Cyberscope

Audit Report

Karma

November 2023

Network	BSC
Address	0x8f9ba08cbf014ab233a33067b21bedf3876c6605
Audited by	© cyberscope

Analysis

● Critical ● Medium ● Minor / Informative ● Pass

Severity	Code	Description	Status
●	ST	Stops Transactions	Unresolved
●	OTUT	Transfers User's Tokens	Passed
●	ELFM	Exceeds Fees Limit	Passed
●	MT	Mints Tokens	Passed
●	BT	Burns Tokens	Passed
●	BC	Blacklists Addresses	Passed

Diagnostics

● Critical ● Medium ● Minor / Informative

Severity	Code	Description	Status
● Critical	TSD	Total Supply Diversion	Unresolved
● Critical	ZD	Zero Division	Unresolved
● Minor / Informative	RSD	Redundant Swap Duplication	Unresolved
● Minor / Informative	PVC	Price Volatility Concern	Unresolved
● Minor / Informative	FSA	Fixed Swap Address	Unresolved
● Minor / Informative	IDI	Immutable Declaration Improvement	Unresolved
● Minor / Informative	L02	State Variables could be Declared Constant	Unresolved
● Minor / Informative	L04	Conformance to Solidity Naming Conventions	Unresolved
● Minor / Informative	L09	Dead Code Elimination	Unresolved
● Minor / Informative	L11	Unnecessary Boolean equality	Unresolved
● Minor / Informative	L13	Divide before Multiply Operation	Unresolved
● Minor / Informative	L14	Uninitialized Variables in Local Scope	Unresolved
● Minor / Informative	L17	Usage of Solidity Assembly	Unresolved
● Minor / Informative	L20	Succeeded Transfer Check	Unresolved

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Review

Contract Name	KARMA
Compiler Version	v0.8.17+commit.8df45f5f
Optimization	200 runs
Explorer	https://bscscan.com/address/0x8f9ba08cbf014ab233a33067b21bedf3876c6605
Address	0x8f9ba08cbf014ab233a33067b21bedf3876c6605
Network	BSC
Symbol	KARMA
Decimals	9
Total Supply	1,000,000,000

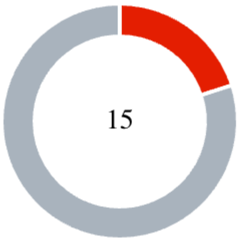
Audit Updates

Initial Audit	17 Nov 2023

Source Files

Filename	SHA256
KARMA.sol	913b3c59a36e5cf3e721cadfb9e21ae9fa9a8b82b3d2849f2ba9152ebac67f52

Findings Breakdown



Critical	3
Medium	0
Minor / Informative	12

Severity	Unresolved	Acknowledged	Resolved	Other
Critical	3	0	0	0
Medium	0	0	0	0
Minor / Informative	12	0	0	0

ST - Stops Transactions

Criticality	Critical
Location	KARMA.sol#L732
Status	Unresolved

Description

The transactions are initially disabled for all users excluding the authorized addresses. The owner can enable the transactions for all users. Once the transactions are enable the owner will not be able to disable them again.

```
if(!_isExcludedFromFees[from] && !_isExcludedFromFees[to]) {
  require(tradingEnabled, "Trading is not enabled yet");
}
```

Recommendation

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. Some suggestions are:

- Introduce a multi-sign wallet so that many addresses will confirm the action.
- Introduce a governance model where users will vote about the actions.

TSD - Total Supply Diversion

Criticality	Critical
Location	KARMA.sol#L650
Status	Unresolved

Description

The total supply of a token is the total number of tokens that have been created, while the balances of individual accounts represent the number of tokens that an account owns. The total supply and the balances of individual accounts are two separate concepts that are managed by different variables in a smart contract. These two entities should be equal to each other.

In the contract, the amount that is added to the total supply does not equal the amount that is added to the balances. As a result, the sum of balances is diverse from the total supply.

```
if(burnAmount > 0){
    uint256 currentRate =  _getRate();
    uint256 rBurn = burnAmount * currentRate;
    _rOwned[address(0xdead)] = _rOwned[address(0xdead)] + rBurn;
    if(_isExcluded[address(0xdead)])
        _tOwned[address(0xdead)] = _tOwned[address(0xdead)] +
burnAmount;

    _tTotalSupply -= burnAmount;
}
```

Recommendation

The total supply and the balance variables are separate and independent from each other. The total supply represents the total number of tokens that have been created, while the balance mapping stores the number of tokens that each account owns. The sum of balances should always equal the total supply.

ZD - Zero Division

Criticality	Critical
Location	KARMA.sol#L639
Status	Unresolved

Description

The contract is using variables that may be set to zero as denominators. This can lead to unpredictable and potentially harmful results, such as a transaction revert.

```
function setBuyFeePercentages(uint256 _taxFeeonBuy, uint256
_liquidityFeeonBuy, uint256 _marketingFeeonBuy, uint256
_burnFeeOnBuy) external onlyOwner {
    taxFeeonBuy = _taxFeeonBuy;
    liquidityFeeonBuy = _liquidityFeeonBuy;
    marketingFeeonBuy = _marketingFeeonBuy;
    burnFeeOnBuy = _burnFeeOnBuy;

    totalBuyFees = taxFeeonBuy + liquidityFeeonBuy +
marketingFeeonBuy + burnFeeOnBuy;

    require(totalBuyFees <= 100, "Buy fees cannot be greater than
10%");

    emit BuyFeesChanged(taxFeeonBuy, liquidityFeeonBuy,
marketingFeeonBuy);
}

...

uint256 liquidityAmount = tLiquidity * (liquidityFeeonBuy +
liquidityFeeonSell) / (liquidityFeeonBuy + liquidityFeeonSell +
burnFeeOnBuy + burnFeeOnSell);
```

Recommendation

It is important to handle division by zero appropriately in the code to avoid unintended behavior and to ensure the reliability and safety of the contract. The contract should ensure that the divisor is always non-zero before performing a division operation. It should prevent the variables to be set to zero, or should not allow the execution of the corresponding statements.

RSD - Redundant Swap Duplication

Criticality	Minor / Informative
Location	KARMA.sol#L771
Status	Unresolved

Description

The contract contains multiple swap methods that individually perform token swaps and transfer promotional amounts to specific addresses and features. This redundant duplication of code introduces unnecessary complexity and increases dramatically the gas consumption. By consolidating these operations into a single swap method, the contract can achieve better code readability, reduce gas costs, and improve overall efficiency.

```
if(liquidityShare > 0) {
    uint256 liquidityTokens = (contractTokenBalance *
liquidityShare) / totalShare;
    swapAndLiquify(liquidityTokens);
}

if(marketingShare > 0) {
    uint256 marketingTokens = (contractTokenBalance *
marketingShare) / totalShare;
    swapAndSendMarketing(marketingTokens);
}
```

Recommendation

A more optimized approach could be adopted to perform the token swap operation once for the total amount of tokens and distribute the proportional amounts to the corresponding addresses, eliminating the need for separate swaps.

PVC - Price Volatility Concern

Criticality	Minor / Informative
Location	KARMA.sol#L842
Status	Unresolved

Description

The contract accumulates tokens from the taxes to swap them for ETH. The variable `swapTokensAtAmount` sets a threshold where the contract will trigger the swap functionality. If the variable is set to a big number, then the contract will swap a huge amount of tokens for ETH.

It is important to note that the price of the token representing it, can be highly volatile. This means that the value of a price volatility swap involving Ether could fluctuate significantly at the triggered point, potentially leading to significant price volatility for the parties involved.

```
function setSwapTokensAtAmount(uint256 newAmount) external
onlyOwner() {
    require(newAmount > totalSupply() / 1e5, "SwapTokensAtAmount
must be greater than 0.001% of total supply");
    swapTokensAtAmount = newAmount;
    emit SwapTokensAtAmountUpdated(newAmount);
}
```

Recommendation

The contract could ensure that it will not sell more than a reasonable amount of tokens in a single transaction. A suggested implementation could check that the maximum amount should be less than a fixed percentage of the exchange reserves. Hence, the contract will guarantee that it cannot accumulate a huge amount of tokens in order to sell them.

FSA - Fixed Swap Address

Criticality	Minor / Informative
Location	KARMA.sol#L418
Status	Unresolved

Description

The swap address is assigned once and it can not be changed. It is a common practice in decentralized exchanges to create new swap versions. A contract that cannot change the swap address may not be able to catch up to the upgrade. As a result, the contract will not be able to migrate to a new liquidity pool pair or decentralized exchange.

```
IUniswapV2Router02 _uniswapV2Router = IUniswapV2Router02(router);
uniswapV2Pair = IUniswapV2Factory(_uniswapV2Router.factory())
    .createPair(address(this), _uniswapV2Router.WETH());
uniswapV2Router = _uniswapV2Router;
```

Recommendation

The team is advised to add the ability to change the pair and router address in order to cover potential liquidity pool migrations. It would be better to support multiple pair addresses so the token will be able to have the same behavior in all the decentralized liquidity pairs.

IDI - Immutable Declaration Improvement

Criticality	Minor / Informative
Location	KARMA.sol#L415,417
Status	Unresolved

Description

The contract declares state variables that their value is initialized once in the constructor and are not modified afterwards. The `immutable` is a special declaration for this kind of state variables that saves gas when it is defined.

```
uniswapV2Pair
uniswapV2Router
```

Recommendation

By declaring a variable as immutable, the Solidity compiler is able to make certain optimizations. This can reduce the amount of storage and computation required by the contract, and make it more gas-efficient.

L02 - State Variables could be Declared Constant

Criticality	Minor / Informative
Location	KARMA.sol#L348,349,350,381
Status	Unresolved

Description

State variables can be declared as constant using the constant keyword. This means that the value of the state variable cannot be changed after it has been set. Additionally, the constant variables decrease gas consumption of the corresponding transaction.

```
string private _name      = "Karma"
string private _symbol    = "KARMA"
uint8  private _decimals = 9
address private DEAD = 0x000000000000000000000000000000000000dEaD
```

Recommendation

Constant state variables can be useful when the contract wants to ensure that the value of a state variable cannot be changed by any function in the contract. This can be useful for storing values that are important to the contract's behavior, such as the contract's address or the maximum number of times a certain function can be called. The team is advised to add the constant keyword to state variables that never change.

L04 - Conformance to Solidity Naming Conventions

Criticality	Minor / Informative
Location	KARMA.sol#L167,168,184,203,381,667,671,675,844,928,935,948,985
Status	Unresolved

Description

The Solidity style guide is a set of guidelines for writing clean and consistent Solidity code. Adhering to a style guide can help improve the readability and maintainability of the Solidity code, making it easier for others to understand and work with.

The followings are a few key points from the Solidity style guide:

1. Use camelCase for function and variable names, with the first letter in lowercase (e.g., myVariable, updateCounter).
2. Use PascalCase for contract, struct, and enum names, with the first letter in uppercase (e.g., MyContract, UserStruct, ErrorEnum).
3. Use uppercase for constant variables and enums (e.g., MAX_VALUE, ERROR_CODE).
4. Use indentation to improve readability and structure.
5. Use spaces between operators and after commas.
6. Use comments to explain the purpose and behavior of the code.
7. Keep lines short (around 120 characters) to improve readability.

```
function DOMAIN_SEPARATOR() external view returns (bytes32);
function PERMIT_TYPEHASH() external pure returns (bytes32);
function MINIMUM_LIQUIDITY() external pure returns (uint);
function WETH() external pure returns (address);
address private DEAD = 0x000000000000000000000000000000000000dEaD
uint256 _amount
bool _enabled
address _marketingWallet
uint256 _taxFeeonBuy
uint256 _burnFeeOnBuy
uint256 _liquidityFeeonBuy
uint256 _marketingFeeonBuy
uint256 _liquidityFeeonSell
uint256 _taxFeeonSell

...
```

Recommendation

By following the Solidity naming convention guidelines, the codebase increased the readability, maintainability, and makes it easier to work with.

Find more information on the Solidity documentation https://docs.soliditylang.org/en/v0.8.17/style-guide.html#naming-convention.

L09 - Dead Code Elimination

Criticality	Minor / Informative
Location	KARMA.sol#L76,95,99,103,107,112
Status	Unresolved

Description

In Solidity, dead code is code that is written in the contract, but is never executed or reached during normal contract execution. Dead code can occur for a variety of reasons, such as:

- Conditional statements that are always false.
- Functions that are never called.
- Unreachable code (e.g., code that follows a return statement).

Dead code can make a contract more difficult to understand and maintain, and can also increase the size of the contract and the cost of deploying and interacting with it.

```
function isContract(address account) internal view returns (bool) {
        // According to EIP-1052, 0x0 is the value returned for not-yet
created accounts
        // and
0xc5d2460186f7233c927e7db2dcc703c0e500b653ca82273b7bfad8045d85a470 is
returned
        // for accounts without code, i.e. `keccak256('')`
        bytes32 codehash;
        bytes32 accountHash =
0xc5d2460186f7233c927e7db2dcc703c0e500b653ca82273b7bfad8045d85a470;
        // solhint-disable-next-line no-inline-assembly
        assembly { codehash := extcodehash(account) }
        return (codehash != accountHash && codehash != 0x0);
    }

function functionCall(address target, bytes memory data) internal
returns (bytes memory) {
      return functionCall(target, data, "Address: low-level call
failed");
    }

...
```

Recommendation

To avoid creating dead code, it's important to carefully consider the logic and flow of the contract and to remove any code that is not needed or that is never executed. This can help improve the clarity and efficiency of the contract.

L11 - Unnecessary Boolean equality

Criticality	Minor / Informative
Location	KARMA.sol#L716,734
Status	Unresolved

Description

Boolean equality is unnecessary when comparing two boolean values. This is because a boolean value is either true or false, and there is no need to compare two values that are already known to be either true or false.

it's important to be aware of the types of variables and expressions that are being used in the contract's code, as this can affect the contract's behavior and performance. The comparison to boolean constants is redundant. Boolean constants can be used directly and do not need to be compared to true or false.

```
require(tradingEnabled == false, "Trading is already enabled")

(from == uniswapV2Pair || to == uniswapV2Pair) &&
                _isExcludedFromMaxTxLimit[from] == false &&
                _isExcludedFromMaxTxLimit[to]   == false
```

Recommendation

Using the boolean value itself is clearer and more concise, and it is generally considered good practice to avoid unnecessary boolean equalities in Solidity code.

L13 - Divide before Multiply Operation

Criticality	Minor / Informative
Location	KARMA.sol#L635,640
Status	Unresolved

Description

It is important to be aware of the order of operations when performing arithmetic calculations. This is especially important when working with large numbers, as the order of operations can affect the final result of the calculation. Performing divisions before multiplications may cause loss of prediction.

```
uint256 liquidityAmount = tLiquidity * (liquidityFeeonBuy +
liquidityFeeonSell) / (liquidityFeeonBuy + liquidityFeeonSell +
burnFeeOnBuy + burnFeeOnSell)
uint256 rLiquidity = liquidityAmount * currentRate
```

Recommendation

To avoid this issue, it is recommended to carefully consider the order of operations when performing arithmetic calculations in Solidity. It's generally a good idea to use parentheses to specify the order of operations. The basic rule is that the multiplications should be prior to the divisions.

L14 - Uninitialized Variables in Local Scope

Criticality	Minor / Informative
Location	KARMA.sol#L403
Status	Unresolved

Description

Using an uninitialized local variable can lead to unpredictable behavior and potentially cause errors in the contract. It's important to always initialize local variables with appropriate values before using them.

```
address router
```

Recommendation

By initializing local variables before using them, the contract ensures that the functions behave as expected and avoid potential issues.

L17 - Usage of Solidity Assembly

Criticality	Minor / Informative
Location	KARMA.sol#L83,125
Status	Unresolved

Description

Using assembly can be useful for optimizing code, but it can also be error-prone. It's important to carefully test and debug assembly code to ensure that it is correct and does not contain any errors.

Some common types of errors that can occur when using assembly in Solidity include Syntax, Type, Out-of-bounds, Stack, and Revert.

```
assembly { codehash := extcodehash(account) }

assembly {
                    let returndata_size := mload(returndata)
                    revert(add(32, returndata), returndata_size)
                }
```

Recommendation

It is recommended to use assembly sparingly and only when necessary, as it can be difficult to read and understand compared to Solidity code.

L20 - Succeeded Transfer Check

Criticality	Minor / Informative
Location	KARMA.sol#L586
Status	Unresolved

Description

According to the ERC20 specification, the transfer methods should be checked if the result is successful. Otherwise, the contract may wrongly assume that the transfer has been established.

```
ERC20token.transfer(msg.sender, balance)
```

Recommendation

The contract should check if the result of the transfer methods is successful. The team is advised to check the SafeERC20 library from the Openzeppelin library.

Functions Analysis

Contract	Type	Bases		
	Function Name	**Visibility**	**Mutability**	**Modifiers**
Context	Implementation			
	_msgSender	Internal		
	_msgData	Internal		
Ownable	Implementation	Context		
		Public	✓	-
	owner	Public		-
	renounceOwnership	Public	✓	onlyOwner
	transferOwnership	Public	✓	onlyOwner
IERC20	Interface			
	totalSupply	External		-
	balanceOf	External		-
	transfer	External	✓	-
	allowance	External		-
	approve	External	✓	-
	transferFrom	External	✓	-
Address	Library			

	isContract	Internal		
	sendValue	Internal	✓	
	functionCall	Internal	✓	
	functionCall	Internal	✓	
	functionCallWithValue	Internal	✓	
	functionCallWithValue	Internal	✓	
	_functionCallWithValue	Private	✓	
IUniswapV2Factory	Interface			
	feeTo	External		-
	feeToSetter	External		-
	getPair	External		-
	allPairs	External		-
	allPairsLength	External		-
	createPair	External	✓	-
	setFeeTo	External	✓	-
	setFeeToSetter	External	✓	-
IUniswapV2Pair	Interface			
	name	External		-
	symbol	External		-
	decimals	External		-
	totalSupply	External		-

	balanceOf	External		-
	allowance	External		-
	approve	External	✓	-
	transfer	External	✓	-
	transferFrom	External	✓	-
	DOMAIN_SEPARATOR	External		-
	PERMIT_TYPEHASH	External		-
	nonces	External		-
	permit	External	✓	-
	MINIMUM_LIQUIDITY	External		-
	factory	External		-
	token0	External		-
	token1	External		-
	getReserves	External		-
	price0CumulativeLast	External		-
	price1CumulativeLast	External		-
	kLast	External		-
	burn	External	✓	-
	swap	External	✓	-
	skim	External	✓	-
	sync	External	✓	-
	initialize	External	✓	-

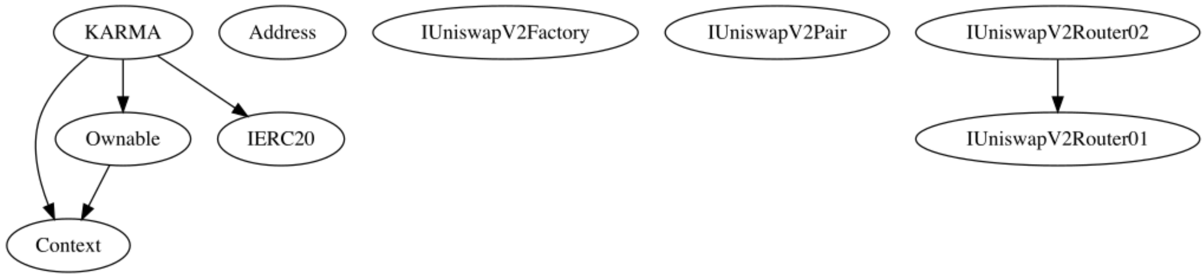
IUniswapV2Router01	Interface			
	factory	External		-
	WETH	External		-
	addLiquidity	External	✓	-
	addLiquidityETH	External	Payable	-
	removeLiquidity	External	✓	-
	removeLiquidityETH	External	✓	-
	removeLiquidityWithPermit	External	✓	-
	removeLiquidityETHWithPermit	External	✓	-
	swapExactTokensForTokens	External	✓	-
	swapTokensForExactTokens	External	✓	-
	swapExactETHForTokens	External	Payable	-
	swapTokensForExactETH	External	✓	-
	swapExactTokensForETH	External	✓	-
	swapETHForExactTokens	External	Payable	-
	quote	External		-
	getAmountOut	External		-
	getAmountIn	External		-
	getAmountsOut	External		-
	getAmountsIn	External		-
IUniswapV2Router02	Interface	IUniswapV2Router01		
	removeLiquidityETHSupportingFeeOnTransferTokens	External	✓	-

	removeLiquidityETHWithPermitSupportingFeeOnTransferTokens	External	✓	-
	swapExactTokensForTokensSupportingFeeOnTransferTokens	External	✓	-
	swapExactETHForTokensSupportingFeeOnTransferTokens	External	Payable	-
	swapExactTokensForETHSupportingFeeOnTransferTokens	External	✓	-
KARMA	Implementation	Context, IERC20, Ownable		
		Public	✓	-
	name	Public		-
	symbol	Public		-
	decimals	Public		-
	totalSupply	Public		-
	balanceOf	Public		-
	transfer	Public	✓	-
	allowance	Public		-
	approve	Public	✓	-
	transferFrom	Public	✓	-
	increaseAllowance	Public	✓	-
	decreaseAllowance	Public	✓	-
	isExcludedFromReward	Public		-
	totalReflectionDistributed	Public		-
	deliver	Public	✓	-
	reflectionFromToken	Public		-

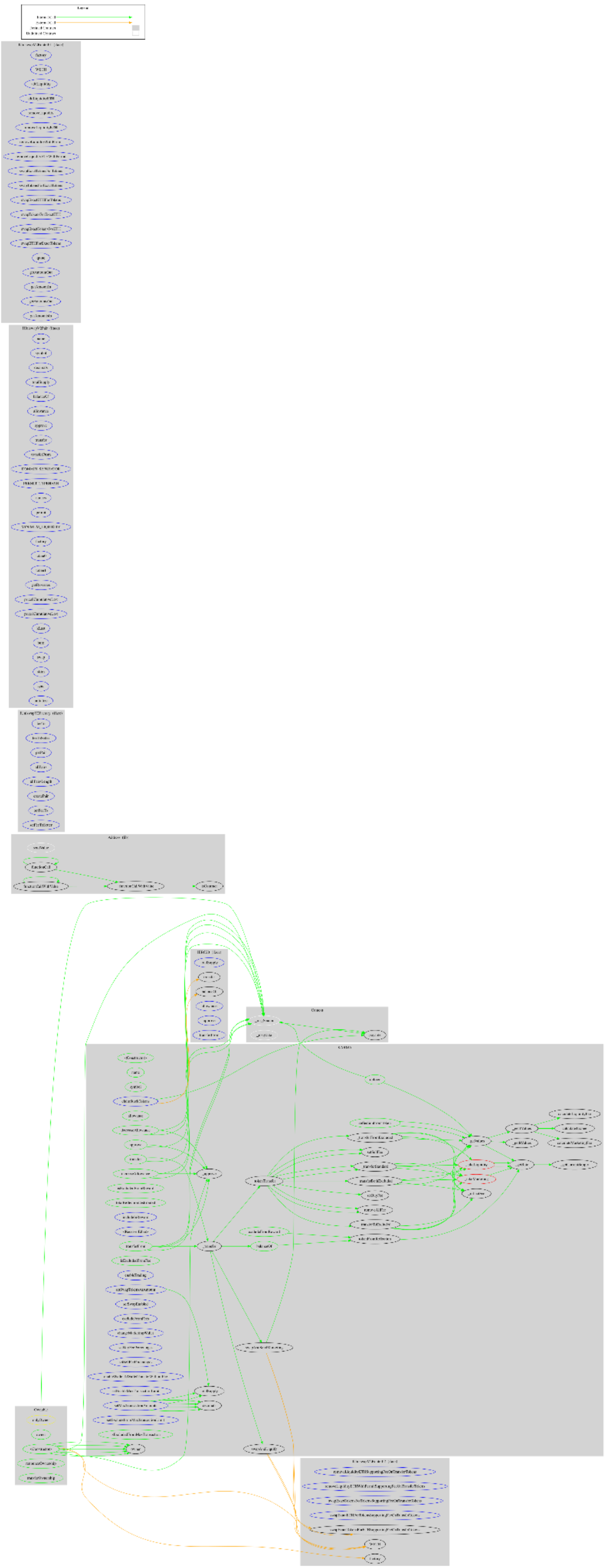
	tokenFromReflection	Public		-
	excludeFromReward	Public	✓	onlyOwner
	includeInReward	External	✓	onlyOwner
		External	Payable	-
	claimStuckTokens	External	✓	onlyOwner
	_reflectFee	Private	✓	
	_getValues	Private		
	_getTValues	Private		
	_getRValues	Private		
	_getRate	Private		
	_getCurrentSupply	Private		
	_takeLiquidity	Private	✓	
	_takeMarketing	Private	✓	
	calculateTaxFee	Private		
	calculateLiquidityFee	Private		
	calculateMarketingFee	Private		
	removeAllFee	Private	✓	
	setBuyFee	Private	✓	
	setSellFee	Private	✓	
	isExcludedFromFee	Public		-
	_approve	Private	✓	
	enableTrading	External	✓	onlyOwner
	_transfer	Private	✓	

	swapAndLiquify	Private	✓	
	swapAndSendMarketing	Private	✓	
	setSwapTokensAtAmount	External	✓	onlyOwner
	setSwapEnabled	External	✓	onlyOwner
	_tokenTransfer	Private	✓	
	_transferStandard	Private	✓	
	_transferToExcluded	Private	✓	
	_transferFromExcluded	Private	✓	
	_transferBothExcluded	Private	✓	
	excludeFromFees	External	✓	onlyOwner
	changeMarketingWallet	External	✓	onlyOwner
	setBuyFeePercentages	External	✓	onlyOwner
	setSellFeePercentages	External	✓	onlyOwner
	enableWalletToWalletTransferWithoutFee	External	✓	onlyOwner
	setEnableMaxTransactionLimit	External	✓	onlyOwner
	setMaxTransactionAmounts	External	✓	onlyOwner
	setExcludeFromMaxTransactionLimit	External	✓	onlyOwner
	isExcludedFromMaxTransaction	Public		-

Inheritance Graph



Flow Graph



Summary

Karma contract implements a token mechanism. This audit investigates security issues, business logic concerns and potential improvements. There are some functions that can be abused by the owner like stop transactions. A multi-wallet signing pattern will provide security against potential hacks. Temporarily locking the contract or renouncing ownership will eliminate all the contract threats. There is also a limit of max 10% fees.

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Cyberscope is one of the leading smart contract audit firms in the crypto space and has built a high-profile network of clients and partners.

The Cyberscope team

https://www.cyberscope.io