Cyberscope

Audit Report

Paywong

March 2023

Network	BSC
Address	0x383E64ac8808DCE10a39f0DDA8a0484F44E68f5a
Audited by	© cyberscope

Table of Contents

Review

Contract Name	PaywongToken
Compiler Version	v0.8.18+commit.87f61d96
Optimization	200 runs
Explorer	https://bscscan.com/address/0x383e64ac8808dce10a39f0dda8a0484f44e68f5a
Address	0x383e64ac8808dce10a39f0dda8a0484f44e68f5a
Network	BSC
Symbol	PWG
Decimals	18
Total Supply	1,000,000,000

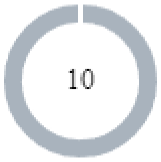
Audit Updates

Initial Audit	31 Mar 2023

Source Files

Filename	SHA256
PaywongToken.sol	3358e50e0ca1a51b36d0b7e0fcfbae49bef5c42d8c7c0a6741f14a3a837da56a

Findings Breakdown



●	Critical	0
●	Medium	0
●	Minor / Informative	10

Severity		Unresolved	Acknowledged	Resolved	Other
●	Critical	0	0	0	0
●	Medium	0	0	0	0
●	Minor / Informative	10	0	0	0

Analysis

🔴 Critical 🟠 Medium ⚪ Minor / Informative ● Pass

Severity	Code	Description	Status
●	ST	Stops Transactions	Passed
●	OCTD	Transfers Contract's Tokens	Passed
●	OTUT	Transfers User's Tokens	Passed
●	ELFM	Exceeds Fees Limit	Passed
●	ULTW	Transfers Liquidity to Team Wallet	Passed
●	MT	Mints Tokens	Passed
●	BT	Burns Tokens	Passed
●	BC	Blacklists Addresses	Passed

Diagnostics

🔴 Critical 🟠 Medium ● Minor / Informative

Severity	Code	Description	Status
●	RSK	Redundant Storage Keyword	Unresolved
●	L02	State Variables could be Declared Constant	Unresolved
●	L04	Conformance to Solidity Naming Conventions	Unresolved
●	L05	Unused State Variable	Unresolved
●	L09	Dead Code Elimination	Unresolved
●	L13	Divide before Multiply Operation	Unresolved
●	L15	Local Scope Variable Shadowing	Unresolved
●	L17	Usage of Solidity Assembly	Unresolved
●	L18	Multiple Pragma Directives	Unresolved
●	L19	Stable Compiler Version	Unresolved

RSK - Redundant Storage Keyword

Criticality	Minor / Informative
Location	PaywongToken.sol#L711
Status	Unresolved

Description

The contract uses the `storage` keyword in a view function. The `storage` keyword is used to persist data on the contract's storage. View functions are functions that do not modify the state of the contract and do not perform any actions that cost gas (such as sending a transaction). As a result, the use of the `storage` keyword in view functions is redundant.

```
Counter storage counter
```

Recommendation

It is generally considered good practice to avoid using the `storage` keyword in view functions, because it is unnecessary and can make the code less readable.

L02 - State Variables could be Declared Constant

Criticality	Minor / Informative
Location	PaywongToken.sol#L1513
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.

```
private _PERMIT_TYPEHASH_DEPRECATED_SLOT;
```

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	PaywongToken.sol#L684,1401,1402,1403,1405,1406,1407,1513,1557
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);

 private immutable _CACHED_DOMAIN_SEPARATOR;


 private immutable _CACHED_CHAIN_ID;

...


 private immutable _HASHED_NAME;


 private immutable _HASHED_VERSION;


...
```

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.

L05 - Unused State Variable

Criticality	Minor / Informative
Location	PaywongToken.sol#L1513
Status	Unresolved

Description

An unused state variable is a state variable that is declared in the contract, but is never used in any of the contract's functions. This can happen if the state variable was originally intended to be used, but was later removed or never used.

Unused state variables can create clutter in the contract and make it more difficult to understand and maintain. They can also increase the size of the contract and the cost of deploying and interacting with it.

```
private _PERMIT_TYPEHASH_DEPRECATED_SLOT;
```

Recommendation

To avoid creating unused state variables, it's important to carefully consider the state variables that are needed for the contract's functionality, and to remove any that are no longer needed. This can help improve the clarity and efficiency of the contract.

L09 - Dead Code Elimination

Criticality	Minor / Informative
Location	PaywongToken.sol#L721,729,755,762,770,781,791,876,894,930,941,983,994,1032,1045,1075,1101,1126,1135,1150,1210,1243,1256,1271,1338,1352
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 decrement(Counter storage counter) internal {
        uint256 value = counter._value;
        require(value > 0, "Counter: decrement overflow");
        unchecked {
            counter._value = value - 1;
        }
...
function reset(Counter storage counter) internal {
        counter._value = 0;
    }

function max(uint256 a, uint256 b) internal pure returns
(uint256) {
        return a > b ? a : b;
    }

...
```

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.

L13 - Divide before Multiply Operation

Criticality	Minor / Informative
Location	PaywongToken.sol#L838,841,853,857,858,859,860,861,862,868
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.

```
denominator := div(denominator, twos)
inverse *= 2 - denominator * inverse
```

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.

L15 - Local Scope Variable Shadowing

Criticality	Minor / Informative
Location	PaywongToken.sol#L1520
Status	Unresolved

Description

Local scope variable shadowing occurs when a local variable with the same name as a variable in an outer scope is declared within a function or code block. When this happens, the local variable "shadows" the outer variable, meaning that it takes precedence over the outer variable within the scope in which it is declared.

```
memory name) EIP71
```

Recommendation

It's important to be aware of shadowing when working with local variables, as it can lead to confusion and unintended consequences if not used correctly. It's generally a good idea to choose unique names for local variables to avoid shadowing outer variables and causing confusion.

L17 - Usage of Solidity Assembly

Criticality	Minor / Informative
Location	PaywongToken.sol#L802,1107,1218
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 {
                let mm := mulmod(x, y, not(0))
                prod0 := mul(x, y)
                prod1 := sub(sub(mm, prod0), lt(mm, prod0))
            }

mbly {
                ptr := add(buffer, add(32, length))
            }


...
```

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.

L18 - Multiple Pragma Directives

Criticality	Minor / Informative
Location	PaywongToken.sol#L9,37,122,208,238,629,693,740,1089,1161,1376,1482,1579,1618
Status	Unresolved

Description

If the contract includes multiple conflicting pragma directives, it may produce unexpected errors. To avoid this, it's important to include the correct pragma directive at the top of the contract and to ensure that it is the only pragma directive included in the contract.

```
pragma solidity ^0.8.0;
ma solidity ^0.8.0;


solidity ^0.8.0;

...


/
solidity ^0.8.9;
```

Recommendation

It is important to include only one pragma directive at the top of the contract and to ensure that it accurately reflects the version of Solidity that the contract is written in.

By including all required compiler options and flags in a single pragma directive, the potential conflicts could be avoided and ensure that the contract can be compiled correctly.

L19 - Stable Compiler Version

Criticality	Minor / Informative
Location	PaywongToken.sol#L9,37,122,208,238,629,693,740,1089,1161,1376,1482,1579,1618
Status	Unresolved

Description

The `^` symbol indicates that any version of Solidity that is compatible with the specified version (i.e., any version that is a higher minor or patch version) can be used to compile the contract. The version lock is a mechanism that allows the author to specify a minimum version of the Solidity compiler that must be used to compile the contract code. This is useful because it ensures that the contract will be compiled using a version of the compiler that is known to be compatible with the code.

```
pragma solidity ^0.8.0;

ma solidity ^0.8.0;



solidity ^0.8.0;

/**

solidity ^0.8.0;




...
```

Recommendation

The team is advised to lock the pragma to ensure the stability of the codebase. The locked pragma version ensures that the contract will not be deployed with an unexpected version. An unexpected version may produce vulnerabilities and undiscovered bugs. The compiler should be configured to the lowest version that provides all the required functionality for the codebase. As a result, the project will be compiled in a well-tested LTS (Long Term Support) environment.

Functions Analysis

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

	transferFrom	External	✓	-
IERC20Metadata	Interface	IERC20		
	name	External		-
	symbol	External		-
	decimals	External		-
ERC20	Implementation	Context, IERC20, IERC20Metadata		
		Public	✓	-
	name	Public		-
	symbol	Public		-
	decimals	Public		-
	totalSupply	Public		-
	balanceOf	Public		-
	transfer	Public	✓	-
	allowance	Public		-
	approve	Public	✓	-
	transferFrom	Public	✓	-
	increaseAllowance	Public	✓	-
	decreaseAllowance	Public	✓	-
	_transfer	Internal	✓	
	_mint	Internal	✓	

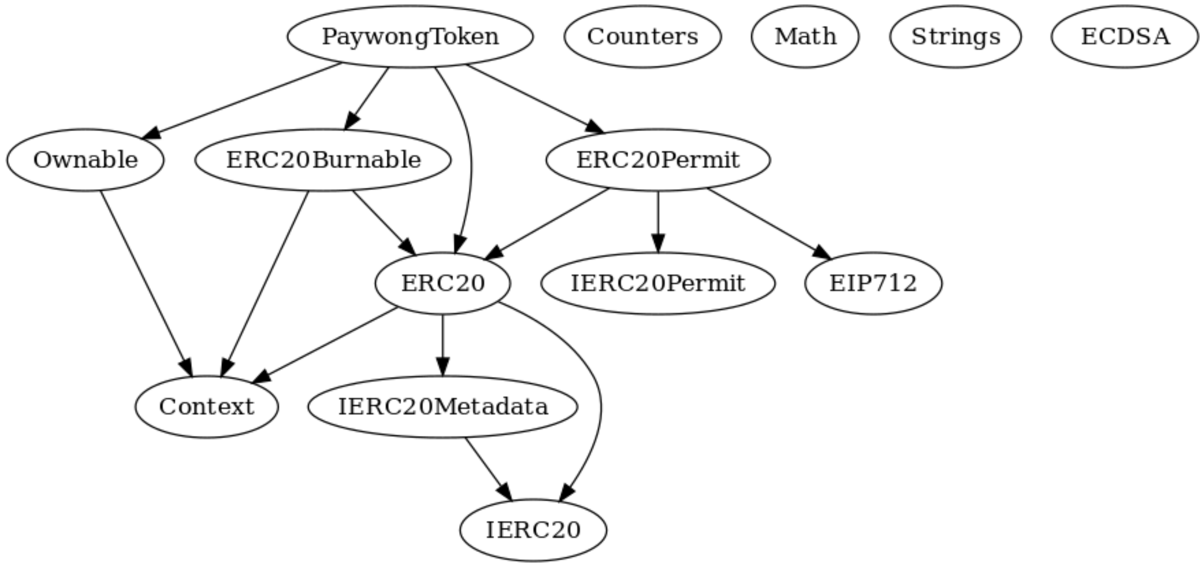
	_burn	Internal	✓	
	_approve	Internal	✓	
	_spendAllowance	Internal	✓	
	_beforeTokenTransfer	Internal	✓	
	_afterTokenTransfer	Internal	✓	
IERC20Permit	Interface			
	permit	External	✓	-
	nonces	External		-
	DOMAIN_SEPARATOR	External		-
Counters	Library			
	current	Internal		
	increment	Internal	✓	
	decrement	Internal	✓	
	reset	Internal	✓	
Math	Library			
	max	Internal		
	min	Internal		
	average	Internal		
	ceilDiv	Internal		
	mulDiv	Internal		

	mulDiv	Internal		
	sqrt	Internal		
	sqrt	Internal		
	log2	Internal		
	log2	Internal		
	log10	Internal		
	log10	Internal		
	log256	Internal		
	log256	Internal		
Strings	Library			
	toString	Internal		
	toHexString	Internal		
	toHexString	Internal		
	toHexString	Internal		
ECDSA	Library			
	_throwError	Private		
	tryRecover	Internal		
	recover	Internal		
	tryRecover	Internal		
	recover	Internal		
	tryRecover	Internal		

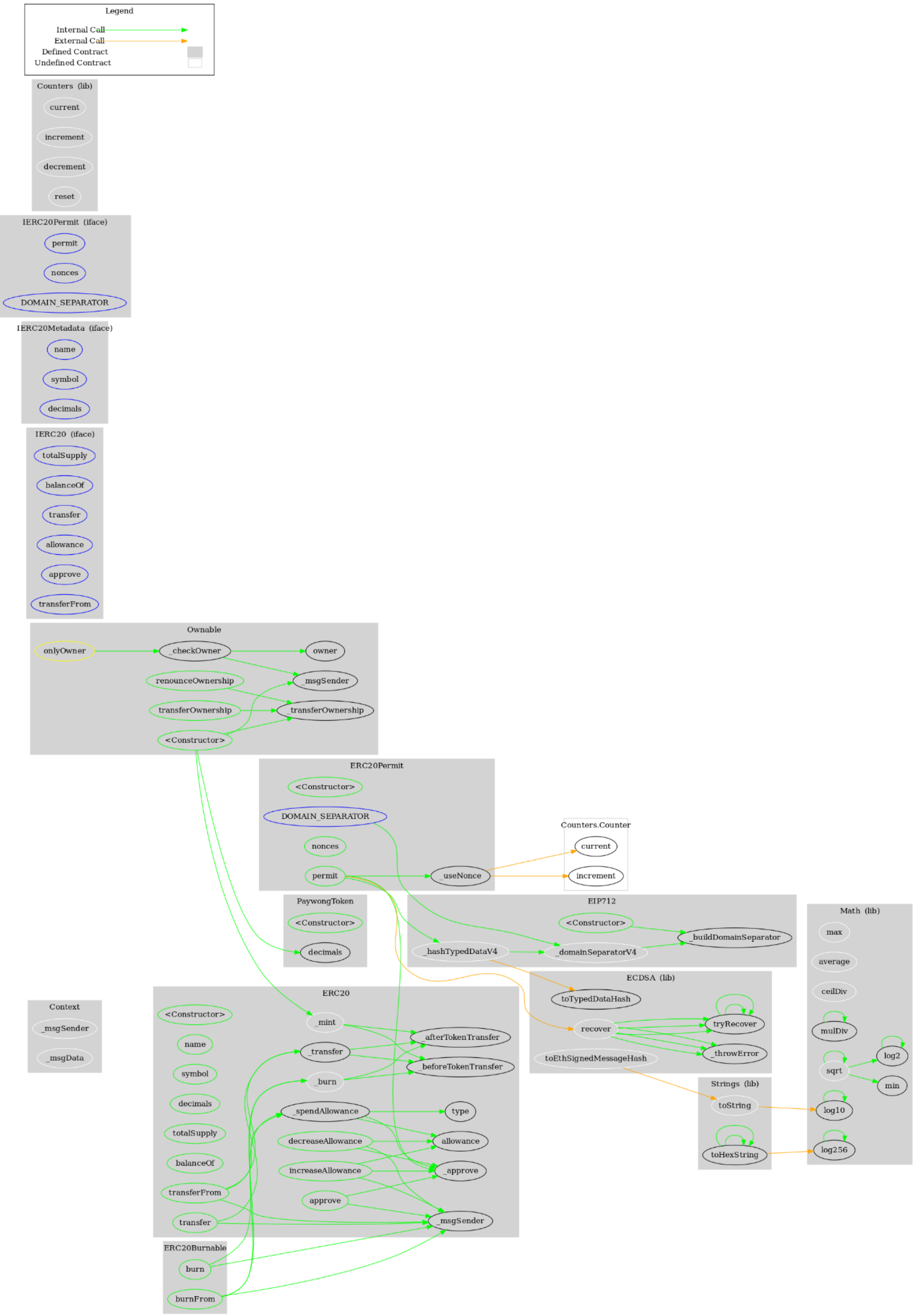
	recover	Internal		
	toEthSignedMessageHash	Internal		
	toEthSignedMessageHash	Internal		
	toTypedDataHash	Internal		
EIP712	Implementation			
		Public	✓	-
	_domainSeparatorV4	Internal		
	_buildDomainSeparator	Private		
	_hashTypedDataV4	Internal		
ERC20Permit	Implementation	ERC20, IERC20Permit, EIP712		
		Public	✓	EIP712
	permit	Public	✓	-
	nonces	Public		-
	DOMAIN_SEPARATOR	External		-
	_useNonce	Internal	✓	
ERC20Burnable	Implementation	Context, ERC20		
	burn	Public	✓	-
	burnFrom	Public	✓	-

PaywongToken	Implementation	ERC20, ERC20Burnable, ERC20Permit, Ownable		
		Public	✓	ERC20 ERC20Permit

Inheritance Graph



Flow Graph


Legend
Internal Call
External Call
Defined Contract
Undefined Contract
Counters (lib)
current
increment
decrement
reset
IERC20Permit (iface)
permit
nonces
DOMAIN_SEPARATOR
IERC20Metadata (iface)
name
symbol
decimals
IERC20 (iface)
totalSupply
balanceOf
transfer
allowance
approve
transferFrom
Ownable
onlyOwner
_checkOwner
owner
renounceOwnership
_msgSender
transferOwnership
_transferOwnership
<Constructor>
ERC20Permit
<Constructor>
DOMAIN_SEPARATOR
nonces
permit
_useNonce
Counters.Counter
current
increment
PaywongToken
<Constructor>
decimals
EIP712
<Constructor>
_buildDomainSeparator
_hashTypedDataV4
_domainSeparatorV4
Math (lib)
max
average
ceilDiv
mulDiv
sqrt
log2
min
log10
log256
ECDSA (lib)
toTypedDataHash
recover
tryRecover
_throwError
toEthSignedMessageHash
Strings (lib)
toString
toHexString
Context
_msgSender
_msgData
ERC20
<Constructor>
_mint
name
_transfer
afterTokenTransfer
_beforeTokenTransfer
symbol
_burn
decimals
_spendAllowance
type
totalSupply
decreaseAllowance
allowance
balanceOf
increaseAllowance
_approve
transferFrom
approve
transfer
_msgSender
ERC20Burnable
burn
burnFrom

Summary

Paywong contract implements a token mechanism. This audit investigates security issues, business logic concerns and potential improvements. Paywong is an interesting project that has a friendly and growing community. The Smart Contract analysis reported no compiler error or critical issues. The contract Owner can access some admin functions that can not be used in a malicious way to disturb the users' transactions.

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The Cyberscope team

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