SMART CONTRACT AUDIT REPORT

for

Metal-L2

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1 | Introduction

Given the opportunity to review the design document and related source code of the `Metal-L2` token contract, we outline in the report our systematic method to evaluate potential security issues in the smart contract implementation, expose possible semantic inconsistency between smart contract code and the documentation, and provide additional suggestions or recommendations for improvement. Our results show that the given version of the smart contract can be further improved due to the presence of certain issues related to `ERC20`-compliance, security, or performance. This document outlines our audit results.

1.1 About Metal-L2

`Metal-L2 (MTL2)` is a layer two protocol for `Ethereum`, forked from the original `Optimism` rollup network and governed by the `MTL` token. The vision for `Metal DAO` is to evolve to not only host the popular `XMD Metal Dollar` stablecoin, but to help scale `Ethereum` by joining the `Optimism Superchain` along with `Base`. `MTL2` presents unique opportunities for scaling `Ethereum` and shared security through its unique fiat ramp `Metal Pay`, `WebAuth` wallet, and `Metal X` exchange. The basic information of the audited contracts is as follows:

Table 1.1: Basic Information of Metal-L2

Item	Description
Name	Metallicus
Type	ERC20 Token Contract
Platform	Solidity
Audit Method	Whitebox
Latest Audit Report	October 29, 2023

In the following, we show the Git repository of reviewed files and the commit hash value used in this audit.

- https://github.com/metallicusdev/metal-l2-contract.git (2e2e9c5)

1.2   About PeckShield

PeckShield Inc. [6] is a leading blockchain security company with the goal of elevating the security, privacy, and usability of current blockchain ecosystem by offering top-notch, industry-leading services and products (including the service of smart contract auditing). We are reachable at Telegram (https://t.me/peckshield), Twitter (http://twitter.com/peckshield), or Email (contact@peckshield.com).

1.3   Methodology

To standardize the evaluation, we define the following terminology based on OWASP Risk Rating Methodology [5]:

- Likelihood represents how likely a particular vulnerability is to be uncovered and exploited in the wild;

- Impact measures the technical loss and business damage of a successful attack;

- Severity demonstrates the overall criticality of the risk;

Likelihood and impact are categorized into three ratings: *H*, *M* and *L*, i.e., *high*, *medium* and *low* respectively. Severity is determined by likelihood and impact and can be classified into four categories accordingly, i.e., *Critical*, *High*, *Medium*, *Low* shown in Table 1.2.
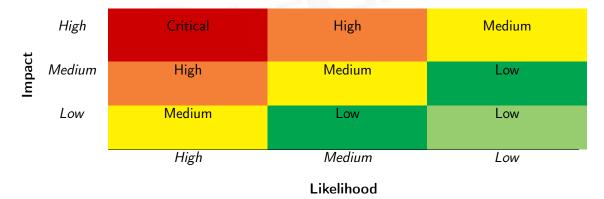
Table 1.2:   Vulnerability Severity Classification

Impact			
High	Critical	High	Medium
Medium	High	Medium	Low
Low	Medium	Low	Low
	High	Medium	Low
	Likelihood		

We perform the audit according to the following procedures:

- Basic Coding Bugs: We first statically analyze given smart contracts with our proprietary static code analyzer for known coding bugs, and then manually verify (reject or confirm) all the issues found by our tool.

- ERC20 Compliance Checks: We then manually check whether the implementation logic of the audited smart contract(s) follows the standard ERC20 specification and other best practices.

- Additional Recommendations: We also provide additional suggestions regarding the coding and development of smart contracts from the perspective of proven programming practices.

Table 1.3:   The Full List of Check Items

Category	Check Item
Basic Coding Bugs	Constructor Mismatch
	Ownership Takeover
	Redundant Fallback Function
	Overflows & Underflows
	Reentrancy
	Money-Giving Bug
	Blackhole
	Unauthorized Self-Destruct
	Revert DoS
	Unchecked External Call
	Gasless Send
	Send Instead of Transfer
	Costly Loop
	(Unsafe) Use of Untrusted Libraries
	(Unsafe) Use of Predictable Variables
	Transaction Ordering Dependence
	Deprecated Uses
	Approve / TransferFrom Race Condition
ERC20 Compliance Checks	Compliance Checks (Section 3)
Additional Recommendations	Avoiding Use of Variadic Byte Array
	Using Fixed Compiler Version
	Making Visibility Level Explicit
	Making Type Inference Explicit
	Adhering To Function Declaration Strictly
	Following Other Best Practices

To evaluate the risk, we go through a list of check items and each would be labeled with a severity category. For one check item, if our tool does not identify any issue, the contract is considered safe regarding the check item. For any discovered issue, we might further deploy contracts on our private testnet and run tests to confirm the findings. If necessary, we would additionally build a PoC to demonstrate the possibility of exploitation. The concrete list of check items is shown in Table 1.3.

1.4   Disclaimer

Note that this security audit is not designed to replace functional tests required before any software release, and does not give any warranties on finding all possible security issues of the given smart contract(s) or blockchain software, i.e., the evaluation result does not guarantee the nonexistence of any further findings of security issues. As one audit-based assessment cannot be considered comprehensive, we always recommend proceeding with several independent audits and a public bug bounty program to ensure the security of smart contract(s). Last but not least, this security audit should not be used as investment advice.

2 | Findings

2.1 Summary

Here is a summary of our findings after analyzing the MTL2 token contract. During the first phase of our audit, we study the smart contract source code and run our in-house static code analyzer through the codebase. The purpose here is to statically identify known coding bugs, and then manually verify (reject or confirm) issues reported by our tool. We further manually review business logics, examine system operations, and place ERC20-related aspects under scrutiny to uncover possible pitfalls and/or bugs.

Severity	# of Findings	
Critical	0	
High	0	
Medium	0	
Low	1	■
Informational	1	■
Total	2	

Moreover, we explicitly evaluate whether the given contracts follow the standard ERC20 specification and other known best practices, and validate its compatibility with other similar ERC20 tokens and current DeFi protocols. The detailed ERC20 compliance checks are reported in Section 3. After that, we examine a few identified issues of varying severities that need to be brought up and paid more attention to. (The findings are categorized in the above table.) Additional information can be found in the next subsection, and the detailed discussions are in Section 4.