



# Push Protocol Smart Contract Audit Report

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# AUDITED DETAILS

## Audited Project

| Project name  | Token ticker | Blockchain |
|---------------|--------------|------------|
| Push Protocol | PUSH         | Ethereum   |

## Addresses

|                           |  |
|---------------------------|--|
| Contract address          | 0xf418588522d5dd018b425E472991E52EBBeEEEE  |
| Contract deployer address | 0x057fcD7BD66e0b0e7CBF387D12b2A49A20d30922 |

## Project Website

<https://push.org/>

## Codebase

<https://etherscan.io/address/0xf418588522d5dd018b425E472991E52EBBeEEEE#code>

# SUMMARY

Push is a decentralized and blockchain-agnostic communication protocol for the entire web3 world that aims to provide the users to receive notifications for on-chain or off-chain activity. Push allows Web3 actors (users, dapps, service providers) to create notifications that are can be based on any off-chain or on-chain logic that can be triggered via smart contract, backend or dApps. These come from an open communication network (push nodes) and are tied to wallet addresses allowing any crypto wallet, frontend, or infra service to display it to Web3 users.

## Contract Summary

### **Documentation Quality**

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

- The technical description is provided clearly and structured and also dont have any high risk issue.

### **Code Quality**

The Overall quality of the basecode is standard.

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

### **Test Coverage**

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

## Audit Findings Summary

- SWC-120 | It is recommended to use external sources of randomness via oracles on lines 88, 89, 226, 228, 292 and 391.

## CONCLUSION

We have audited the Push Protocol project released on April 2021 to discover issues and identify potential security vulnerabilities in Push Protocol 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 a satisfactory result with some low-risk issues.

The issues found in the Push Protocol 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 weak sources of randomness. It is recommended to use external sources of randomness via oracles.

# AUDIT RESULT

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

|                                     |                               |   |             |
|-------------------------------------|-------------------------------|---|-------------|
| DoS (Denial of Service)             | SWC-113<br>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.   | PASS        |
| Block values as a proxy for time    | SWC-116                       | Block numbers should not be used for time calculations.   | PASS        |
| Signature Unique ID                 | SWC-117<br>SWC-121<br>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.  | ISSUE FOUND |
| 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<br>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 |





## SWC-120 | POTENTIAL USE OF "BLOCK.NUMBER" AS SOURCE OF RANDOMNESS.

LINE 88

### low SEVERITY

The environment variable "block.number" looks like it might be used as a source of randomness. Note that the values of variables like coinbase, gaslimit, block number and timestamp are predictable and can be manipulated by a malicious miner. Also keep in mind that attackers know hashes of earlier blocks. Don't use any of those environment variables as sources of randomness and be aware that use of these variables introduces a certain level of trust into miners.

### Source File

- EPNS.sol

### Locations

```
87 // holder weight initial adjustments
88 holderWeight[account] = block.number;
89 born = block.number;
90 }
91
92
```

## SWC-120 | POTENTIAL USE OF "BLOCK.NUMBER" AS SOURCE OF RANDOMNESS.

LINE 89

### low SEVERITY

The environment variable "block.number" looks like it might be used as a source of randomness. Note that the values of variables like coinbase, gaslimit, block number and timestamp are predictable and can be manipulated by a malicious miner. Also keep in mind that attackers know hashes of earlier blocks. Don't use any of those environment variables as sources of randomness and be aware that use of these variables introduces a certain level of trust into miners.

### Source File

- EPNS.sol

### Locations

```
88  holderWeight[account] = block.number;  
89  born = block.number;  
90  }  
91  
92  /**  
93
```

## SWC-120 | POTENTIAL USE OF "BLOCK.NUMBER" AS SOURCE OF RANDOMNESS.

LINE 226

### low SEVERITY

The environment variable "block.number" looks like it might be used as a source of randomness. Note that the values of variables like coinbase, gaslimit, block number and timestamp are predictable and can be manipulated by a malicious miner. Also keep in mind that attackers know hashes of earlier blocks. Don't use any of those environment variables as sources of randomness and be aware that use of these variables introduces a certain level of trust into miners.

### Source File

- EPNS.sol

### Locations

```
225   require(holderDelegation[holder][msg.sender] == true || holder == msg.sender,  
"Push::resetHolderWeight: unauthorized");  
226   holderWeight[holder] = block.number;  
227  
228   emit HolderWeightChanged(holder, balances[holder], block.number);  
229   }  
230
```

## SWC-120 | POTENTIAL USE OF "BLOCK.NUMBER" AS SOURCE OF RANDOMNESS.

LINE 228

### low SEVERITY

The environment variable "block.number" looks like it might be used as a source of randomness. Note that the values of variables like coinbase, gaslimit, block number and timestamp are predictable and can be manipulated by a malicious miner. Also keep in mind that attackers know hashes of earlier blocks. Don't use any of those environment variables as sources of randomness and be aware that use of these variables introduces a certain level of trust into miners.

### Source File

- EPNS.sol

### Locations

```
227
228   emit HolderWeightChanged(holder, balances[holder], block.number);
229   }
230
231   /**
232
```

## SWC-120 | POTENTIAL USE OF "BLOCK.NUMBER" AS SOURCE OF RANDOMNESS.

LINE 292

### low SEVERITY

The environment variable "block.number" looks like it might be used as a source of randomness. Note that the values of variables like coinbase, gaslimit, block number and timestamp are predictable and can be manipulated by a malicious miner. Also keep in mind that attackers know hashes of earlier blocks. Don't use any of those environment variables as sources of randomness and be aware that use of these variables introduces a certain level of trust into miners.

### Source File

- EPNS.sol

### Locations

```
291 function getPriorVotes(address account, uint blockNumber) public view returns
(uint96) {
292     require(blockNumber < block.number, "Push::getPriorVotes: not yet determined");
293
294     uint32 nCheckpoints = numCheckpoints[account];
295     if (nCheckpoints == 0) {
296
```

# SWC-120 | POTENTIAL USE OF "BLOCK.NUMBER" AS SOURCE OF RANDOMNESS.

LINE 391

## low SEVERITY

The environment variable "block.number" looks like it might be used as a source of randomness. Note that the values of variables like coinbase, gaslimit, block number and timestamp are predictable and can be manipulated by a malicious miner. Also keep in mind that attackers know hashes of earlier blocks. Don't use any of those environment variables as sources of randomness and be aware that use of these variables introduces a certain level of trust into miners.

## Source File

- EPNS.sol

## Locations

```
390 function _writeCheckpoint(address delegatee, uint32 nCheckpoints, uint96 oldVotes,
uint96 newVotes) internal {
391     uint32 blockNumber = safe32(block.number, "Push::_writeCheckpoint: block number
exceeds 32 bits");
392
393     if (nCheckpoints > 0 && checkpoints[delegatee][nCheckpoints - 1].fromBlock ==
blockNumber) {
394         checkpoints[delegatee][nCheckpoints - 1].votes = newVotes;
395
```

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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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