Cyberscope

# Audit Report

# Stargate

June 2022

Github https://github.com/StargateBSC/STARGATE

Commit e69ed0280a760603a7aceb1bf8bee70177924672

Audited by © cyberscope

# Table of Contents

| | |
|---|---|
| **Contract Name** | StarGateToken |
| **Compiler Version** | v0.8.5+commit.a4f2e591 |
| **Optimization** | 200 runs |
| **Testing Deploy** | https://testnet.bscscan.com/token/0x226D8bD767Ae0336F6c1bfec6Bdb37C5954F0CB0 |
| **Symbol** | STAR |
| **Decimals** | 18 |
| **Total Supply** | 100,000 |
| **Domain** | stargateprotocol.io |

# Audit Updates

| | |
|---|---|
| **Initial Audit** | 13th June 2022 |
| **Corrected** | |

# Source Files

| Filename | SHA256 |
| --- | --- |
| **Context.sol** | 6f7bd013f2a4000b92811ab05a3bc5ec25aefde638cb15ea68faac1546d21246 |
| **IERC20.sol** | af5d31a257314cef3ec105377fd1c6f5db4a9b9038669de892cb7591432b825d |
| **IPancakeRouterV2.sol** | cb47b3c53a6ff3ca8edda2ff1ae47006272418f394dedeff71be1c4b3b5ca505 |
| **Ownable.sol** | 3007da1e0e54e6c24fdde11696fbf40ef26304b1f53d53a63697cfd844b972fa |
| **StarGateToken.sol** | 075e302530c9f7e9209179ee3a079e85fbaedc7d05cfd3382302d32cb0ef088d |

# Contract Analysis

Critical Medium Minor Pass

| Severity | Code | Description |
|---|---|---|
| ● | ST | Contract Owner is not able to stop or pause transactions |
| ● | OCTD | Contract Owner is not able to transfer tokens from specific address |
| ● | OTUT | Owner Transfer User's Tokens |
| ● | ELFM | Contract Owner is not able to increase fees more than a reasonable percent (25%) |
| ● | ULTW | Contract Owner is not able to increase the amount of liquidity taken by dev wallet more than a reasonable percent |
| ● | MT | Contract Owner is not able to mint new tokens |
| ● | BT | Contract Owner is not able to burn tokens from specific wallet |
| ● | BC | Contract Owner is not able to blacklist wallets from selling |

# ELFM - Exceed Limit Fees Manipulation

| | |
|---|---|
| **Criticality** | medium |
| **Location** | contract.sol#L210 |

## Description

The contract owner has the authority to increase over the allowed limit of 25%. The owner may take advantage of it by setting addresses to the blacklist. The blacklisted addresses may be taxed up to 10 + 36 = **46%**

```
function calculateFeeRate(address sender, address recipient) private view
returns(uint256) {
	bool applyFees = _isFeeEnabled && !_addressesExcludedFromFees[sender] &&
!_addressesExcludedFromFees[recipient];
	if (applyFees) {
		if (isPancakeswapPair(recipient)) {
			if (_blacklistedAddresses[sender]) {
				return _totalFee + 36;
			} else {
				return _totalFee + _additionalSellFee;
			}
		}
		return _totalFee;
	}
	return 0;
}
```

## Recommendation

The contract could embody a check for the maximum acceptable value.

The team should carefully manage the private keys of the owner's account. We strongly recommend a powerful security mechanism that will prevent a single user from accessing the contract admin functions. That risk can be prevented by temporarily locking the contract or renouncing ownership.

# Contract Diagnostics

Critical Medium Minor

| Severity | Code | Description |
|---|---|---|
| | BLC | Business Logic Concern |
| | MC | Missing Check |
| | L01 | Public Function could be Declared External |
| | L04 | Conformance to Solidity Naming Conventions |
| | L07 | Missing Events Arithmetic |
| | L13 | Divide before Multiply Operation |

# BLC - Business Logic Concern

| | |
|---|---|
| **Criticality** | minor |
| **Location** | contract.sol#L55 |

## Description

One of the contract fees is called burnFee. The burn fee gives the perspective that the taxed amount will be burned. On the contrary, **the contract sends the burned amount to the owner's wallet**.

```
// during the transfer
burnFee = amount * _blackHoleFee / 100;

// constructor
_blackHole = msg.sender;
```

## Recommendation

The team is advised to carefully check if the implementation follows the expected business logic.

# MC - Missing Check

| | |
|---|---|
| **Criticality** | medium |
| **Location** | contract.sol#L159 |

## Description

The contract is processing variables that have not properly sanitized and checked that they form the proper shape. These variables may produce vulnerability issues.

The poolFee that is used as a divisor is the sum of _totalFee and _additionalSellFee. Both variables can be set to zero in the setFees() method. As a result, the sale transactions will revert and the contract will behave similar to a **honeypot**.

```
uint256 poolFee = _totalFee + _additionalSellFee;

uint256 tokensReservedForLiquidity = amount * _celestialLpFee / poolFee;
uint256 tokensReservedForReward = amount * _stargateFee / poolFee;
```

## Recommendation

The contract should properly check the variables according to the required specifications.

# L01 - Public Function could be Declared External

| | |
|---|---|
| **Criticality** | minor |
| **Location** | contracts/Ownable.sol#L53,61<br><br>contracts/StarGateToken.sol#L72,77,85,90,96,259,299,309,313,318,323,328,338,343,347,355,359,375,379,383,388 |

## Description

Public functions that are never called by the contract should be declared external to save gas.

```
sendToBigBang
isBlacklistedWallet
removeBlacklistedWallet
setBlacklistedWallet
isFeeEnabled
setStarGateReserve
pancakeswapPairAddress
allowance
decimals
...
```

## Recommendation

Use the external attribute for functions never called from the contract.

# L04 - Conformance to Solidity Naming Conventions

| | |
|---|---|
| **Criticality** | minor |
| **Location** | contracts/IPancakeRouterV2.sol#L7<br>contracts/StarGateToken.sol#L299,355,15,16,17,18,19,20,22,36,38,39,40,41 |

## Description

Solidity defines a naming convention that should be followed. Rule exceptions:

- Allow constant variable name/symbol/decimals to be lowercase.
- Allow _ at the beginning of the mixed_case match for private variables and unused parameters.

```
_blackHole
_StarGateReserve
_bigBangWallet
_celestialLiquidityWallet
_pancakeswapV2Router
_totalTokens
_totalFee
_additionalSellFee
_blackHoleFee
...
```

## Recommendation

Follow the Solidity naming convention.
https://docs.soliditylang.org/en/v0.4.25/style-guide.html#naming-conventions.

# L07 - Missing Events Arithmetic

| | |
|---|---|
| **Criticality** | minor |
| **Location** | contracts/StarGateToken.sol#L282,299,304,313 |

## Description

Detected missing events for critical arithmetic parameters. There are functions that have no event emitted, so it is difficult to track off-chain changes.

```
_tokenSwapThreshold = threshold
_transactionLimit = limit
_tokenSwapThresholdAmount = _amount
_celestialLpFee = liquidityFee
```

## Recommendation

Emit an event for critical parameter changes.

# L13 - Divide before Multiply Operation

| | |
|---|---|
| **Criticality** | minor |
| **Location** | contracts/StarGateToken.sol#L72,155 |

## Description

Performing divisions before multiplications may cause lose of prediction.

```
tokensToSwapForLiquidity = tokensReservedForLiquidity / 2
setTransactionLimit(_totalTokens / 100 * 1)
```

## Recommendation

The multiplications should be prior to the divisions.

# Contract Functions

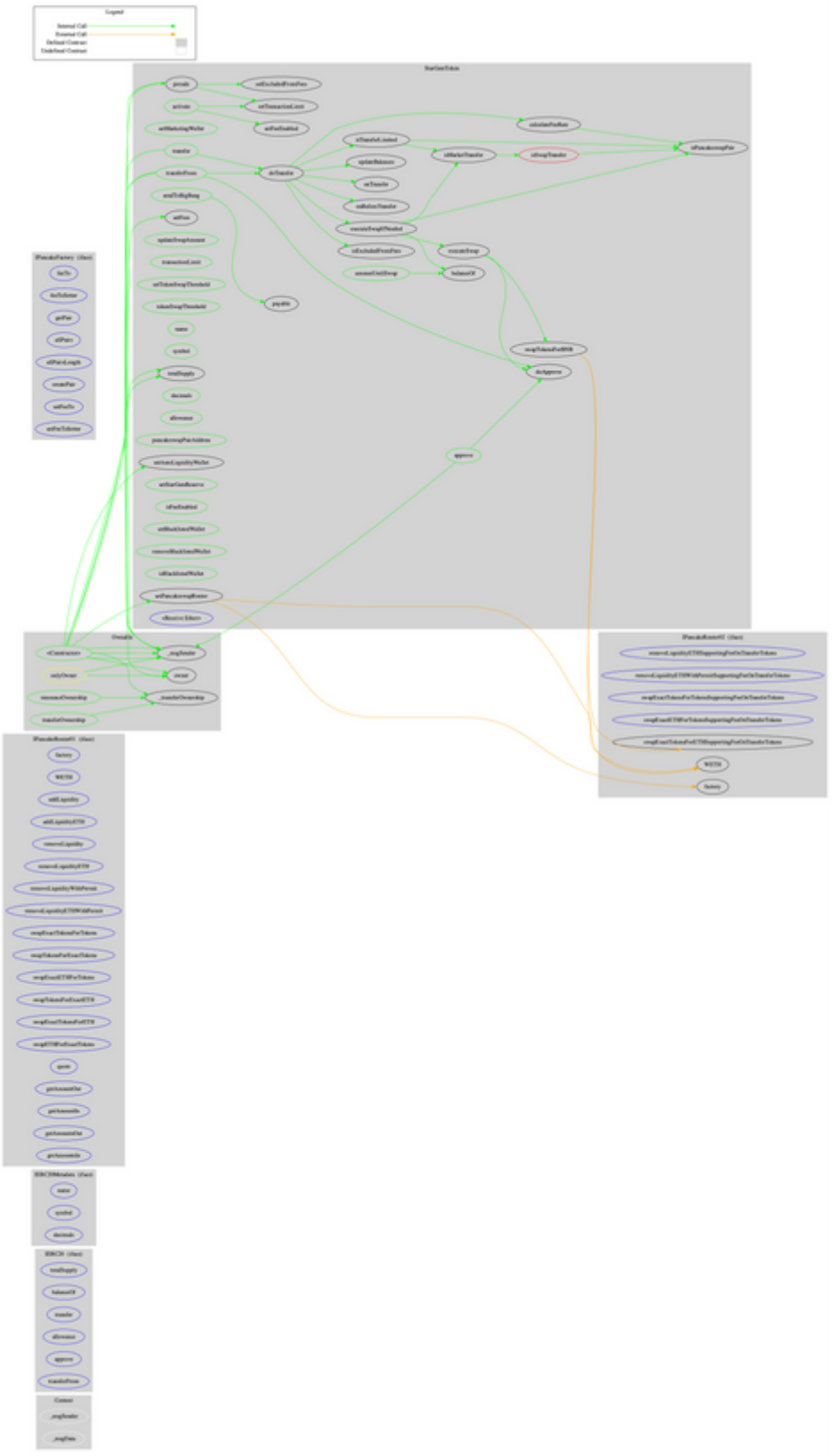
| Contract | Type | Bases | | |
|---|---|---|---|---|
| | Function Name | Visibility | Mutability | Modifiers |
| | | | | |
| **Context** | Implementation | | | |
| | _msgSender | Internal | | |
| | _msgData | Internal | | |
| | | | | |
| **IERC20** | Interface | | | |
| | totalSupply | External | | - |
| | balanceOf | External | | - |
| | transfer | External | ✓ | - |
| | allowance | External | | - |
| | approve | External | ✓ | - |
| | transferFrom | External | ✓ | - |
| | | | | |
| **IERC20Metadata** | Interface | IERC20 | | |
| | name | External | | - |
| | symbol | External | | - |
| | decimals | External | | - |
| | | | | |
| **IPancakeRouter01** | Interface | | | |
| | factory | External | | - |
| | WETH | External | | - |
| | addLiquidity | External | ✓ | - |
| | addLiquidityETH | External | Payable | - |
| | removeLiquidity | External | ✓ | - |
| | removeLiquidityETH | External | ✓ | - |
| | removeLiquidityWithPermit | External | ✓ | - |
| | removeLiquidityETHWithPermit | External | ✓ | - |
| | swapExactTokensForTokens | External | ✓ | - |

| | | | | |
|---|---|---|---|---|
| | swapTokensForExactTokens | External | ✓ | - |
| | swapExactETHForTokens | External | Payable | - |
| | swapTokensForExactETH | External | ✓ | - |
| | swapExactTokensForETH | External | ✓ | - |
| | swapETHForExactTokens | External | Payable | - |
| | quote | External | | - |
| | getAmountOut | External | | - |
| | getAmountIn | External | | - |
| | getAmountsOut | External | | - |
| | getAmountsIn | External | | - |
| | | | | |
| **IPancakeRouter02** | Interface | IPancakeRouter01 | | |
| | removeLiquidityETHSupportingFeeOnTransferTokens | External | ✓ | - |
| | removeLiquidityETHWithPermitSupportingFeeOnTransferTokens | External | ✓ | - |
| | swapExactTokensForTokensSupportingFeeOnTransferTokens | External | ✓ | - |
| | swapExactETHForTokensSupportingFeeOnTransferTokens | External | Payable | - |
| | swapExactTokensForETHSupportingFeeOnTransferTokens | External | ✓ | - |
| | | | | |
| **IPancakeFactory** | Interface | | | |
| | feeTo | External | | - |
| | feeToSetter | External | | - |
| | getPair | External | | - |
| | allPairs | External | | - |
| | allPairsLength | External | | - |
| | createPair | External | ✓ | - |
| | setFeeTo | External | ✓ | - |
| | setFeeToSetter | External | ✓ | - |
| | | | | |
| **Ownable** | Implementation | Context | | |
| | <Constructor> | Public | ✓ | - |
| | owner | Public | | - |

| | | | | |
|---|---|---|---|---|
| | renounceOwnership | Public | ✓ | onlyOwner |
| | transferOwnership | Public | ✓ | onlyOwner |
| | _transferOwnership | Internal | ✓ | |
| | | | | |
| **StarGateToken** | Implementation | Context, IERC20Metadata, Ownable | | |
| | <Constructor> | Public | ✓ | - |
| | presale | Public | ✓ | onlyOwner |
| | activate | Public | ✓ | onlyOwner |
| | setMarketingWallet | Public | ✓ | onlyOwner |
| | balanceOf | Public | | - |
| | transfer | Public | ✓ | - |
| | transferFrom | Public | ✓ | - |
| | approve | Public | ✓ | - |
| | doTransfer | Internal | ✓ | |
| | executeSwapIfNeeded | Private | ✓ | |
| | executeSwap | Private | ✓ | |
| | onBeforeTransfer | Internal | ✓ | |
| | onTransfer | Internal | ✓ | |
| | updateBalances | Private | ✓ | |
| | doApprove | Private | ✓ | |
| | calculateFeeRate | Private | | |
| | swapTokensForBNB | Internal | ✓ | |
| | isTransferLimited | Private | | |
| | isSwapTransfer | Private | | |
| | isMarketTransfer | Internal | | |
| | amountUntilSwap | Public | | - |
| | setPancakeswapRouter | Public | ✓ | onlyOwner |
| | isPancakeswapPair | Internal | | |
| | setFees | Public | ✓ | onlyOwner |
| | updateSwapAmount | Public | ✓ | onlyOwner |
| | setTransactionLimit | Public | ✓ | onlyOwner |
| | transactionLimit | Public | | - |
| | setTokenSwapThreshold | Public | ✓ | onlyOwner |

| | | | | |
|---|---|---|---|---|
| | tokenSwapThreshold | Public | | - |
| | name | Public | | - |
| | symbol | Public | | - |
| | totalSupply | Public | | - |
| | decimals | Public | | - |
| | allowance | Public | | - |
| | pancakeswapPairAddress | Public | | - |
| | setAutoLiquidityWallet | Public | ✓ | onlyOwner |
| | setStarGateReserve | Public | ✓ | onlyOwner |
| | isFeeEnabled | Public | | - |
| | setFeeEnabled | Public | ✓ | onlyOwner |
| | isExcludedFromFees | Public | | - |
| | setExcludedFromFees | Public | ✓ | onlyOwner |
| | setBlacklistedWallet | Public | ✓ | onlyOwner |
| | removeBlacklistedWallet | Public | ✓ | onlyOwner |
| | isBlacklistedWallet | Public | | onlyOwner |
| | sendToBigBang | Public | Payable | onlyOwner |
| | <Receive Ether> | External | Payable | - |

# Contract Flow



# Domain Info

| | |
|---|---|
| **Domain Name** | stargateprotocol.io |
| **Registry Domain ID** | d40b51074cdb46fbb3f22bc65c2d0994-DONUTS |
| **Creation Date** | 2022-06-09T15:06:41Z |
| **Updated Date** | 2022-06-09T16:04:21Z |
| **Registry Expiry Date** | 2023-06-09T15:06:41Z |
| **Registrar WHOIS Server** | whois.namecheap.com |
| **Registrar URL** | https://www.namecheap.com/ |
| **Registrar** | NameCheap, Inc. |
| **Registrar IANA ID** | 1068 |

The domain has been created in 12 months before the creation of the audit.

There is no public billing information, the creator is protected by the privacy settings.

# Summary

The Smart Contract analysis reported one medium severity issue. The contract owner has the authority to manipulate the fees. Additionally, the contract contains some misleading implementations regarding the naming and the variables sanitization. A multi-wallet signing pattern will provide security against potential hacks. Temporarily locking the contract or renouncing ownership will eliminate all the contract threats.

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The Cyberscope team

https://www.cyberscope.io