



SMART CONTRACT SECURITY AUDIT OF **PLANET IX MARKETPLACE**

SMART CONTRACT AUDIT | SOLIDITY DEVELOPMENT & TESTING | KYC | PROJECT EVALUATION

RELENTLESSLY SECURING THE PUBLIC BLOCKCHAIN

Summary

Auditing Firm	InterFi Network
Client Firm	Planet IX Marketplace
Architecture	InterFi "Echelon" Auditing Standard
Language	Solidity
Mandatory Audit Check	Static, Software, Auto Intelligent & Manual Analysis
Preliminary Report Date	January 10, 2022

Audit Summary

InterFi team has performed a line-by-line manual analysis and automated review of the smart contract. The smart contract was analyzed mainly for common smart contract vulnerabilities, exploits, and manipulation hacks. According to the smart contract audit:

- ❖ Planet IX Marketplace's smart contract source codes have **LOW RISK SEVERITY**
- ❖ Planet IX Marketplace's smart contracts have an **ACTIVE OWNERSHIP**

For the detailed understanding of risk severity, source code vulnerability, and functional test, kindly refer to the audit.

✅ Verify the authenticity of this report on InterFi's GitHub: <https://github.com/interfinetwork>



Table Of Contents

Project Information

Overview	4
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InterFi “Echelon” Audit Standard

Audit Scope & Methodology	6
InterFi’s Risk Classification.....	8

Smart Contract Risk Assessment

Static Analysis.....	9
Software Analysis	13
Manual Analysis.....	17
SWC Attacks.....	18
Risk Status & Radar Chart.....	20

Report Summary

Auditor’s Verdict	21
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Legal Advisory

Important Disclaimer	22
About InterFi Network.....	23



Project Overview

InterFi was consulted by Planet IX Marketplace to conduct the smart contract security audit of their solidity source codes.

About Planet IX Marketplace

Planet IX is an NFT-based strategy game. With a virtual copy of planet earth as your arena, your goal is to rebuild the planet to its former green and blue glory.

Project	Planet IX Marketplace
Blockchain	Polygon Chain
Language	Solidity
Website	https://planetix.com/
Discord	https://discord.gg/nSKdhpY5zx
Twitter	https://twitter.com/PlanetixO
Instagram	https://www.instagram.com/planet_ix/
YouTube	https://bit.ly/3zZDPQb
Medium	https://blog.planetix.com/

Project Logo



Files Under Scope (Solidity Multiple Files)

- ❖ PIX.sol
- ❖ PIXT.sol
- ❖ IPIX.sol
- ❖ TokenPool.sol
- ❖ TokenGeyser.sol
- ❖ Vesting.sol
- ❖ IOracle.sol
- ❖ FullMath.sol
- ❖ MockToken.sol
- ❖ PIXLandmark.sol
- ❖ PIXTreasury.sol
- ❖ FixedPoint.sol
- ❖ PIXBaseSale.sol
- ❖ SwapManager.sol
- ❖ UniV2Oracle.sol
- ❖ PIXStaking.sol
- ❖ PIXTStaking.sol
- ❖ DecimalMath.sol
- ❖ PIXFixedSale.sol
- ❖ ISwapManager.sol
- ❖ OracleManager.sol
- ❖ PIXAuctionSale.sol
- ❖ IERC20Detailed.sol
- ❖ IOracleManager.sol
- ❖ ChainlinkOracle.sol



Audit Scope & Methodology

The scope of this report is to audit the smart contract source code of Planet IX Marketplace. InterFi has scanned the contract and reviewed the project for common vulnerabilities, exploits, hacks, and back-doors. Below is the list of commonly known smart contract vulnerabilities, exploits, and hacks:

Category

Smart Contract Vulnerabilities

- ❖ Re-entrancy
- ❖ Unhandled Exceptions
- ❖ Transaction Order Dependency
- ❖ Integer Overflow
- ❖ Unrestricted Action
- ❖ Incorrect Inheritance Order
- ❖ Typographical Errors
- ❖ Requirement Violation

Source Code Review

- ❖ Ownership Takeover
- ❖ Gas Limit and Loops
- ❖ Deployment Consistency
- ❖ Repository Consistency
- ❖ Data Consistency
- ❖ Token Supply Manipulation
- ❖ Access Control and Authorization
- ❖ Operations Trail and Event Generation

Functional Assessment

- ❖ Assets Manipulation
- ❖ Liquidity Access



InterFi's Echelon Audit Standard

The aim of InterFi's "Echelon" standard is to analyze the smart contract and identify the vulnerabilities and the hacks in the smart contract. Mentioned are the steps used by ECHELON-1 to assess the smart contract:

1. Solidity smart contract source code reviewal:
 - ❖ Review of the specifications, sources, and instructions provided to InterFi to make sure we understand the size, scope, and functionality of the smart contract.
 - ❖ Manual review of code, which is the process of reading source code line-byline to identify potential vulnerabilities.
2. Static, Manual, and Software analysis:
 - ❖ Test coverage analysis, which is the process of determining whether the test cases are covering the code and how much code is exercised when we run those test cases.
 - ❖ Symbolic execution, which is analysing a program to determine what inputs causes each part of a program to execute.
3. Best practices review, which is a review of the smart contracts to improve efficiency, effectiveness, clarify, maintainability, security, and control based on the established industry and academic practices, recommendations, and research.
4. Specific, itemized, actionable recommendations to help you take steps to secure your smart contracts

Automated 3P frameworks used to assess the smart contract vulnerabilities

- ❖ Slither
- ❖ Consensys MythX, Mythril
- ❖ SWC Registry
- ❖ Solidity Coverage
- ❖ Open Zeppelin Code Analyzer
- ❖ Solidity Code Compiler



InterFi's Risk Classification

Smart contracts are generally designed to manipulate and hold funds denominated in ETH/BNB. This makes them very tempting attack targets, as a successful attack may allow the attacker to directly steal funds from the contract. Below are the typical risk levels of a smart contract:

Vulnerable: A contract is vulnerable if it has been flagged by a static analysis tool as such. As we will see later, this means that some contracts may be vulnerable because of a false-positive.

Exploitable: A contract is exploitable if it is vulnerable and the vulnerability could be exploited by an external attacker. For example, if the "vulnerability" flagged by a tool is in a function which requires to own the contract, it would be vulnerable but not exploitable.

Exploited: A contract is exploited if it received a transaction on the main network which triggered one of its vulnerabilities. Therefore, a contract can be vulnerable or even exploitable without having been exploited.

Risk severity	Meaning
! Critical	This level vulnerabilities could be exploited easily, and can lead to asset loss, data loss, asset, or data manipulation. They should be fixed right away.
! High	This level vulnerabilities are hard to exploit but very important to fix, they carry an elevated risk of smart contract manipulation, which can lead to high-risk severity
! Medium	This level vulnerabilities should be fixed, as they carry an inherent risk of future exploits, and hacks which may or may not impact the smart contract execution.
! Low	This level vulnerabilities can be ignored. They are code style violations, and informational statements in the code. They may not affect the smart contract execution



Smart Contract – Static Analysis

Symbol	Meaning
	Function can be modified
	Function is payable
	Function is locked
	Function can be accessed
!	Important functionality

```

| **PIX** | Implementation | IPIX, ERC721EnumerableUpgradeable, OwnableUpgradeable |||
| L | initialize | Public ! |  | initializer |
| L | setOracleManager | External ! |  | onlyOwner |
| L | setSwapManager | External ! |  | onlyOwner |
| L | withdraw | External ! |  | onlyOwner |
| L | setTrader | External ! |  | onlyOwner |
| L | setModerator | External ! |  | onlyOwner |
| L | setPackPrice | External ! |  | onlyOwner |
| L | setCombinePrice | External ! |  | onlyOwner |
| L | setPaymentToken | External ! |  | onlyOwner |
| L | setTreasury | External ! |  | onlyOwner |
| L | isDisabledDropForPlayer | Public ! | |NO ! |
| L | requestMint | External ! |  | nonBlacklisted |
| L | mintTo | External ! |  | onlyMod |
| L | completeRequest | External ! |  | onlyMod |
| L | cancelRequest | External ! |  | onlyMod |
| L | combine | External ! |  |NO ! |
| L | _proceedCombine | Private  |  |
| L | updateTerritoryInfo | External ! |  | onlyMod |
| L | safeMint | External ! |  | onlyMod |
| L | batchMint | External ! |  | onlyMod |
| L | _safeMint | Internal  |  |
| L | safeBurn | External ! |  |NO ! |
| L | batchBurn | External ! |  |NO ! |
| L | _baseURI | Internal  | |
| L | setBaseURI | External ! |  | onlyOwner |
| L | isTerritory | External ! | |NO ! |
| L | pixelsInLand | External ! | |NO ! |
| L | setPIXInLandStatus | External ! |  | onlyMod |
| L | approve | Public ! |  |NO ! |
| L | setApprovalForAll | Public ! |  |NO ! |

```



```

| L | setTokenForPrice | External ! | ● | onlyOwner |
| L | setDropInfo | External ! | ● | onlyOwner |
| L | setRelationForDrops | External ! | ● | onlyOwner |
| L | setBlacklistedAddress | External ! | ● | onlyOwner |
|||||
| **PIXT** | Implementation | ERC20Burnable, EIP712 |||
| L | <Constructor> | Public ! | ● | ERC20 |
| L | permitForBid | External ! | ● | NO ! |
|||||
| **IPIX** | Interface | |||
| L | isTerritory | External ! | | NO ! |
| L | pixesInLand | External ! | | NO ! |
| L | setPIXInLandStatus | External ! | ● | NO ! |
| L | safeMint | External ! | ● | NO ! |
|||||
| **PIXStaking** | Implementation | OwnableUpgradeable |||
| L | initialize | External ! | ● | initializer |
| L | stake | External ! | ● | updateRewardPool |
| L | withdraw | External ! | ● | updateRewardPool |
| L | claim | External ! | ● | updateRewardPool |
| L | setRewardPerBlock | External ! | ● | onlyOwner |
| L | setTierInfo | External ! | ● | onlyOwner |
| L | _calculateReward | Internal 🔒 | | |
|||||
| **PIXTStaking** | Implementation | OwnableUpgradeable |||
| L | initialize | External ! | ● | initializer |
| L | lastTimeRewardApplicable | Public ! | | NO ! |
| L | rewardPerToken | Public ! | | NO ! |
| L | earned | Public ! | | NO ! |
| L | stake | Public ! | ● | updateReward |
| L | unstake | Public ! | ● | updateReward |
| L | exit | External ! | ● | NO ! |
| L | claim | Public ! | ● | updateReward |
| L | notifyRewardAmount | External ! | ● | onlyRewardDistributor updateReward |
| L | setRewardDistributor | External ! | ● | onlyOwner |
|||||
| **IOracle** | Interface | |||
| L | tokens | External ! | | NO ! |
| L | getAmountOut | External ! | ● | NO ! |
|||||
| **Vesting** | Implementation | |||
| L | <Constructor> | Public ! | ● | NO ! |
| L | initVesting | Public ! | ● | NO ! |
| L | initVestings | External ! | ● | NO ! |
| L | _claim | Internal 🔒 | ● | |
| L | claim | Public ! | ● | NO ! |
| L | claimInBatch | External ! | ● | NO ! |
| L | getPendingAmount | Public ! | | NO ! |
| L | getPendingAmounts | External ! | | NO ! |
|||||

```



```

| **FullMath** | Library | |||
| L | fullMul | Internal 🔒 | | |
| L | fullDiv | Private 🔒 | | |
| L | mulDiv | Internal 🔒 | | |
| |||||
| **MockToken** | Implementation | ERC20 |||
| L | <Constructor> | Public ! | 🔴 | ERC20 |
| L | decimals | Public ! | | NO ! |
| |||||
| **PIXLandmark** | Implementation | ERC721EnumerableUpgradeable, OwnableUpgradeable |||
| L | initialize | External ! | 🔴 | initializer |
| L | setModerator | External ! | 🔴 | onlyOwner |
| L | addLandmarkType | External ! | 🔴 | onlyMod |
| L | safeMint | External ! | 🔴 | onlyMod |
| L | safeBurn | External ! | 🔴 | NO ! |
| L | _baseURI | Internal 🔒 | | |
| L | setBaseURI | External ! | 🔴 | onlyOwner |
| |||||
| **PIXTreasury** | Implementation | Ownable |||
| L | <Constructor> | Public ! | 🔴 | NO ! |
| L | transfer | External ! | 🔴 | onlyOwner |
| |||||
| **FixedPoint** | Library | |||
| L | encode | Internal 🔒 | | |
| L | encode144 | Internal 🔒 | | |
| L | decode | Internal 🔒 | | |
| L | decode144 | Internal 🔒 | | |
| L | mul | Internal 🔒 | | |
| L | fraction | Internal 🔒 | | |
| |||||
| **PIXBaseSale** | Implementation | OwnableUpgradeable, ERC721HolderUpgradeable |||
| L | __PIXBaseSale_init | Internal 🔒 | 🔴 | initializer |
| L | setTreasury | External ! | 🔴 | onlyOwner |
| L | setWhitelistedNFTs | External ! | 🔴 | onlyOwner |
| |||||
| **SwapManager** | Implementation | ISwapManager, Ownable |||
| L | <Constructor> | Public ! | 🔴 | NO ! |
| L | addOtherRouter | External ! | 🔴 | onlyOwner |
| L | removeOtherRouter | External ! | 🔴 | onlyOwner |
| L | swap | External ! | 🟡 | NO ! |
| |||||
| **UniV2Oracle** | Implementation | IOracle |||
| L | <Constructor> | Public ! | 🔴 | NO ! |
| L | tokens | External ! | | NO ! |
| L | update | Public ! | 🔴 | NO ! |
| L | getAmountOut | External ! | 🔴 | NO ! |
| |||||
| **PIXT** | Implementation | ERC20Burnable, EIP712 |||
| L | <Constructor> | Public ! | 🔴 | ERC20 |
| L | permitForBid | External ! | 🔴 | NO ! |

```



```

||||| | |
| **DecimalMath** | Library | |||
| L | decimalMul | Internal | | |
| L | isLessThanAndEqualToDenominator | Internal | | |
|||||
| **PIXFixedSale** | Implementation | PIXBaseSale, EIP712Upgradeable |||
| L | initialize | External ! | | | initializer |
| L | requestSale | External ! | | | onlyWhitelistedNFT |
| L | updateSale | External ! | | | NO ! |
| L | cancelSale | External ! | | | NO ! |
| L | purchaseNFT | External ! | | | NO ! |
| L | sellNFTWithSignature | External ! | | | NO ! |
| L | setBurnHolder | External ! | | | onlyOwner |
|||||
| **ISwapManager** | Interface | |||
| L | swap | External ! | | | NO ! |
|||||
| **OracleManager** | Implementation | IOracleManager, Ownable |||
| L | registerOracle | External ! | | | onlyOwner |
| L | removeOracle | External ! | | | onlyOwner |
| L | registerStable | External ! | | | onlyOwner |
| L | removeStable | External ! | | | onlyOwner |
| L | getAmountOut | External ! | | | NO ! |
|||||
| **PIXAuctionSale** | Implementation | PIXBaseSale, ReentrancyGuardUpgradeable, EIP712Upgradeable
||| | | | |
| L | initialize | External ! | | | initializer |
| L | requestSale | External ! | | | onlyWhitelistedNFT |
| L | updateSale | External ! | | | NO ! |
| L | cancelSale | External ! | | | NO ! |
| L | endAuction | External ! | | | nonReentrant |
| L | setBurnHolder | External ! | | | onlyOwner |
| L | setOperator | External ! | | | onlyOwner |
|||||
| **IERC20Detailed** | Interface | |||
| L | decimals | External ! | | | NO ! |
|||||
| **IOracleManager** | Interface | |||
| L | getAmountOut | External ! | | | NO ! |
|||||
| **ChainlinkOracle** | Implementation | IOracle |||
| L | <Constructor> | Public ! | | | NO ! |
| L | tokens | External ! | | | NO ! |
| L | getAmountOut | External ! | | | NO ! |
| **TokenPool** | Implementation | Ownable |||
| L | <Constructor> | Public ! | | | NO ! |
| L | balance | Public ! | | | NO ! |
| L | transfer | External ! | | | onlyOwner |
| L | rescueFunds | External ! | | | onlyOwner |
|||||

```



```

| **TokenGeyser** | Implementation | IStaking, Ownable |||
| L | <Constructor> | Public ! | 🚫 | NO ! |
| L | getStakingToken | Public ! | 🚫 | NO ! |
| L | getDistributionToken | Public ! | 🚫 | NO ! |
| L | stake | External ! | 🚫 | NO ! |
| L | stakeFor | External ! | 🚫 | onlyOwner |
| L | _stakeFor | Private 🗝️ | 🚫 | |
| L | unstake | External ! | 🚫 | NO ! |
| L | unstakeQuery | Public ! | 🚫 | NO ! |
| L | _unstake | Private 🗝️ | 🚫 | |
| L | computeNewReward | Private 🗝️ | | |
| L | totalStakedFor | Public ! | 🚫 | NO ! |
| L | totalStaked | Public ! | 🚫 | NO ! |
| L | token | External ! | 🚫 | NO ! |
| L | updateAccounting | Public ! | 🚫 | NO ! |
| L | totalLocked | Public ! | 🚫 | NO ! |
| L | totalUnlocked | Public ! | 🚫 | NO ! |
| L | unlockScheduleCount | Public ! | 🚫 | NO ! |
| L | lockTokens | External ! | 🚫 | onlyOwner |
| L | unlockTokens | Public ! | 🚫 | NO ! |
| L | unlockScheduleShares | Private 🗝️ | 🚫 | |
| L | rescueFundsFromStakingPool | Public ! | 🚫 | onlyOwner |
| L | rewardPreview | Public ! | 🚫 | NO ! |
| L | supportsHistory | External ! | 🚫 | NO ! |

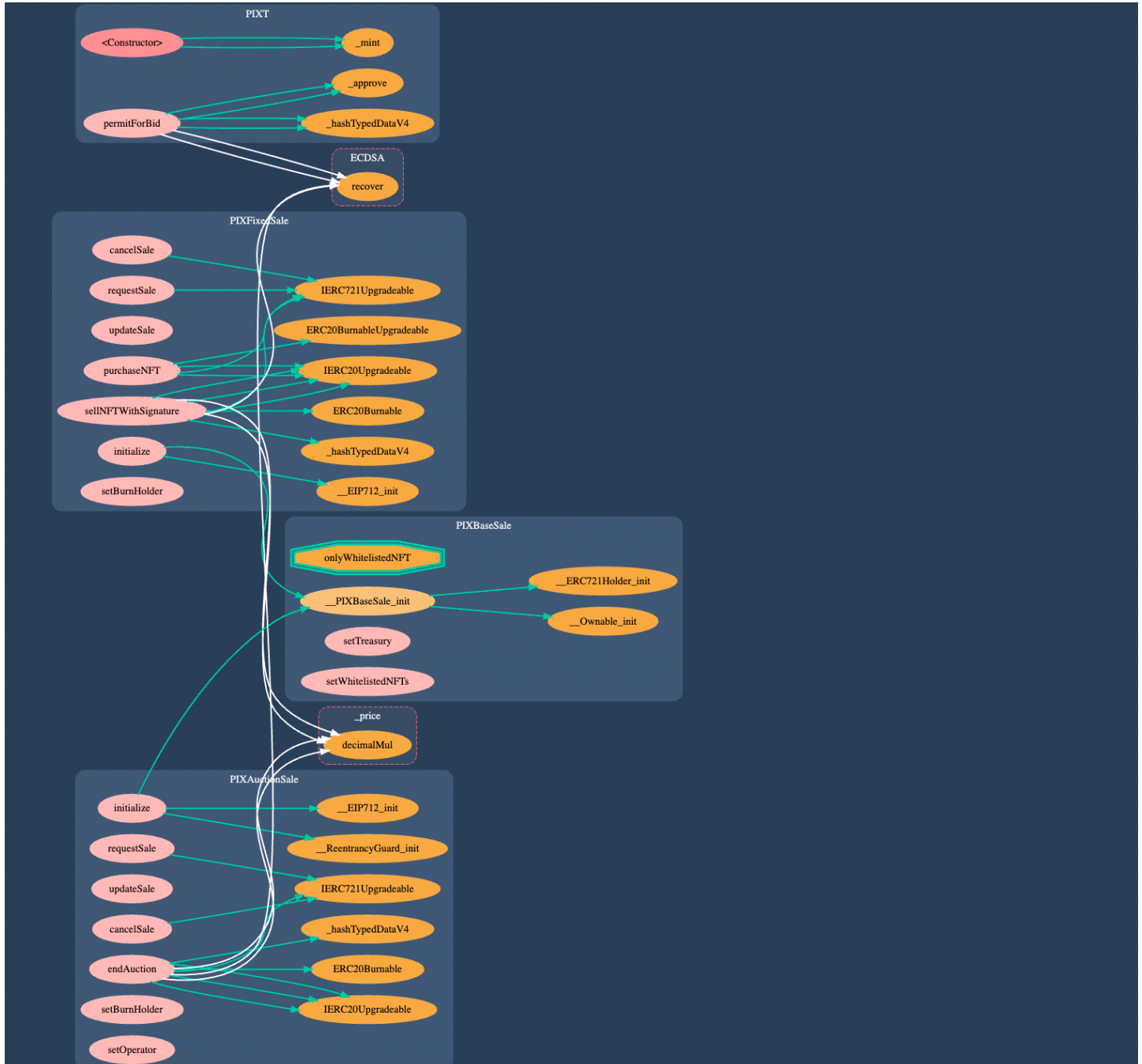
```



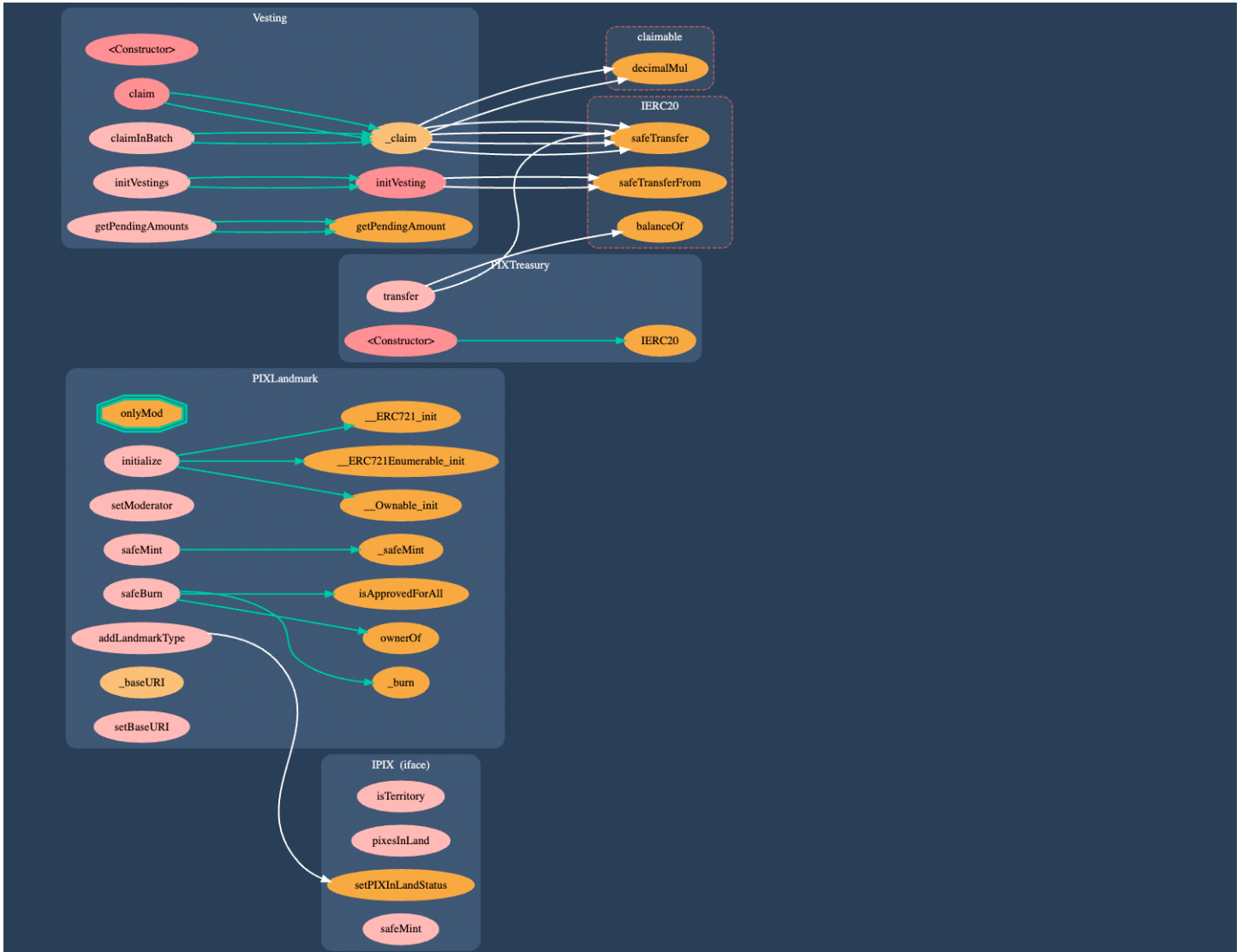
Smart Contract – Software Analysis

Callout Graph

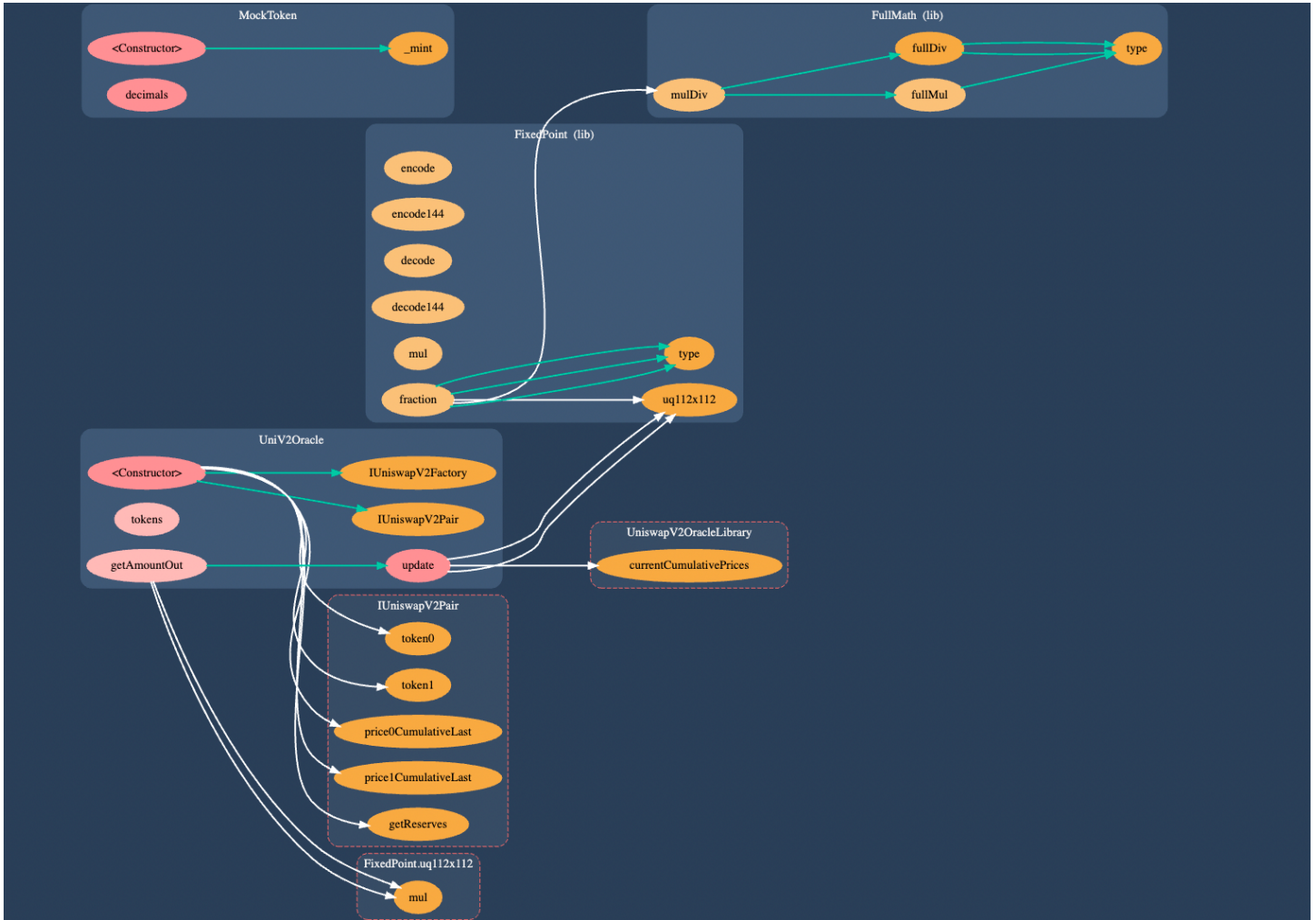
PIXT.sol, PIXFixedSale.sol, PIXBaseSale.sol, PIXAuctionSale.sol



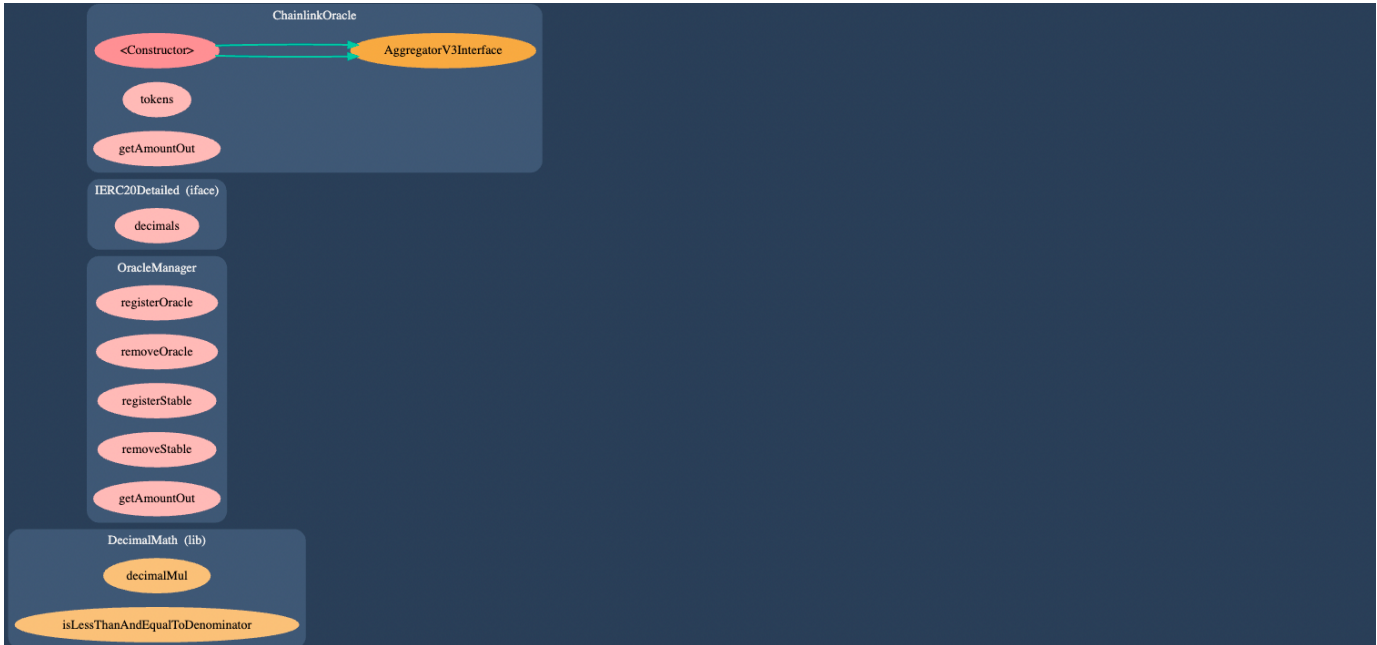
Vesting.sol, PIXTreasury.sol, PIXLandmark.sol, IPIX.sol



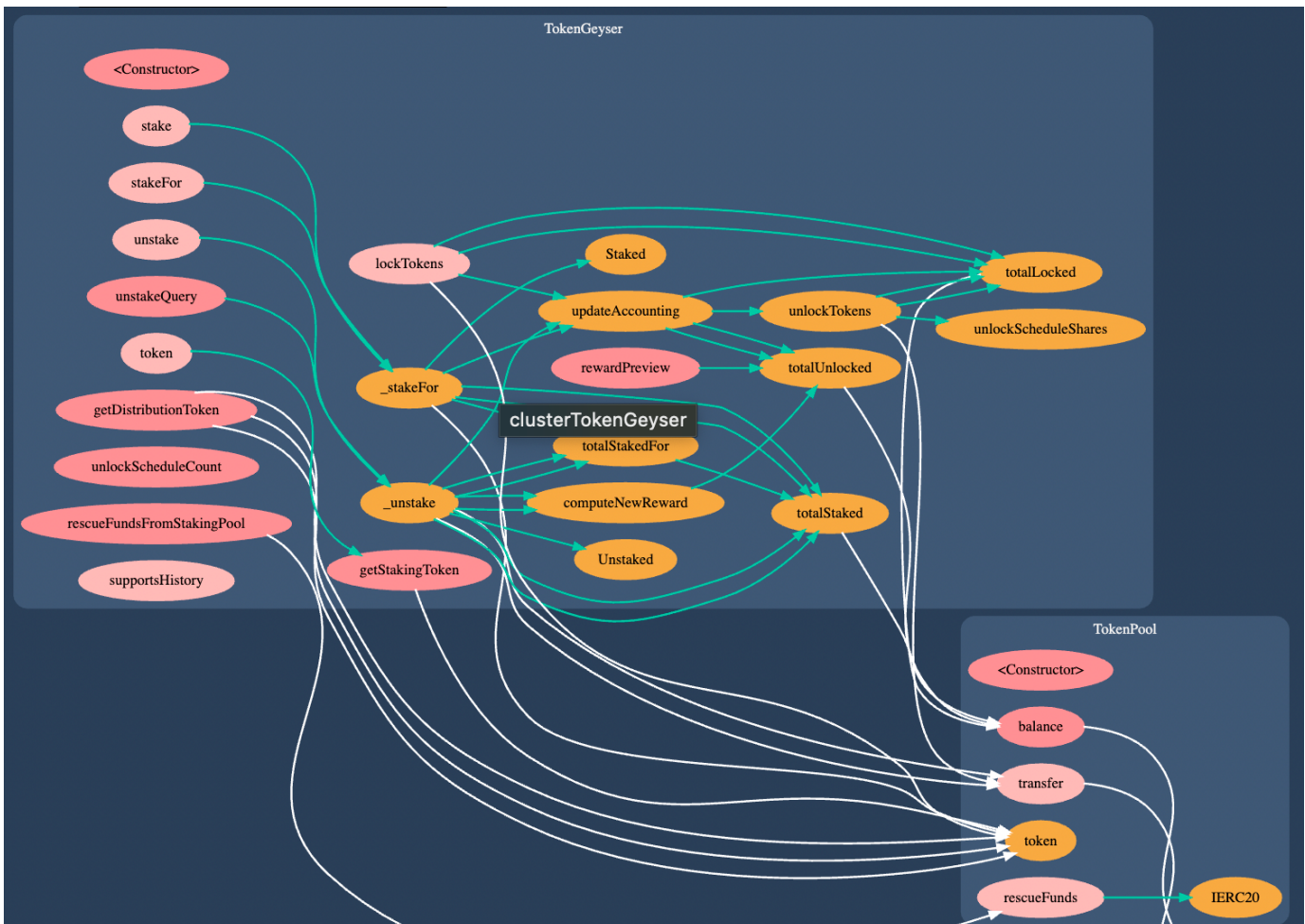
MockToken.sol, FullMath.sol, UniV2Oracle.sol, UniswapV2OracleLibrary.sol, UniswapV2Pair.sol



ChainlinkOracle.sol, IERC20Detailed.sol, OracleManager.sol, DecimalMath.sol



TokenPool.sol, TokenGeyser.sol



Smart Contract – Manual Analysis

- ❖ Be aware that active smart contract owner privileges constitute an elevated impact to smart contract's safety and security.
- ❖ Planet IX Marketplace's smart contracts **utilize** the "Reentrancy Guard" to prevent known vulnerabilities. Reentrancy Guard is a contract module that helps prevent reentrant calls to a function.
- ❖ Planet IX's smart contract IPIX.sol has a low severity issue which may not create any functional vulnerability.

Expected elementary type name for mapping key type

"severity": 8, (! Low Severity)

- ❖ Planet IX's smart contract PIXAuctionSale.sol has a low severity issue which may not create any functional vulnerability.

Wrong argument count for function call: 2 arguments given but expected 1

"severity": NULL

- ❖ Planet IX's smart contracts have an upgradability mechanism. The contracts can be upgraded extensively for sustained development. The upgradability mechanism will be used to resolve errors identified during tests, audits, etc.



Smart Contract – SWC Attacks

SWC ID	Description	Verdict
SWC-101	Integer Overflow and Underflow	Passed
SWC-102	Outdated Compiler Version	! Low
SWC-103	Floating Pragma	Passed
SWC-104	Unchecked Call Return Value	Passed
SWC-105	Unprotected Ether Withdrawal	Passed
SWC-106	Unprotected SELFDESTRUCT Instruction	Passed
SWC-107	Re-entrancy	Passed
SWC-108	State Variable Default Visibility	Passed
SWC-109	Uninitialized Storage Pointer	Passed
SWC-110	Assert Violation	Passed
SWC-111	Use of Deprecated Solidity Functions	Passed
SWC-112	Delegate Call to Untrusted Callee	Passed
SWC-113	DoS with Failed Call	Passed
SWC-114	Transaction Order Dependence	Passed
SWC-115	Authorization through tx.origin	Passed
SWC-116	Block values as a proxy for time	Passed
SWC-117	Signature Malleability	Passed
SWC-118	Incorrect Constructor Name	Passed

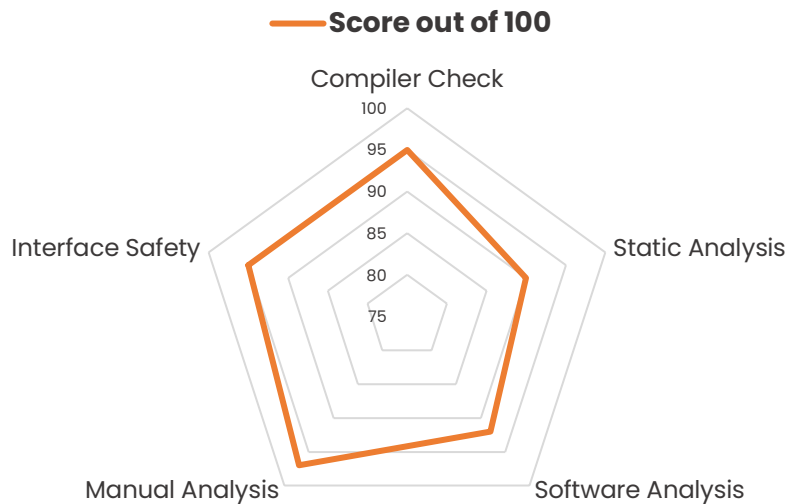


SWC-119	Shadowing State Variables	Passed
SWC-120	Weak Sources of Randomness from Chain Attributes	Passed
SWC-121	Missing Protection against Signature Replay Attacks	Passed
SWC-122	Lack of Proper Signature Verification	Passed
SWC-123	Requirement Violation	Passed
SWC-124	Write to Arbitrary Storage Location	Passed
SWC-125	Incorrect Inheritance Order	Passed
SWC-126	Insufficient Gas Griefing	Passed
SWC-127	Arbitrary Jump with Function Type Variable	Passed
SWC-128	DoS With Block Gas Limit	Passed
SWC-129	Typographical Error	Passed
SWC-130	Right-To-Left-Override control character (U+202E)	Passed
SWC-131	Presence of unused variables	Passed
SWC-132	Unexpected Ether balance	Passed
SWC-133	Hash Collisions With Multiple Variable Length Arguments	Passed
SWC-134	Message call with hardcoded gas amount	Passed
SWC-135	Code With No Effects (Irrelevant/Dead Code)	Passed
SWC-136	Unencrypted Private Data On-Chain	Passed



Smart Contract - Risk Status & Radar Chart

Risk Severity	Status
! Critical	None critical severity issues identified
! High	None high severity issues identified
! Medium	None medium severity issues identified
! Low	1 low severity issue identified
Verified	54 functions and instances verified and checked



Auditor's Verdict

InterFi team has performed a line-by-line manual analysis and automated review of the smart contract. The smart contract was analyzed mainly for common smart contract vulnerabilities, exploits, and manipulation hacks.

- ❖ Planet IX Marketplace's smart contract source code has **LOW RISK SEVERITY**
- ❖ Planet IX Marketplace's smart contract has an **ACTIVE OWNERSHIP**

Note for stakeholders

- ❖ Be aware that active smart contract owner privileges constitute an elevated impact on smart contract's safety and security.



Important Disclaimer

InterFi Network provides contract auditing and project verification services for blockchain projects. The purpose of the audit is to analyse the on-chain smart contract source code, and to provide basic overview of the project. **This report should not be transmitted, disclosed, referred to, or relied upon by any person for any purposes without InterFi's prior written consent.**

InterFi provides the easy-to-understand assessment of the project, and the smart contract (otherwise known as the source code). The audit makes no statements or warranties on the security of the code. It also cannot be considered as an enough assessment regarding the utility and safety of the code, bug-free status, or any other statements of the contract. While we have used all the data at our disposal to provide the transparent analysis, it is important to note that you should not rely on this report only – we recommend proceeding with several independent audits and a public bug bounty program to ensure the security of smart contracts. **Be aware that smart contracts deployed on a blockchain aren't resistant from external vulnerability, or a hack. Be aware that active smart contract owner privileges constitute an elevated impact to smart contract's safety and security. Therefore, InterFi does not guarantee the explicit security of the audited smart contract.**

The analysis of the security is purely based on the smart contracts alone. No applications or operations were reviewed for security. No product code has been reviewed.

This report should not be considered as an endorsement or disapproval of any project or team.

The information provided on this report does not constitute investment advice, financial advice, trading advice, or any other sort of advice and you should not treat any of the report's content as such. Do conduct your own due diligence and consult your financial advisor before making any investment decisions.



About InterFi Network

InterFi Network provides intelligent blockchain solutions. InterFi is developing an ecosystem that is seamless and responsive. Some of our services: Blockchain Security, Token Launchpad, NFT Marketplace, etc. **InterFi's mission is to interconnect multiple services like Blockchain Security, DeFi, Gaming, and Marketplace under one ecosystem that is seamless, multi-chain compatible, scalable, secure, fast, responsive, and easy-to-use.**

InterFi is built by a decentralized team of UI experts, contributors, engineers, and enthusiasts from all over the world. Our team currently consists of 6+ core team members, and 10+ casual contributors. **InterFi provides manual, static, and automatic smart contract analysis, to ensure that project is checked against known attacks and potential vulnerabilities.**

To learn more, visit <https://interfi.network>

To view our audit portfolio, visit <https://github.com/interfinetwork>

To book an audit, message <https://t.me/interfiaudits>





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