



Ox

# Smart Contract Audit Report

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# AUDITED DETAILS

## Audited Project

Project name	Token ticker	Blockchain
0x	ZRX.e	Avalanche

## Addresses

Contract address	0x596fa47043f99a4e0f122243b841e55375cde0d2
Contract deployer address	0x50Ff3B278fCC70ec7A9465063d68029AB460eA04

## Project Website

<https://www.0x.org/>

## Codebase

<https://snowtrace.io/address/0x596fa47043f99a4e0f122243b841e55375cde0d2#code>

# SUMMARY

Ox is an essential infrastructure for the emerging crypto economy and enables markets to be created that couldn't have existed. As more assets become tokenized, public blockchains allow establishing of a new financial stack that is more efficient, transparent, and equitable than any previous system.

## Contract Summary

### Documentation Quality

Ox provides a very good documentation with standard of solidity base code.

- The technical description is provided clearly and structured and also don't have any high risk issue.

### Code Quality

The Overall quality of the basecode is standard.

- Standard solidity basecode and rules are already followed by Ox with the discovery of several low issues.

### Test Coverage

Test coverage of the project is 100% ( Through Codebase )

## Audit Findings Summary

- SWC-100 SWC-108 | Explicitly define visibility for all state variables on lines 541.
- SWC-103 | Pragma statements can be allowed to float when a contract is intended on lines 9, 88, 115, 141, 445, 485 and 524.
- SWC-107 | It is recommended to use a reentrancy lock, reentrancy weaknesses detected on lines 376 and 377.
- SWC-115 | tx.origin should not be used for authorization, use msg.sender instead on lines 622, 622, 349, 419, 517, 393 and 420.

## CONCLUSION

We have audited the Ox project released in July 2021 to discover issues and identify potential security vulnerabilities in Ox Project. This process is used to find technical issues and security loopholes which might be found in the smart contract.

The security audit report provides satisfactory results with low-risk issues.

The issues found in the Ox smart contract code do not pose a considerable risk. The writing of the contract is close to the standard of writing contracts in general. The low-risk issues found are some arithmetic operation issues, a floating pragma is set, read of persistent state following the external call, state variable visibility is not set, and Use of "tx.origin" as a part of authorization control. The tx.origin environment variable has been found to influence a control flow decision. Note that using tx.origin as a security control might cause a situation where a user inadvertently authorizes a smart contract to act on their behalf. It is recommended to use msg.sender instead. Also, it is recommended to specify a fixed compiler version to ensure that the bytecode produced does not vary between builds. This is especially important if you rely on bytecode-level verification of the code.

# AUDIT RESULT

Article	Category	Description	Result
Default Visibility	SWC-100 SWC-108	Functions and state variables visibility should be set explicitly. Visibility levels should be specified consciously.	<b>ISSUE FOUND</b>
Integer Overflow and Underflow	SWC-101	If unchecked math is used, all math operations should be safe from overflows and underflows.	<b>PASS</b>
Outdated Compiler Version	SWC-102	It is recommended to use a recent version of the Solidity compiler.	<b>PASS</b>
Floating Pragma	SWC-103	Contracts should be deployed with the same compiler version and flags that they have been tested thoroughly.	<b>ISSUE FOUND</b>
Unchecked Call Return Value	SWC-104	The return value of a message call should be checked.	<b>PASS</b>
Unprotected Ether Withdrawal	SWC-105	Due to missing or insufficient access controls, malicious parties can withdraw from the contract.	<b>PASS</b>
SELFDESTRUCT Instruction	SWC-106	The contract should not be self-destructible while it has funds belonging to users.	<b>PASS</b>
Reentrancy	SWC-107	Check effect interaction pattern should be followed if the code performs recursive call.	<b>ISSUE FOUND</b>
Uninitialized Storage Pointer	SWC-109	Uninitialized local storage variables can point to unexpected storage locations in the contract.	<b>PASS</b>
Assert Violation	SWC-110 SWC-123	Properly functioning code should never reach a failing assert statement.	<b>PASS</b>
Deprecated Solidity Functions	SWC-111	Deprecated built-in functions should never be used.	<b>PASS</b>
Delegate call to Untrusted Callee	SWC-112	Delegatecalls should only be allowed to trusted addresses.	<b>PASS</b>

DoS (Denial of Service)	SWC-113 SWC-128	Execution of the code should never be blocked by a specific contract state unless required.	PASS
Race Conditions	SWC-114	Race Conditions and Transactions Order Dependency should not be possible.	PASS
Authorization through tx.origin	SWC-115	tx.origin should not be used for authorization.	ISSUE FOUND
Block values as a proxy for time	SWC-116	Block numbers should not be used for time calculations.	PASS
Signature Unique ID	SWC-117 SWC-121 SWC-122	Signed messages should always have a unique id. A transaction hash should not be used as a unique id.	PASS
Incorrect Constructor Name	SWC-118	Constructors are special functions that are called only once during the contract creation.	PASS
Shadowing State Variable	SWC-119	State variables should not be shadowed.	PASS
Weak Sources of Randomness	SWC-120	Random values should never be generated from Chain Attributes or be predictable.	PASS
Write to Arbitrary Storage Location	SWC-124	The contract is responsible for ensuring that only authorized user or contract accounts may write to sensitive storage locations.	PASS
Incorrect Inheritance Order	SWC-125	When inheriting multiple contracts, especially if they have identical functions, a developer should carefully specify inheritance in the correct order. The rule of thumb is to inherit contracts from more /general/ to more /specific/.	PASS
Insufficient Gas Griefing	SWC-126	Insufficient gas griefing attacks can be performed on contracts which accept data and use it in a sub-call on another contract.	PASS
Arbitrary Jump Function	SWC-127	As Solidity doesnt support pointer arithmetics, it is impossible to change such variable to an arbitrary value.	PASS

Typographical Error	SWC-129	A typographical error can occur for example when the intent of a defined operation is to sum a number to a variable.	PASS
Override control character	SWC-130	Malicious actors can use the Right-To-Left-Override unicode character to force RTL text rendering and confuse users as to the real intent of a contract.	PASS
Unused variables	SWC-131 SWC-135	Unused variables are allowed in Solidity and they do not pose a direct security issue.	PASS
Unexpected Ether balance	SWC-132	Contracts can behave erroneously when they strictly assume a specific Ether balance.	PASS
Hash Collisions Variable	SWC-133	Using <code>abi.encodePacked()</code> with multiple variable length arguments can, in certain situations, lead to a hash collision.	PASS
Hardcoded gas amount	SWC-134	The <code>transfer()</code> and <code>send()</code> functions forward a fixed amount of 2300 gas.	PASS
Unencrypted Private Data	SWC-136	It is a common misconception that private type variables cannot be read.	PASS



# SMART CONTRACT ANALYSIS

Started	Friday Jul 23 2021 04:36:44 GMT+0000 (Coordinated Universal Time)
Finished	Saturday Jul 24 2021 03:02:39 GMT+0000 (Coordinated Universal Time)
Mode	Standard
Main Source File	BridgeToken.sol

## Detected Issues

ID	Title	Severity	Status
SWC-103	A FLOATING PRAGMA IS SET.	low	acknowledged
SWC-103	A FLOATING PRAGMA IS SET.	low	acknowledged
SWC-103	A FLOATING PRAGMA IS SET.	low	acknowledged
SWC-103	A FLOATING PRAGMA IS SET.	low	acknowledged
SWC-103	A FLOATING PRAGMA IS SET.	low	acknowledged
SWC-103	A FLOATING PRAGMA IS SET.	low	acknowledged
SWC-103	A FLOATING PRAGMA IS SET.	low	acknowledged
SWC-103	A FLOATING PRAGMA IS SET.	low	acknowledged
SWC-107	READ OF PERSISTENT STATE FOLLOWING EXTERNAL CALL.	low	acknowledged
SWC-107	READ OF PERSISTENT STATE FOLLOWING EXTERNAL CALL.	low	acknowledged
SWC-108	STATE VARIABLE VISIBILITY IS NOT SET.	low	acknowledged
SWC-115	USE OF "TX.ORIGIN" AS A PART OF AUTHORIZATION CONTROL.	low	acknowledged
SWC-115	USE OF TX.ORIGIN AS A PART OF AUTHORIZATION CONTROL.	low	acknowledged
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SWC-115	USE OF TX.ORIGIN AS A PART OF AUTHORIZATION CONTROL.	<b>low</b>	acknowledged

## SWC-103 | A FLOATING PRAGMA IS SET.

LINE 9

### low SEVERITY

The current pragma Solidity directive is ""^0.8.0"". It is recommended to specify a fixed compiler version to ensure that the bytecode produced does not vary between builds. This is especially important if you rely on bytecode-level verification of the code.

### Source File

- BridgeToken.sol

### Locations

```
8
9  pragma solidity ^0.8.0;
10
11  /**
12   * @dev Interface of the ERC20 standard as defined in the EIP.
13
```

## SWC-103 | A FLOATING PRAGMA IS SET.

LINE 88

### low SEVERITY

The current pragma Solidity directive is ""^0.8.0"". It is recommended to specify a fixed compiler version to ensure that the bytecode produced does not vary between builds. This is especially important if you rely on bytecode-level verification of the code.

### Source File

- BridgeToken.sol

### Locations

```
87
88  pragma solidity ^0.8.0;
89
90
91  /**
92
```

## SWC-103 | A FLOATING PRAGMA IS SET.

LINE 115

### low SEVERITY

The current pragma Solidity directive is ""^0.8.0"". It is recommended to specify a fixed compiler version to ensure that the bytecode produced does not vary between builds. This is especially important if you rely on bytecode-level verification of the code.

### Source File

- BridgeToken.sol

### Locations

```
114
115  pragma solidity ^0.8.0;
116
117  /*
118   * @dev Provides information about the current execution context, including the
119
```

## SWC-103 | A FLOATING PRAGMA IS SET.

LINE 141

### low SEVERITY

The current pragma Solidity directive is ""^0.8.0"". It is recommended to specify a fixed compiler version to ensure that the bytecode produced does not vary between builds. This is especially important if you rely on bytecode-level verification of the code.

### Source File

- BridgeToken.sol

### Locations

```
140
141  pragma solidity ^0.8.0;
142
143
144
145
```

## SWC-103 | A FLOATING PRAGMA IS SET.

LINE 445

### low SEVERITY

The current pragma Solidity directive is `""^0.8.0""`. It is recommended to specify a fixed compiler version to ensure that the bytecode produced does not vary between builds. This is especially important if you rely on bytecode-level verification of the code.

### Source File

- BridgeToken.sol

### Locations

```
444  
445  pragma solidity ^0.8.0;  
446  
447  
448  
449
```

## SWC-103 | A FLOATING PRAGMA IS SET.

LINE 485

### low SEVERITY

The current pragma Solidity directive is ""^0.8.0"". It is recommended to specify a fixed compiler version to ensure that the bytecode produced does not vary between builds. This is especially important if you rely on bytecode-level verification of the code.

### Source File

- BridgeToken.sol

### Locations

```
484
485  pragma solidity ^0.8.0;
486
487  library Roles {
488    struct Role {
489
```



## SWC-103 | A FLOATING PRAGMA IS SET.

LINE 524

### low SEVERITY

The current pragma Solidity directive is ""^0.8.0"". It is recommended to specify a fixed compiler version to ensure that the bytecode produced does not vary between builds. This is especially important if you rely on bytecode-level verification of the code.

### Source File

- BridgeToken.sol

### Locations

```
523  
524  pragma solidity ^0.8.0;  
525  
526  
527  
528
```

## SWC-107 | READ OF PERSISTENT STATE FOLLOWING EXTERNAL CALL.

LINE 376

### low SEVERITY

The contract account state is accessed after an external call. To prevent reentrancy issues, consider accessing the state only before the call, especially if the callee is untrusted. Alternatively, a reentrancy lock can be used to prevent untrusted callees from re-entering the contract in an intermediate state.

### Source File

- BridgeToken.sol

### Locations

```
375
376  _totalSupply += amount;
377  _balances[account] += amount;
378  emit Transfer(address(0), account, amount);
379  }
380
```

## SWC-107 | READ OF PERSISTENT STATE FOLLOWING EXTERNAL CALL.

LINE 377

### low SEVERITY

The contract account state is accessed after an external call. To prevent reentrancy issues, consider accessing the state only before the call, especially if the callee is untrusted. Alternatively, a reentrancy lock can be used to prevent untrusted callees from re-entering the contract in an intermediate state.

### Source File

- BridgeToken.sol

### Locations

```
376     _totalSupply += amount;
377     _balances[account] += amount;
378     emit Transfer(address(0), account, amount);
379 }
380
381
```

## SWC-108 | STATE VARIABLE VISIBILITY IS NOT SET.

LINE 541

### low SEVERITY

It is best practice to set the visibility of state variables explicitly. The default visibility for "swapTokens" is internal. Other possible visibility settings are public and private.

### Source File

- BridgeToken.sol

### Locations

```
540     }  
541     mapping(address => SwapToken) swapTokens;  
542  
543     mapping(uint256 => bool) public chainIds;  
544  
545
```

# SWC-115 | USE OF "TX.ORIGIN" AS A PART OF AUTHORIZATION CONTROL.

LINE 622

## low SEVERITY

The tx.origin environment variable has been found to influence a control flow decision. Note that using "tx.origin" as a security control might cause a situation where a user inadvertently authorizes a smart contract to perform an action on their behalf. It is recommended to use "msg.sender" instead.

## Source File

- BridgeToken.sol

## Locations

```
621 function unwrap(uint256 amount, uint256 chainId) public {
622     require(tx.origin == msg.sender, "Contract calls not supported.");
623     require(chainIds[chainId] == true, "Chain ID not supported.");
624     _burn(msg.sender, amount);
625     emit Unwrap(amount, chainId);
626 }
```

# SWC-115 | USE OF TX.ORIGIN AS A PART OF AUTHORIZATION CONTROL.

LINE 622

## low SEVERITY

The tx.origin environment variable has been found to influence a control flow decision. Note that using tx.origin as a security control might cause a situation where a user inadvertently authorizes a smart contract to perform an action on their behalf. It is recommended to use msg.sender instead.

## Source File

- BridgeToken.sol

## Locations

```
621 function unwrap(uint256 amount, uint256 chainId) public {
622     require(tx.origin == msg.sender, "Contract calls not supported.");
623     require(chainIds[chainId] == true, "Chain ID not supported.");
624     _burn(msg.sender, amount);
625     emit Unwrap(amount, chainId);
626 }
```

# SWC-115 | USE OF TX.ORIGIN AS A PART OF AUTHORIZATION CONTROL.

LINE 349

## low SEVERITY

The tx.origin environment variable has been found to influence a control flow decision. Note that using tx.origin as a security control might cause a situation where a user inadvertently authorizes a smart contract to perform an action on their behalf. It is recommended to use msg.sender instead.

## Source File

- BridgeToken.sol

## Locations

```
348 function _transfer(address sender, address recipient, uint256 amount) internal
virtual {
349     require(sender != address(0), "ERC20: transfer from the zero address");
350     require(recipient != address(0), "ERC20: transfer to the zero address");
351
352     _beforeTokenTransfer(sender, recipient, amount);
353 }
```

# SWC-115 | USE OF TX.ORIGIN AS A PART OF AUTHORIZATION CONTROL.

LINE 419

## low SEVERITY

The tx.origin environment variable has been found to influence a control flow decision. Note that using tx.origin as a security control might cause a situation where a user inadvertently authorizes a smart contract to perform an action on their behalf. It is recommended to use msg.sender instead.

## Source File

- BridgeToken.sol

## Locations

```
418 function _approve(address owner, address spender, uint256 amount) internal virtual
419 {
420     require(owner != address(0), "ERC20: approve from the zero address");
421     require(spender != address(0), "ERC20: approve to the zero address");
422     _allowances[owner][spender] = amount;
423 }
```



# SWC-115 | USE OF TX.ORIGIN AS A PART OF AUTHORIZATION CONTROL.

LINE 517

## low SEVERITY

The tx.origin environment variable has been found to influence a control flow decision. Note that using tx.origin as a security control might cause a situation where a user inadvertently authorizes a smart contract to perform an action on their behalf. It is recommended to use msg.sender instead.

## Source File

- BridgeToken.sol

## Locations

```
516  {  
517  require(account != address(0), "Roles: account is the zero address");  
518  return role.bearer[account];  
519  }  
520  }  
521
```

# SWC-115 | USE OF TX.ORIGIN AS A PART OF AUTHORIZATION CONTROL.

LINE 393

## low SEVERITY

The tx.origin environment variable has been found to influence a control flow decision. Note that using tx.origin as a security control might cause a situation where a user inadvertently authorizes a smart contract to perform an action on their behalf. It is recommended to use msg.sender instead.

## Source File

- BridgeToken.sol

## Locations

```
392 function _burn(address account, uint256 amount) internal virtual {
393     require(account != address(0), "ERC20: burn from the zero address");
394
395     _beforeTokenTransfer(account, address(0), amount);
396
397 }
```

# SWC-115 | USE OF TX.ORIGIN AS A PART OF AUTHORIZATION CONTROL.

LINE 420

## low SEVERITY

The tx.origin environment variable has been found to influence a control flow decision. Note that using tx.origin as a security control might cause a situation where a user inadvertently authorizes a smart contract to perform an action on their behalf. It is recommended to use msg.sender instead.

## Source File

- BridgeToken.sol

## Locations

```
419 require(owner != address(0), "ERC20: approve from the zero address");
420 require(spender != address(0), "ERC20: approve to the zero address");
421
422 _allowances[owner][spender] = amount;
423 emit Approval(owner, spender, amount);
424
```

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This is a limited report on our findings based on our analysis, in accordance with good industry practice as of 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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