

Smart contracts security assessment

Final report

Tariff: Standard

Anyrand

October 2024





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Introduction

Anyrand is a random number coordinator contract similar to Chainlink VRF (Verifiable Random Function). It allows to request and fulfill requests of verifiable random numbers derived from off-chain entropy provided by <u>drand</u>. Execution of request fulfillment is sponsored by the request creator, execution is also permissionless, but the sponsored amount remains for the contract owner. Sponsoring amount is calculated by using a gas station contract, that is individual and specific for each chain.

Anyrand is an upgradable contract with a single owner. We recommend the owner to secure his account, and users should check the current implementation before interacting with the contract.

The code is available at the GitHub repository <u>frogworksio/anyrand</u> and was audited after the commit a48f47c84c945d0729515324d51780ab3a9c6c56.

The audit scope excludes external libraries, including the @kevincharm/bls-bn254 cryptographic library.

Report update. The contract's code was updated according to this report and rechecked after the commit <u>60b8143b568e16d11417c3b47137d4dee30d8550</u>. The Anyrand contract was deployed to the Scroll network at address <u>0x7ED45287f817842d72753FE02617629c4c7c2FBE</u>.

Name	Anyrand	
Audit date	2024-10-10 - 2024-10-12	
Language	Solidity	
Platform	Scroll zkEVM	

Contracts checked

Name	Address
Anyrand.sol	0x7ED45287f817842d72753FE02617629c4c7c2FBE

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AnyrandStorage.sol

Gas.sol

GasStationEthereum.sol

GasStationOptimism.sol

GasStationScroll.sol

DrandBeacon.sol

Procedure

We perform our audit according to the following procedure:

Automated analysis

- Scanning the project's smart contracts with several publicly available automated Solidity analysis tools
- Manual verification (reject or confirm) all the issues found by the tools

Manual audit

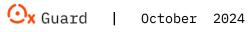
- Manually analyze smart contracts for security vulnerabilities
- Smart contracts' logic check

Known vulnerabilities checked

Title	Check result
Unencrypted Private Data On-Chain	passed
Code With No Effects	passed
Message call with hardcoded gas amount	passed
Typographical Error	passed
DoS With Block Gas Limit	passed

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Presence of unused variables	passed
Incorrect Inheritance Order	passed
Requirement Violation	passed
Weak Sources of Randomness from Chain Attributes	passed
Shadowing State Variables	passed
Incorrect Constructor Name	passed
Block values as a proxy for time	passed
Authorization through tx.origin	passed
DoS with Failed Call	passed
Delegatecall to Untrusted Callee	passed
Use of Deprecated Solidity Functions	passed
Assert Violation	passed
State Variable Default Visibility	passed
Reentrancy	passed
<u>Unprotected SELFDESTRUCT Instruction</u>	passed
<u>Unprotected Ether Withdrawal</u>	passed
<u>Unchecked Call Return Value</u>	passed
Floating Pragma	passed
Outdated Compiler Version	passed
Integer Overflow and Underflow	passed
Function Default Visibility	passed



Classification of issue severity

High severity High severity issues can cause a significant or full loss of funds, change

of contract ownership, major interference with contract logic. Such issues

require immediate attention.

Medium severity Medium severity issues do not pose an immediate risk, but can be

detrimental to the client's reputation if exploited. Medium severity issues may lead to a contract failure and can be fixed by modifying the contract

state or redeployment. Such issues require attention.

Low severity Low severity issues do not cause significant destruction to the contract's

functionality. Such issues are recommended to be taken into

consideration.

Issues

High severity issues

1. Incorrect deadline to round calculations (Anyrand.sol)

Status: Fixed

The function requestRandomness transforms the deadline input parameter into the beacon's round parameter. The rounding up uses delta % period, that leads to non-continuous result and undocumented features, as round (deadline1) = round (deadline1 + period - 1).

```
function requestRandomness(
    uint256 deadline,
    uint256 callbackGasLimit
) external payable override nonReentrant returns (uint256) {
        . . .
        uint256 genesis = drandBeacon.genesisTimestamp();
        uint256 period = drandBeacon.period();
        uint256 delta = deadline - genesis;
        round = uint64((delta / period) + (delta % period));
        . . . .
}
```

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Recommendation: Add round = ((delta % period) > 0) ? (round + 1) : (round); line or document the feature.

2. Owner privileges (Anyrand.sol)

Status: Partially fixed

The contract owner can fulfill any request by changing request's beacon address. He can also set a malicious beacon address to prevent requests with that beacon public key from fulfillment (including permissionless fulfillment).

```
/// @notice Add a new beacon and set the current beacon to it (privileged)
/// @notice This is intended to be used only in the case that the evmnet
        beacon is deprecated in favour of the BLS12-381 beacon.
/// @notice NB: This can replace/fix a beacon that is known to this
111
        contract by its public key hash.
/// @param newBeacon The new beacon
function setBeacon(address newBeacon) external onlyOwner {
   setBeacon(newBeacon);
}
/// @notice Add a new beacon and set the current beacon to it
/// @param newBeacon The new beacon
function _setBeacon(address newBeacon) internal {
    // Sanity check
   try IDrandBeacon(newBeacon).publicKeyHash() returns (
        bytes32 pubKeyHash
    ) {
        if (pubKeyHash == bytes32(0) || pubKeyHash == keccak256(hex"")) {
            revert InvalidBeacon(newBeacon);
        }
        // Looks good - add the beacon and update it
        MainStorage storage $ = _getMainStorage();
        $.beacons[pubKeyHash] = newBeacon;
        $.currentBeaconPubKeyHash = pubKeyHash;
        emit BeaconUpdated(newBeacon);
    } catch {
        revert InvalidBeacon(newBeacon);
    }
```

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Recommendation: Secure the owner's account.

Anyrand comment: Following production deployment, the owner will immediately be transferred to a 3/4 multisig, initially only the Anyrand team, with the aim of increasing the threshold and finding more reputable signers from the community.

Medium severity issues

No issues were found

Low severity issues

1. getRequestPrice function may return incorrect data in explorers (Anyrand.sol) Status: Fixed

Return values of the function <code>getRequestPrice</code> are calculated via external call to an IGasStation implementation, but all existed implementations (GasStationEthereum, GasStationOptimism, GasStationScroll) rely on <code>tx.gasprice</code> value, which can equal to zero when viewed via the network explorer.

Recommendation: Cover this case in the documentation and in the NatSpec descriptions.

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Conclusion

Anyrand Anyrand.sol, AnyrandStorage.sol, Gas.sol, GasStationEthereum.sol, GasStationOptimism.sol, GasStationScroll.sol, DrandBeacon.sol contracts were audited. 2 high, 1 low severity issues were found.

1 high, 1 low severity issues have been fixed in the update.

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