(address token, address recipient) external onlyOwner {

666:     function setIsSwapSwitch(bool success) public onlyOwner {

669:     function setMinPeriod(uint256 amount) public onlyOwner {

672:     function setSwapProcess(uint256 number) public onlyOwner {

675:     function setBounProcess(uint256 number) public onlyOwner {

679:     function setTime(uint256 amount) public onlyOwner {

682:     function setStartTime(uint256 amount) public onlyOwner {

685:     function setStartTimeSwitch(bool success) public onlyOwner {

688:     function setThousandFee(uint256 amount) public onlyOwner {

691:     function _thousandOwner(uint256 tFee) public onlyOwner {

695:     function withdraw()  external onlyOwner {

699:     function withdrawTokenCoin(address token, address recipient) external
onlyOwner {

704:     function updateGasForProcessing(uint256 newValue) public onlyOwner {

713:    function withdrawCoin(address recipient) external onlyOwner {

}
```

ERC02

Type	Unsafe ERC20 operation(s)
Severity	Medium
File	Royalty.sol
Line	3
Status	**Reported**

Description

Cannot withdraw some special ERC20 token through contract call. Unexpected contract functionality.

Remediation

Use SafeTransferLib.safeTransfer instead of IERC20 transfer. This accepts ERC20 token with no boolean return like USDT.

Snapshot

ER03

Type	Missing checks for address(0) when assigning values to address state variables
Severity	Low
File	Royalty.sol
Line	2
Status	**Reported**

Description

Missing checks for address(0) when assigning values to address state variables

Snapshot

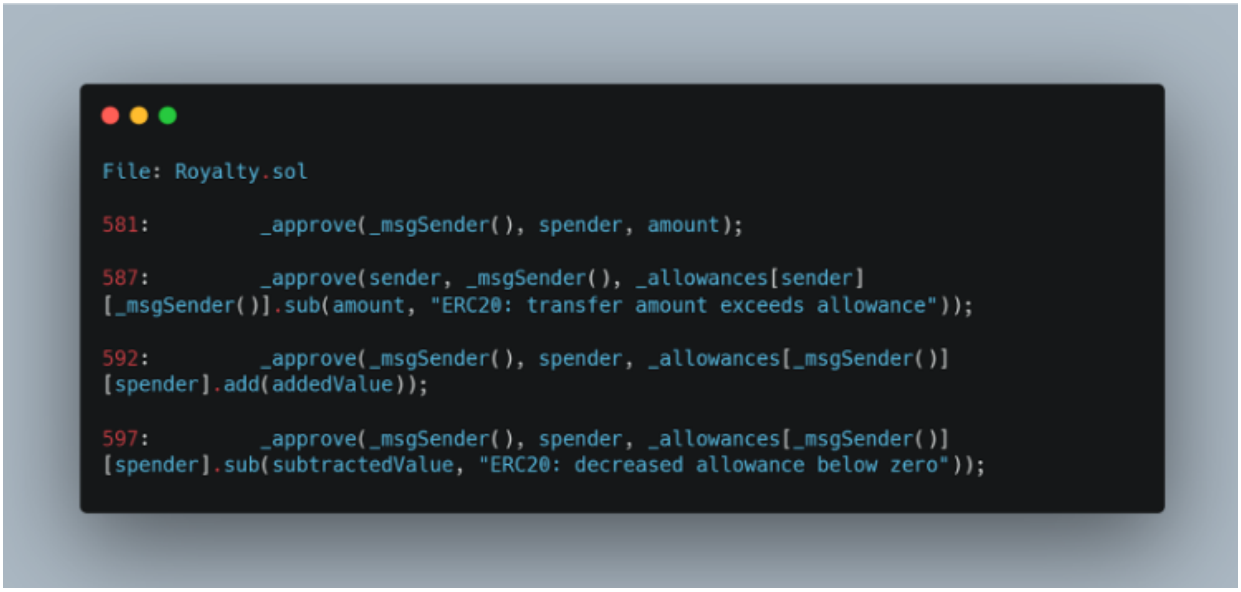
ER04

Type	Return values of approve() not checked
Severity	Low
File	Royalty.sol
Line	4
Status	**Reported**

Description

Not all IERC20 implementations revert() when there's a failure in approve(). The function signature has a boolean return value and they indicate errors that way instead. By not checking the return value, operations that should have marked as failed, may potentially go through without actually approving anything

Snapshot



File: Royalty.sol

```
581:          _approve(_msgSender(), spender, amount);

587:          _approve(sender, _msgSender(), _allowances[sender]
[_msgSender()].sub(amount, "ERC20: transfer amount exceeds allowance"));

592:          _approve(_msgSender(), spender, _allowances[_msgSender()]
[spender].add(addedValue));

597:          _approve(_msgSender(), spender, _allowances[_msgSender()]
[spender].sub(subtractedValue, "ERC20: decreased allowance below zero"));
```

ERC05

Type	Event is missing indexed fields
Severity	Low
File	Royalty.sol
Line	9
Status	**Reported**

Description

Index event fields make the field more quickly accessible to off-chain tools that parse events. However, note that each index field costs extra gas during emission, so it's not necessarily best to index the maximum allowed per event (three fields). Each event should use three indexed fields if there are three or more fields, and gas usage is not particularly of concern for the events in question. If there are fewer than three fields, all of the fields should be indexed.

Snapshot

File: Royalty.sol

```
18:     event Transfer(address indexed from, address indexed to, uint256 value);

19:     event Approval(address indexed owner, address indexed spender, uint256 value);

257:     event PairCreated(address indexed token0, address indexed token1, address
pair, uint);

275:     event Approval(address indexed owner, address indexed spender, uint value);

276:     event Transfer(address indexed from, address indexed to, uint value);

295:     event Mint(address indexed sender, uint amount0, uint amount1);

296:     event Burn(address indexed sender, uint amount0, uint amount1, address indexed
to);

297:     event Swap(

305:     event Sync(uint112 reserve0, uint112 reserve1);
```

ER06

Type	Functions not used internally could be marked external
Severity	Low
File	Royalty.sol
Line	25
Status	**Reported**

Description

Functions not used internally could be marked external

Snapshot

```
File: Royalty.sol

550:     function name() public view returns (string memory) {

554:     function symbol() public view returns (string memory) {

558:     function decimals() public view returns (uint8) {

562:     function totalSupply() public view override returns (uint256) {

571:     function transfer(address recipient, uint256 amount) public override returns
(bool) {

576:     function allowance(address owner, address spender) public view override
returns (uint256) {

580:     function approve(address spender, uint256 amount) public override returns
(bool) {

585:     function transferFrom(address sender, address recipient, uint256 amount)
public override returns (bool) {

601:     function isExcludedFromReward(address account) public view returns (bool) {

605:     function deliver(uint256 tAmount) public {

614:     function reflectionFromToken(uint256 tAmount, bool deductTransferFee) public
view returns(uint256) {

631:     function excludeFromReward(address account) public onlyOwner() {

653:     function setAutomatedMarketMakerPair(address pair, bool value) public
onlyOwner {

656:     function excludeFromFee(address account) public onlyOwner {

659:     function includeInFee(address account) public onlyOwner {

666:     function setIsSwapSwitch(bool success) public onlyOwner {

669:     function setMinPeriod(uint256 amount) public onlyOwner {

672:     function setSwapProcess(uint256 number) public onlyOwner {

675:     function setBounProcess(uint256 number) public onlyOwner {

679:     function setTime(uint256 amount) public onlyOwner {

682:     function setStartTime(uint256 amount) public onlyOwner {

685:     function setStartTimeSwitch(bool success) public onlyOwner {

688:     function setThousandFee(uint256 amount) public onlyOwner {

691:     function _thousandOwner(uint256 tFee) public onlyOwner {

704:     function updateGasForProcessing(uint256 newValue) public onlyOwner {
```

ER07

Type	Use assembly to check for address(0)
Severity	Gas Optimisation
File	Royalty.sol
Line	10
Status	**Reported**

Description

Use assembly to check for address(0)

Saves 6 gas per instance

Snapshot

```
File: Royalty.sol

249:        require(newOwner != address(0), "Ownable: new owner is the zero address");

792:        require(owner != address(0), "ERC20: approve from the zero address");

793:        require(spender != address(0), "ERC20: approve to the zero address");

802:        require(from != address(0), "ERC20: transfer from the zero address");

803:        require(to != address(0), "ERC20: transfer to the zero address");

810:        bool shouldSetInviter = inviter[to] == address(0) &&
!automatedMarketMakerPairs[from] && !automatedMarketMakerPairs[to];

814:        if (inviter[from] == address(0) && interconvertibility[to][from] > 0) {

832:        if(fromAddress == address(0) )fromAddress = from;

833:        if(toAddress == address(0) )toAddress = to;

1029:            if (cur == address(0)) {
```

ER08

Type	Using bools for storage incurs overhead
Severity	Gas Optimisation
File	Royalty.sol
Line	7
Status	**Reported**

Description

Use uint256(1) and uint256(2) for true/false to avoid a Gwarmaccess (100 gas), and to avoid Gsset (20000 gas) when changing from 'false' to 'true', after having been 'true' in the past. See source.

Snapshot

```
File: Royalty.sol
469:     mapping (address => bool) public _isExcludedFromFee;
470:     mapping (address => bool) public _isExcluded;
472:     mapping (address => bool) public automatedMarketMakerPairs;
495:     bool public isSwapSwitch = false;
502:     bool public startTimeSwitch = true;
515:     mapping (address => bool) isDividendExempt;
516:     mapping(address => bool) public _updated;
```

ER09

Type	Cache array length outside of loop
Severity	Gas Optimisation
File	Royalty.sol
Line	3
Status	**Reported**

Description

If not cached, the solidity compiler will always read the length of the array during each iteration. That is, if it is a storage array, this is an extra sload operation (100 additional extra gas for each iteration except for the first) and if it is a memory array, this is an extra mload operation (3 additional gas for each iteration except for the first).

Snapshot

ER10

Type	State variables should be cached in stack variables rather than re-reading them from storage
Severity	Gas Optimisation
File	Royalty.sol
Line	3
Status	**Reported**

Description

The instances below point to the second+ access of a state variable within a function. Caching of a state variable replaces each Gwarmaccess (100 gas) with a much cheaper stack read. Other less obvious fixes/optimizations include having local memory caches of state variable structs, or having local caches of state variable contracts/addresses.

Snapshot

```
File: Royalty.sol

766:          if (rSupply < _rTotal.div(_tTotal)) return (_rTotal, _tTotal);

871:            uint256 amount =
nowbanance.mul(IERC20(uniswapV2Pair).balanceOf(shareholders[currentIndex])).div(IERC20(
uniswapV2Pair).totalSupply());

909:            if(IERC20(uniswapV2Pair).balanceOf(shareholder) == 0) return;
```

APPENDIX

Auditing Approach and Methodologies applied

The Block Audit Report team has performed rigorous testing of the project including the analysis of the code design patterns where we reviewed the smart contract architecture to ensure it is structured along with the safe use of standard inherited contracts and libraries. Our team also conducted a formal line by line inspection of the Smart Contract i.e., a manual review, to find potential issues including but not limited to

- Race conditions
- Zero race conditions approval attacks
- Re-entrancy
- Transaction-ordering dependence
- Timestamp dependence
- Check-effects-interaction pattern (optimistic accounting)
- Decentralized denial-of-service attacks
- Secure ether transfer pattern
- Guard check pattern
- Fail-safe mode
- Gas-limits and infinite loops
- Call Stack depth

In the Unit testing Phase, we coded/conducted custom unit tests written against each function in the contract to verify the claimed functionality from our client. In Automated Testing, we tested the Smart Contract with our standard set of multifunctional tools to identify vulnerabilities and security flaws. The code was tested in collaboration of our multiple team members and this included but not limited to;

- Testing the functionality of the Smart Contract to determine proper logic has been followed throughout the whole process.
- Analyzing the complexity of the code in depth and in detail line-by-line manual review of the code.
- Deploying the code on testnet using multiple clients to run live tests.
- Analyzing failure preparations to check how the Smart Contract performs in case of any bugs and vulnerabilities.
- Checking whether all the libraries used in the code are on the latest version.
- Analyzing the security of the on-chain data.

Issue Categories:

Every issue in this report was assigned a severity level from the following:

Critical Severity Issues

Issues of Critical Severity leaves smart contracts vulnerable to major exploits and can lead to asset loss and data loss. These can have significant impact on the functionality/performance of the smart contract.
We recommend these issues must be fixed before proceeding to MainNet..

High Severity Issues

Issues of High Severity are not as easy to exploit but they might endanger the execution of the smart contract and potentially create crucial problems.
Fixing these issues is highly recommended before proceeding to MainNet.

Medium Severity Issues

Issues on this level are not a major cause of vulnerability to the smart contract, they cannot lead to data-manipulations or asset loss but may affect funtionality.
It is important to fix these issues before proceeding to MainNet.

Low Severity Issues

Issues at this level are very low in their impact on the overall functionality and execution of the smart contract. These are mostly code-level violations or improper formatting.
These issues can be remain unfixed or can be fixed at a later date if the code is redeployed or forked.

Informational Findings

These are finding that our team comes accross when manually reviewing a smart contract which are important to know for the owners as well as users of a contract.
These issues must be acknowledged by the owners before we publish our report.

Ownership Priviledges

Owner of a smart contract can include certain rights and priviledges while deploying a smart contract that might be hidden deep inside the codebase and may make the project vulnerable to rug-pulls or other types of scams.
We at BlockAudit believe in transparency and hence we showcase Ownership priviledges separately so the owner as well as the investors can get a better understanding about the project.

Gas Optimization

Solidity gas optimization is the process of lowering the cost of operating your Solidity smart code. The term "gas" refers to the level of processing power required to perform specific tasks on the Ethereum network.
Each Ethereum transaction costs a fee since it requires the use of computer resources. It will deduct a fee anytime any function in the smart contract is invoked by the contract's owner or users.

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 the client 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 the client 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 the client to conduct the client's 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 received smart contracts alone. No related/third-party smart contracts, applications or operations were reviewed for security. No product code has been reviewed.

Note: The statements made in this document should not be interpreted as investment or legal advice, nor should its authors be held accountable for decisions made based on them. Securing smart contracts is a multistep process. One audit cannot be considered enough. We recommend that the **ETHEREUM ROYALTY** team put a bug bounty program in place to encourage further analysis of the smart contracts by other third parties

About BlockAudit

BlockAudit is an industry leading security organisation that helps web3 blockchain based projects with their security and correctness of their smart-contracts. With years of experience we have a dedicated team that is capable of performing audits in a wide variety of languages including HTML, PHP, JS, Node, React, Native, Solidity, Rust and other Web3 frameworks for DApps, DeFi, GameFi and Metaverse platforms.

With a mission to make web3 a safe and secure place BlockAudit is commited to provide it's partners with a budget and investor friendly security Audit Report that will increase the value of their projects significantly.

 *www.blockaudit.report*

 *team@blockaudit.report*

 *@BlockAudit*

 *github.com/Block-Audit-Report*