

The logo for DeHacker, featuring the word "DeHacker" in a stylized, bold, green font. The "D" is a square with a diagonal line, and the "e" is a circle with a diagonal line. The background of the slide is black with several concentric green circles and green bokeh light effects in the corners.

**DeHacker**

Code Security Assessment

# Map Protocol Swap

November 15th, 2024



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## Summary

DeHacker's objective was to evaluate the repository for security-related issues, code quality, and adherence to specification and best practices. Possible issues we looked for included (but are not limited to):

- Transaction-ordering dependence
- Timestamp dependence
- Mishandled exceptions and call stack limits
- Unsafe external calls
- Integer overflow/underflow
- Number rounding errors
- Reentrancy and cross-function vulnerabilities
- Denial of service/logical oversights
- Access control
- Centralization of power
- Business logic contradicting the specification
- Code clones, functionality duplication
- Gas usage
- Arbitrary token minting



## Issue Categories

Every issue in this report was assigned a severity level from the following:

### **Critical severity issues**

A vulnerability that can disrupt the contract functioning in a number of scenarios or creates a risk that the contract may be broken.

### **Major severity issues**

A vulnerability that affects the desired outcome when using a contract or provides the opportunity to use a contract in an unintended way.

### **Medium severity issues**

A vulnerability that could affect the desired outcome of executing the contract in a specific scenario.

### **Minor severity issues**

A vulnerability that does not have a significant impact on possible scenarios for the use of the contract and is probably subjective.

### **Informational**

A vulnerability that has informational character but is not affecting any of the code.



# Overview

## Project Summary

<b>Project Name</b>	Map Protocol Swap
<b>Platform</b>	Mapo
<b>Website</b>	<a href="https://www.mapprotocol.io/">https://www.mapprotocol.io/</a>
<b>Type</b>	Bridge
<b>Language</b>	Func, Rust, Solidity
<b>Codebase</b>	<a href="https://github.com/mapprotocol/ton-router-contracts">https://github.com/mapprotocol/ton-router-contracts</a> <a href="https://github.com/mapprotocol/router-contracts">https://github.com/mapprotocol/router-contracts</a> <a href="https://github.com/mapprotocol/solana-router-contracts">https://github.com/mapprotocol/solana-router-contracts</a>

## Vulnerability Summary

Vulnerability Level	Total	Mitigated	Declined	Acknowledged	Partially Resolved	Resolved
Critical	0	0	0	0	0	0
Major	1	0	0	0	0	1
Medium	0	0	0	0	0	0
Minor	0	0	0	0	0	0
Informational	5	0	0	0	0	5
Discussion	0	0	0	0	0	0



## Audit scope

---

ID	File	SHA256 Checksum
DKE	ton-router-contracts/ton_router_v2.fc	69d5234fe5a8c2917dbebdb1f06781fe374860182a11862426fd5ad8bd6dec6d
OFD	router-contracts/RouterPlusV2.sol	28bb6b7f3fd7e0a8bfa030eb216b57b33ee94e0954c3e8a08386d58ed8312c17
WEF	solana-router-contracts/router.rs	6b08a20072cbf93a9853bb27b65cd3516496431441a86800d831e1182e20658b



## Findings

ID	Title	Severity	Status
GLOBAL-01	Centralization Related Risks	Major	Resolved
DKE-1	Optional Gas Optimization	Informational	Resolved
OFD-1	High Complexity	Informational	Resolved
OFD-2	Uninitialized Local Variables	Informational	Resolved
WEF-1	Optional Compute Usage Optimization	Informational	Resolved
WEF-2	Unused Variable	Informational	Resolved



# MAJOR

## GLOBAL-01 | Centralization Related Risks

Issue	Severity	Location	Status
Centralization Related Risks	Major		Resolved

### Description

The owner of the ton-router-contracts/ton\_router\_V2 contract has the following permissions:

- update\_address
- update\_owner

The owner will have the ability to influence the operation results of the protocol.

The owner has the authority to set the withdrawer, who has the authority to withdraw funds from the contract.

The owner of the router-contracts/RouterPlusV2 contract has the following permissions:

- function setAuthorization()
- function setGasForReFund()
- function setBridgeAddress()
- function setWToken()
- function editFuncBlackList()
- function setFee()
- function rescueFunds()

The owner will have the ability to influence the operation results of the protocol.

The owner of the solana-router/contracts/ton\_router\_V2 contract has the following permissions:

- update\_config
- transfer\_admin
- withdraw(Through a router account that has been set up by an administrator.)

The owner will have the ability to influence the operation results of the protocol.

The owner has the authority to set the withdrawer, who has the authority to withdraw funds from the contract.





## Recommendation

---

This finding describes the level of decentralization of the project, and it is recommended to strengthen security and improve the degree of decentralization from the following aspects:

- It is recommended that privileged addresses use multi-signature wallet addresses.
- For modification operations that affect protocol operation stability and key business parameters, it is recommended to implement time locks.

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- For modification operations that affect protocol operation stability and key business parameters, it is recommended to implement time locks.
-



# INFORMATIONAL

## DKE-1 | Optional Gas Optimization

Issue	Severity	Location	Status
Optional Gas Optimization	Informational	ton-router-contracts/ton_router_v2.fc	Resolved

### Description

Line 41, 43

```

```
() recv_internal(int my_balance, int msg_value, cell in_msg_full, slice  
in_msg_body) impure {  
    if (in_msg_body.slice_empty?()) { ;; ignore all empty messages  
        return ();  
    }
```

```
    slice cs = in_msg_full.begin_parse();  
    int flags = cs~load_uint(4);  
    if (flags & 1) { ;; ignore all bounced messages  
        return ();  
    }
```

```
    slice sender_address = cs~load_msg_addr();  
    int op = in_msg_body~load_uint(32); ;; by convention, the first 32 bits of  
incoming message is the op  
    int query_id = in_msg_body~load_uint(64); ;; also by convention, the next 64  
bits contain the "query id", although this is not always the case
```

```
    (int order_id, int swap_id, slice owner, slice withdrawer, slice bridger, slice  
bridge_token_address) = load_data();
```



## Description

---

```
if (op == op::swap_from_ton) {
    handle_swap_from_ton(msg_value, in_msg_body);
} elseif (op == op::withdrawer::withdraw_ton) {
    handle_withdraw_ton(withdrawer, sender_address);
} elseif (op == op::withdrawer::withdraw_jetton) {
    handle_withdraw_jetton(withdrawer, sender_address, query_id, in_msg_body);
} elseif (op == op::bridger::bridge_in) {
    handle_bridge_in(sender_address, bridger, in_msg_body);
} elseif (op == op::admin::update_address) {
    handle_update_address(sender_address, in_msg_body);
} elseif (op == op::admin::update_owner) {
    handle_update_owner(sender_address, in_msg_body);
} elseif (op == op::transfer_notification) {
    handle_transfer_notification(sender_address, in_msg_body);
} elseif (op == op::dedust::payout) {
    handle_dedust_payout(sender_address, in_msg_body, msg_value);
} else {
    throw(0xffff); ;; if the message contains an op that is not known to this contract,
    we throw
}
}
...
```

When executing `handle_update_address` and `handle_update_owner`, internally using `load_data` to fetch and parse the stored data again increases some additional gas consumption.

## Recommendation

---

This is an optional suggestion, as limited by the mechanisms of Ton and Func, although it is possible to directly pass in already parsed data from the outside, doing so would reduce the maintainability of the code. It is not recommended to do this in the early stages of contract development. If the contract has been finalized and there is a clear need to optimize the execution efficiency and cost at this point, consideration can be given to optimizing this option.



# INFORMATIONAL

## OFD-01 | High Complexity

| Issue           | Severity      | Location                          | Status   |
|-----------------|---------------|-----------------------------------|----------|
| High Complexity | Informational | router-contracts/RouterPlusV2.sol | Resolved |

### Description

```
Line 221
```solidity
function onReceived(
    bytes32 _orderId,
    address _srcToken,
    uint256 _amount,
    uint256 _fromChain,
    bytes calldata _from,
    bytes calldata _swapAndCall
) external override nonReentrant {
    ...
}
```

The `onReceived` method has a high complexity.

### Recommendation

Minimize conditional branches and complex logic in functions, break down large functions, and follow the Single Responsibility Principle.



# Informational

## OFD-2 | Uninitialized Local Variables

Issue	Severity	Location	Status
Uninitialized Local Variables	Informational	router-contracts/RouterPlusV2.sol	Resolved

### Description

```
Line 100
```solidity
function swapAndBridge(
    address _srcToken,
    uint256 _amount,
    bytes calldata _swapData,
    bytes calldata _bridgeData,
    bytes calldata _permitData
) external payable nonReentrant transferIn(_srcToken, _amount, _permitData) {
    require(_swapData.length + _bridgeData.length > 0,
ErrorMessage.DATA_EMPTY);
    SwapTemp memory swapTemp;
    ...
}
```

```
Line 162
```
function swapAndCall(
    bytes32 _transferId,
    address _initiator, // initiator address
    address _srcToken,
    uint256 _amount,
```



## Description

---

```
bytes calldata _swapData,
bytes calldata _callbackData,
bytes calldata _permitData,
bool _feeBeforeSwap
) external payable override nonReentrant {
    SwapTemp memory swapTemp;
    swapTemp.initiator = _initiator;
    swapTemp.srcToken = _srcToken;
    swapTemp.srcAmount = _amount;
    swapTemp.transferId = _transferId;
    (swapTemp.nativeBalance, swapTemp.inputBalance) = _transferIn(
        swapTemp.srcToken,
        swapTemp.srcAmount,
        _permitData
    );
    if ((_swapData.length + _callbackData.length) == 0) revert Errors.DATA_EMPTY();

    (
        swapTemp.receiver,
        swapTemp.target,
        swapTemp.swapToken,
        swapTemp.swapAmount,
        swapTemp.callAmount
    ) = _doSwapAndCall(
        swapTemp.transferId,
        swapTemp.srcToken,
        swapTemp.srcAmount,
        swapTemp.inputBalance,
        _swapData,
        _callbackData,
        _feeBeforeSwap
    );

    if (swapTemp.swapAmount > swapTemp.callAmount) {
        _transfer(swapTemp.swapToken, swapTemp.receiver,
            (swapTemp.swapAmount - swapTemp.callAmount));
    }
}
```



```
emit SwapAndCall(  
    TW_REFERRER,  
    swapTemp.initiator,  
    msg.sender,  
    swapTemp.transferId,  
    swapTemp.srcToken,  
    swapTemp.swapToken,  
    swapTemp.srcAmount,  
    swapTemp.swapAmount,  
    swapTemp.receiver,  
    swapTemp.target,  
    swapTemp.callAmount  
);  
_afterCheck(swapTemp.nativeBalance);  
}  
...
```

Uninitialized local variables.

## Recommendation

---

Initialize all the variables.



# Informational

## WEF-1 | Uninitialized Local Variables

| Issue                               | Severity      | Location  | Status   |
|-------------------------------------|---------------|---|----------|
| Optional Compute Usage Optimization | Informational | solana-router/contracts/constants.rs, init_config.rs, update_config.rs #1 | Resolved |

### Description

```
Line 7 (constants.rs)
```rust
#[constant]
pub const ROUTERS_MAX_LEN: u64 = 5;
```

Line 33 (init_config.rs)
```rust
impl InitConfig<'_> {
    pub fn apply(ctx: &mut Context<InitConfig>, params: &InitConfigParams) ->
Result<()> {
    let config = &mut ctx.accounts.config;
    config.admin = params.admin;

    require_gte!(
        ROUTERS_MAX_LEN,
        params.routers.len() as u8,
        ChainPoolError::TooManyRouters
    );
    config.routers = params.routers.clone();
    config.bump = ctx.bumps.config;
    config.auth_bump = ctx.bumps.authority;
    Ok(())
}
}
```
```





Line 20 (update\_config.rs)

```
```rust
impl UpdateConfig<'_> {
    pub fn apply(ctx: &mut Context<UpdateConfig>, params:
&UpdateConfigParams) -> Result<()> {
        let config = &mut ctx.accounts.config;

        require_gte!(
            ROUTERS_MAX_LEN,
            params.routers.len() as u8,
            ChainPoolError::TooManyRouters
        );
        config.routers = params.routers.clone();
        emit!(RouterChanged {
            new_routers: params.routers.clone(),
        });
        Ok(())
    }
}
```
```

From a business scenario perspective, `ROUTERS\_MAX\_LEN` is unlikely to be a large value, so a smaller data type can be used to optimize compute usage.

## Recommendation

---

Use a smaller data type, such as u8.



# Informational

## WEF-2 | Unused Variable

| Issue           | Severity      | Location  | Status   |
|-----------------|---------------|---|----------|
| Unused Variable | Informational | solana-router/contracts/cross_in.rs, cross_finish.rs #1 | Resolved |

## Description

Line 5 (cross\_in.rs)

```
```rust
use crate::constants::{CHAINPOOL_CONFIG_SEED, CHAIN_ID, NATIVE_MINT,
ORDER_SEED};
```
```

Line 32 (cross\_finish.rs)

```
```rust
impl<'info> CrossFinish<'info> {
    pub fn apply(ctx: &mut Context<CrossFinish>, params: &OrderParams) ->
Result<()> {
    ...
    }
}
```
```

The NATIVE\_MINT imported in cross\_in.rs is not used.

The params parameter declared in the apply method is not used.

## Recommendation

Remove unused imports. Remove or rename unused parameter declarations.



## Disclaimer

This report is based on the scope of materials and documentation provided for a limited review at the time provided. Results may not be complete nor inclusive of all vulnerabilities. The review and this report are provided on an as-is, where-is, and as-available basis. You agree that your access and/or use, including but not limited to any associated services, products, protocols, platforms, content, and materials, will be at your sole risk. Blockchain technology remains under development and is subject to unknown risks and flaws. The review does not extend to the compiler layer, or any other areas beyond the programming language, or other programming aspects that could present security risks. A report does not indicate the endorsement of any particular project or team, nor guarantee its security. No third party should rely on the reports in any way, including for the purpose of making any decisions to buy or sell a product, service or any other asset. To the fullest extent permitted by law, we disclaim all warranties, expressed or implied, in connection with this report, its content, and the related services and products and your use thereof, including, without limitation, the implied warranties of merchantability, fitness for a particular purpose, and non-infringement. We do not warrant, endorse, guarantee, or assume responsibility for any product or service advertised or offered by a third party through the product, any open source or third-party software, code, libraries, materials, or information linked to, called by, referenced by or accessible through the report, its content, and the related services and products, any hyperlinked websites, any websites or mobile applications appearing on any advertising, and we will not be a party to or in any way be responsible for monitoring any transaction between you and any third-party providers of products or services. As with the purchase or use of a product or service through any medium or in any environment, you should use your best judgment and exercise caution where appropriate.

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# Appendix

## Finding Categories

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### **Centralization / Privilege**

Centralization / Privilege findings refer to either feature logic or implementation of components that act against the nature of decentralization, such as explicit ownership or specialized access roles in combination with a mechanism to relocate funds.

### **Coding Style**

Coding Style findings usually do not affect the generated bytecode but rather comment on how to make the codebase more legible and, as a result, easily maintainable.

### **Volatile Code**

Volatile Code findings refer to segments of code that behave unexpectedly on certain edge cases that may result in a vulnerability.

### **Logical Issue**

Logical Issue findings detail a fault in the logic of the linked code, such as an incorrect notion on how block. timestamp works.

## Checksum Calculation Method

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The "Checksum" field in the "Audit Scope" section is calculated as the SHA-256 (Secure Hash Algorithm 2 with digest size of 256 bits) digest of the content of each file hosted in the listed source repository under the specified commit.

The result is hexadecimal encoded and is the same as the output of the Linux "sha256sum" command against the target file.



## About

DeHacker is a team of auditors and white hat hackers who perform security audits and assessments. With decades of experience in security and distributed systems, our experts focus on the ins and outs of system security. Our services follow clear and prudent industry standards. Whether it's reviewing the smallest modifications or a new platform, we'll provide an in-depth security survey at every stage of your company's project. We provide comprehensive vulnerability reports and identify structural inefficiencies in smart contract code, combining high-end security research with a real-world attacker mindset to reduce risk and harden code.

### BLOCKCHAINS



Ethereum



Cosmos



Eos



Substrate

### TECH STACK



Python



Solidity



Rust



C++

### CONTACTS

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The image features a dark background with a series of concentric circles in a light green color, centered around the text. The text "DeHacker" is written in a bold, sans-serif font, with the "De" in green and "Hacker" in yellow. The circles are thin and evenly spaced, creating a ripple effect around the central text. There are also some faint green and yellow light spots in the corners of the image.

**DeHacker**

November 15th 2024