FoxWallet

Penetration Test

November 10th, 2021

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Overview

Scope

At the start of the engagement, CertiK worked with FoxWallet to identify the target and set the limits on the scope of the test. A White Box type of testing approach was done where CertiK performed the test with the source code available from the shared GitHub repository.

Application Name	FoxWallet
Environment	Testing
Codebase	https://github.com/6block/fox-wallet/ https://github.com/filfox/filecoin-wallet-provider.git

Audit Summary

Delivery Date	Nov. 10, 2021
Method of Audit	Static Code Review, Dynamic Testing
Consultants Engaged	2
Initial Test	Nov. 2, 2021 - Nov. 5, 2021
Re-Test	Nov. 10, 2021

Vulnerability Summary

Total Issues	9
Total Medium	1
Total Low	2
Total Informational	6

Limitations

No major limitations were identified during the test.

Testing was performed during regular hours as well as off hours throughout the course of the test.

Executive Summary

FoxWallet engaged CertiK to perform an application penetration test for their mobile wallet. FoxWallet is a decentralized cryptocurrency wallet. Users can use the mobile wallet to create and store their accounts and manage their assets.

The main objective of the engagement is to test the overall resiliency of the application to various real-world attacks against the application's controls and functions, and thereby be able to identify its weaknesses and provide recommendations to fix and improve its overall security posture.

Two members of the CertiK team were involved in completing the engagement which took place over the course of 4 days in November 2021 and yielded 9 security-relevant findings. After a thorough review of the application, CertiK believes that the FoxWallet application is currently at a medium risk level. Given the severity of the vulnerabilities on the application, it is unlikely that the application will be directly compromised.

The most significant vulnerabilities were `Redacted`

It is recommended that FoxWallet work on remediating the findings to raise the security posture of the application.

Re-test
FoxWallet has worked diligently to remediate issues discovered by CertiK, significantly increasing the overall security posture of their application. CertiK performed the re-test on November 10, 2021 and verified issues mentioned in the report have been fixed. We suggest that FoxWallet maintain this level of security on future development and leverage our team for a follow up security assessment after any major development changes.

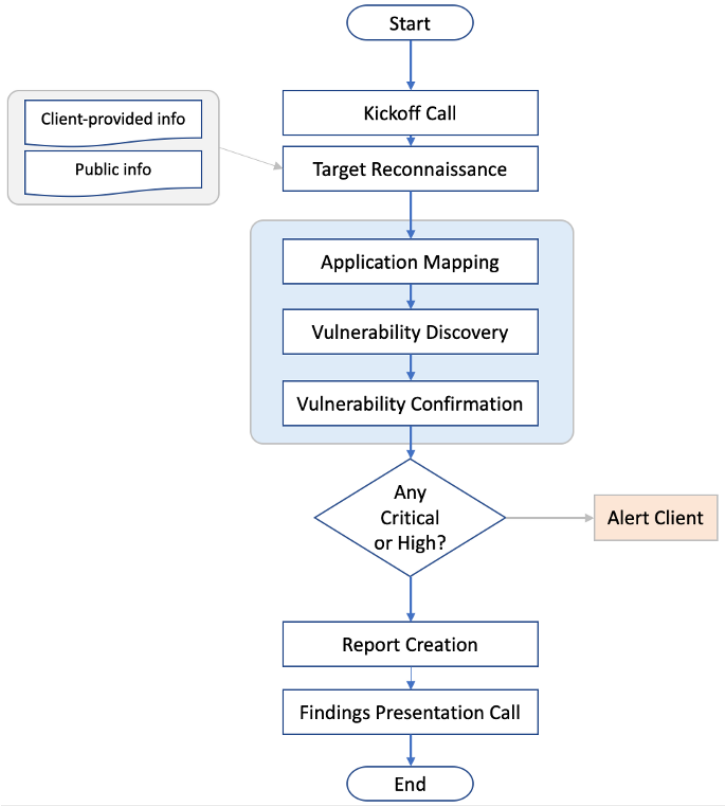
Findings(Redacted)

ID	Title	Severity	Vulnerability Class	Status

Appendix – Methodology

CertiK uses a comprehensive penetration testing methodology which adheres to industry best practices and standards in security assessments including from OWASP (Open Web Application Security Project), NIST, PTES (Penetration Testing Execution Standard).

Below is a flowchart of our assessment process:



Coverage and Prioritization

As many components as possible will be tested manually. Priority is generally based on three factors: critical security controls, sensitive data, and the likelihood of vulnerability.

Critical security controls will always receive the top priority in the test. If a vulnerability is discovered in the critical security control, the entire application is likely to be compromised, resulting in a critical-risk to the business. For most applications, critical controls will include the login page, but it could also include major workflows such as the checkout function in an online store.

The Second priority is given to application components that handle sensitive data. This is dependent on business priorities, but common examples include payment card data, financial data, or authentication credentials.

Final priority includes areas of the application that are most likely to be vulnerable. This is based on CertiK' experience with similar applications developed using the same technology or with other applications that fit the same business role. For example, large applications will often have older sections that are less likely to utilize modern security techniques.

Reconnaissance

CertiK gathers information about the target application from various sources depending on the type of test being performed. CertiK obtains whatever information that is possible and appropriate from the client during scoping and supplements it with relevant information that can be gathered from public sources. This helps provide a better overall picture and understanding of the target.

Application Mapping

CertiK examines the application, reviewing its contents, and mapping out all its functionalities and components. CertiK makes use of different tools and techniques to traverse the entire application and document all input areas and processes. Automated tools are used to scan the application and it is then manually examined for all its parameters and functionalities. With this, CertiK creates and widens the overall attack surface of the target application.

Vulnerability Discovery

Using the information that is gathered, CertiK comes up with various attack vectors to test against the application. CertiK uses a combination of automated tools and manual techniques to identify vulnerabilities and weaknesses. Industry-recognized testing tools will be used, including Burp Suite, Nikto, Metasploit, and Kali. Furthermore, any controls in place that would inhibit the successful exploitation of a particular system will be noted.

Vulnerability Confirmation

After discovering vulnerabilities in the application, CertiK validates the vulnerabilities and assesses its overall impact. To validate, CertiK performs a Proof-of-Concept of an attack on the vulnerability, simulating real world scenarios to prove the risk and overall impact of the vulnerability.

Through CertiK' knowledge and experience on attacks and exploitation techniques, CertiK is able to process all weaknesses and examine how they can be combined to compromise the application. CertiK may use different attack chains, leveraging different weaknesses to escalate and gain a more significant compromise.

To minimize any potential negative impact, vulnerability exploitation was only attempted when it would not adversely affect production applications and systems, and then only to confirm the presence of a specific vulnerability. Any attack with the potential to cause system downtime or seriously impact business continuity was not performed. Vulnerabilities were never exploited to delete or modify data; only read-level access was attempted. If it appeared possible to modify data, this was noted in the list of vulnerabilities below.

Immediate escalation of High or Critical Findings

If critical or high findings are found whereby application elements are compromised, client’s key security contacts will be notified immediately.

Vulnerability Classes

Insecure Data Storage	• Sensitive Data Store in Plant Text • Use of Public Storage • Logging sensitive data
Information Disclosure	• Directory Indexing • Verbose Error Messages • HTML CommentsDefault Content
Account Policy	• Default / Weak Passwords • Unlimited Login Attempts • Password Reset • Insufficient Session Expiration
Session Management	• Session Identifier PredictionSession Hijacking • Cross-Site Request Forgery
Injection	• SQL Injection • Cross-Site Scripting • HTML InjectionXML Injection • OS Command Injection
Broken Access Control	• Authentication Bypass • Authorization Bypass • Privilege Escalation • Insecure Inter-Process Communication(intents, sockets)
Application Resource Handling	• Path Traversal • Predictable Object Identifiers • XML External Entity Expansion
Logic Flaws	• Abuse of FunctionalityWorkflow Bypass
Insufficient Cryptography	• Weak Hashing Algorithms • Weak Encryption Algorithms • Hard Coded Cryptographic Key
Denial of Service	• Server-side Denial of service • Client-side Denial of service
Security Misconfiguration	• Missing Security Headers • Debugging Enabled

Reverse Engineering and Code Tampering	• Lack of Root Detection • Lack of Tampering Detection • Lack of Code Obfuscation

Risk Assessment

The following risk levels categorize the risk level of issues presented in the report:

Risk Level	CVSS Score	Impact	Exploitability
Critical	9.0-10.0	Root-level or full-system compromise, large-scale data breach	Trivial and straightforward
High	7.0-8.9	Elevated privilege access, significant data loss or downtime	Easy, vulnerability details or exploit code are publicly available, but may need additional attack vectors (e.g., social engineering)
Medium	4.0-6.9	Limited access but can still cause loss of tangible assets, which may violate, harm, or impede the org's mission, reputation, or interests.	Difficult, requires a skilled attacker, needs additional attack vectors, attacker must reside on the same network, requires user privileges
Low	0.1-3.9	Very little impact on an org’s business	Extremely difficult, requires local or physical system access
Informational	0.0	Discloses information that may be of interest to an attacker.	Not exploitable but rather is a weakness that may be useful to an attacker should a higher risk issue be found that allows for a system exploit