SEALCOIN

Making the Machines Transactional

WHITEPAPER

A Peer-to-Peer Protocol for Real-Time Machine-to-Machine Transactions

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1. Executive Summary

SEALCOIN AG, a corporation based in Zug, Switzerland (UID: CHE 165.416.820), is introducing a leading-edge platform designed to enable and empower devices within the Internet of Things (IoT) ecosystem to autonomously transact and manage service-for-payment exchanges. At the core of this platform is the SEALCOIN token (QAIT), a hybrid cryptocurrency classified as both a utility and payment token. This whitepaper outlines the SEALCOIN platform's architecture, key technologies, token functionality, regulatory compliance, use cases, and implementation roadmap.

The SEALCOIN platform addresses the growing need for seamless and secure transactions within the IoT landscape (Transactional-IoT or t-IoT), where devices increasingly rely on interconnected services for their functionality. By leveraging DLT Network or Decentralized Ledger Technology and smart contracts, the platform offers the access to a decentralized infrastructure that enables devices to negotiate, execute, and settle transactions independently, without the need for human intervention.

The SEALCOIN platform offers several key features that enhance its functionality and appeal within the IoT ecosystem. It enables IoT devices to autonomously initiate and complete transactions, which streamlines service provision and payment settlement processes. By integrating smart contracts, SEALCOIN ecosystem ensures secure and transparent execution of agreements between parties, thereby enhancing trust and reducing transactional friction.

The platform leverages DLT technology to provide reliant security measures, safeguarding sensitive data and maintaining the integrity and confidentiality of transactions within the ecosystem. This security is reinforced through the physical Secure Element of devices. SEALCOIN platform also focuses on scalability and interoperability, supporting a wide range of IoT devices and services to facilitate seamless integration and interaction across different platforms and protocols. Additionally, its hybrid payment and utility token serves as a universal medium of exchange, allowing for smooth transactions and interactions among IoT devices and participants globally.

In summary, SEALCOIN represents an innovative approach solution that harnesses the power of DLT technology to revolutionize transactions within the IoT ecosystem. By enabling devices to transact autonomously and organize service-for-payment exchanges, SEALCOIN paves the way for a more efficient, secure, and interconnected future for t-IoT stakeholders.

2. Introduction

2.1 Overview

With a unique historical background, SEALCOIN AG emerges as a pioneering entity poised to revolutionize decentralized services. Backed by over 25 years of industry-leading experts in developing secure semiconductor chips, embedded firmware, and trusted hardware provisioning services, SEALCOIN AG is establishing itself as a trusted partner in safeguarding digital assets.
Through the seamless integration of Decentralized Ledger Technology (DLT) components, SEALCOIN platform bridges the gap between physical secure infrastructure and the digital integrity of DLT.
By prioritizing security, transparency, and trust, SEALCOIN is leading the charge towards a future where decentralized services redefine the boundaries of innovation and connectivity. Together, we embark on a transformative path towards a future where the physical and digital worlds converge seamlessly, ushering in an era of unparalleled connectivity and safety.

Imagine the SEALCOIN system as a journey through a house, where each component plays a specific role in granting access to greater opportunities. At the front of this house, you hold the **key**, which represents the **SEALCOIN token, named QAIT.** This key is essential, as it allows you to unlock the **door**, which symbolizes the **SEALCOIN platform**. Without this key, you cannot enter the house.

Once you use the SEALCOIN token (key) to unlock the platform (door), you step through and find yourself in a vast, interconnected **space**, which represents the **SEALCOIN ecosystem**. This ecosystem is where all interactions and opportunities happen – autonomous transactions between IoT devices, access to services, energy trading, and more. The SEALCOIN token is your tool for navigating this ecosystem, enabling secure and seamless transactions within it. This Web3.0-enabled ecosystem offers a decentralized and transparent framework, allowing users to engage with the platform in a more secure and autonomous manner.

Thus, the relationship between the token, platform, and ecosystem is symbiotic: the token grants access to the platform, and the platform provides entry to a dynamic, growing ecosystem where all the opportunities of SEALCOIN ecosystem unfold.

SEALCOIN AG's role

SEALCOIN AG was established as a subsidiary of WISeKey International Holding AG (WISeKey), a listed company based in Zug, Switzerland (UID: CHE-143.782.707), with the mission to spearhead the SEALCOIN Project. The formation of SEALCOIN AG, was finalized in early August 2024, in collaboration with The Hashgraph Group AG (THG), which serves as a minority shareholder in SEALCOIN AG. For more information about THG, please refer to our Partner section (11.4). This partnership was instrumental in integrating cutting-edge decentralized technologies with the well-established industrial and decentralized infrastructure provided by Hedera.

SEALCOIN AG serves as the legal and operational entity responsible for the development, management, and strategic direction of the SEALCOIN platform. As the driving force behind SEALCOIN platform's mission, SEALCOIN AG ensures the secure, scalable, and compliant operation of the platform, while facilitating decentralized, peer-to-peer interactions within the Internet of Things (IoT) ecosystem.

From overseeing token issuance and managing the SEALCOIN platform's technical infrastructure to fostering partnerships and ensuring regulatory compliance, SEALCOIN AG plays a crucial role in the platform's early stages. However, as part of its long-term vision, SEALCOIN AG is committed to progressively decentralizing its governance model. This transition is intended to enable the SEALCOIN community to take a more active role in decision-making through a decentralized autonomous organization (DAO), ensuring that the project evolves in a fully decentralized, community-driven manner.

In the Governance section of this document, we will outline SEALCOIN AG's governance model, followed by a detailed roadmap describing how governance will be incrementally decentralized as the project matures.

2.2 Problem Statement

Current IoT systems are increasingly complex, with millions of interconnected devices that must communicate and transact autonomously. However, these systems face significant challenges in securely managing transactions and services without relying on intermediary intervention.

One of the primary issues is the reliance on centralized entities to facilitate and verify transactions between devices. This dependence creates bottlenecks, leading to inefficiencies in processing, higher costs, and increased vulnerability to single points of failure. Centralized systems are also more susceptible to cyberattacks, where compromising a single entity can expose the entire network to security breaches.

Decentralized trust mechanisms and peer-to-peer validation reduce these risks, leading to more secure and autonomous device interactions.

Moreover, the lack of a standardized and secure method for device-to-device transactions introduces additional risks. Without a decentralized framework, transactions are often vulnerable to fraud, data manipulation, and unauthorized access. This not only undermines the integrity of the IoT ecosystem but also limits the potential for scaling IoT solutions across industries.

Additionally, human interaction and manipulation remain significant concerns in the data monetization context. Manual processes can introduce risks of data corruption or unauthorized use. SEALCOIN platform addresses this issue by leveraging hardware-based solutions and a high level of automation. All transactions within the SEALCOIN ecosystem are initiated by trusted, secure devices, utilizing cryptographic certificates to authenticate themselves and execute transactions autonomously. By removing human intervention, SEALCOIN platform ensures a tamper-proof environment where data can be securely traded, thereby eliminating the potential for manipulation or fraud and enhancing the overall security and value of data exchanges.

In essence, the current IoT infrastructure struggles to provide the necessary security, efficiency, and scalability required for the growing demands of Transactional-IoT (t-IoT) systems, where devices must autonomously and securely manage service-for-payment exchanges without human involvement.

2.3 Objectives

2.3.1 Revolutionize the IoT Ecosystem

SEALCOIN platform aims to transform the Internet of Things (IoT) by enabling devices to autonomously transact and coordinate service-for-payment exchanges (i.e. data or energy trading). By leveraging DLT technology and smart contracts, SEALCOIN Platform will create a secure, efficient, and decentralized infrastructure that facilitates seamless interactions between connected devices.

2.3.2 Establish a Decentralized Marketplace

SEALCOIN Platform seeks to establish a decentralized marketplace within the IoT ecosystem where devices can independently negotiate, execute, and settle transactions without the need for human intervention. This marketplace will be powered by the SEALCOIN QAIT token, which will serve as the primary medium for facilitating transactions and interactions among devices and participants.

2.3.3 Enhance Security and Trust

SEALCOIN platform is committed to enhancing security and trust within the IoT landscape by integrating advanced cryptographic techniques and secure hardware solutions. The platform will ensure that all transactions are authenticated, transparent, and tamper-proof.

2.3.4 Drive Innovation in Transactional-IoT

SEALCOIN platform aims to lead the development of Transactional-IoT (t-IoT), enabling devices to autonomously manage and execute service-for-payment transactions. This will unlock new opportunities for IoT applications, particularly in areas such as energy management, data exchange, and automated services.

3. SEALCOIN Platform Architecture and Key Features

The SEALCOIN Platform is designed to onboard and identify users and devices.

3.1 User Onboarding

A user in the SEALCOIN platform plays an active role by interacting with IoT devices and services using SEALCOIN tokens. They manage their non-custodial wallet, facilitating secure transactions for services like energy trading and data exchanges. Through the device registration process, each device is tokenized, allowing users to claim ownership over both physical and digital assets. The ultimate goal is for users to set up transactions with pre-agreed parameters, enabling devices to interact autonomously, ensuring seamless and secure IoT interactions.

3.1.1 Streamlined User Onboarding

SEALCOIN platform will provide a seamless onboarding process for users, allowing them to easily create accounts and gain access to the platform. This process will involve the creation of a SEALCOIN ID, using the existing ***WISeID*** platform (please read more information on our Partner Section 11.1), and the association to a specific organization, for professional usage.

3.1.2 Know Your Customer (KYC) Integration

To ensure compliance with regulatory standards for potential use-cases, all users of these specific use-cases will undergo a relevant KYC process during onboarding. This will include identity verification and other checks to meet Anti-Money Laundering (AML) requirements, ensuring a secure and trustworthy environment for all participants whenever required.

3.1.3 Role Based Access Control

As an initial step, **professional users** will be onboarded via their company's domain name, ensuring a secure ecosystem of vetted users. Companies will have the ability to assign roles and permissions to users, allowing for customized access levels and management of account interactions within the platform.

In addition to professional users, **individual users** – such as families – can also participate in the SEALCOIN ecosystem. Parents or primary account holders can set specific restrictions for children or dependent accounts. These restrictions may include transaction limits, access to certain features, or specific device interactions. Parents will have full control over their children's permissions, allowing them to monitor and manage transactions or data exchanges within the platform, ensuring a secure and regulated environment for all users.

SEALCOIN AG will take a phased approach, initially enabling **B2B (professional) interactions** at the go-live of the Platform. Once proven robust with a high volume of connected devices, **B2C** interactions will be activated. The platform is designed as a **P2P (peer-to-peer)** ecosystem, allowing flexibility for different transaction models such as **B2B**, **B2C**, **C2B**, and **C2G**. This tiered access system ensures that both professional and individual users can operate securely within a customizable environment, addressing their specific needs while maintaining high security standards.

3.2 Device Onboarding and Management

3.2.1 Secure Enrollment – Device Registration

The SEALCOIN platform offers a streamlined and secure process for onboarding IoT devices, ensuring each device is authenticated and registered with a unique identity. This process leverages **Public Key Infrastructure (PKI)** certificates for IoT, which verify the genuine identity of each device. This mandatory security measure guarantees authenticity and prevents unauthorized access. SEALCOIN platform supports various types of certificates that comply with widely adopted IoT standards, including those set by the CSA (Connectivity Standards Alliance) and GSMA (Global System for Mobile Association), ensuring compatibility and security across the ecosystem.

3.2.2 Role-Based Access Control

Users will be able to assign roles and permissions to devices, allowing for customized access levels and management of device interactions within the platform.

3.3 Transactional-IoT (t-IoT) Services

3.3.1 Autonomous Service-for-Payment Transactions

Devices within the SEALCOIN ecosystem will be able to autonomously negotiate (based on preconfigured parameters), execute, and settle service-for-payment transactions. This feature will enable devices to interact directly with one another, performing tasks such as energy trading, data exchange, and automated service provisioning without human intervention for the most advanced markets.

3.3.2 Smart Contract Integration

The platform will leverage smart contracts to facilitate secure and transparent transactions between devices. These contracts will automatically enforce the terms of the agreements, ensuring that payments are made, and services are delivered as specified.

3.4 Decentralized Marketplace

3.4.1 Peer-to-Peer Services

SEALCOIN platform is aiming at developing a decentralized marketplace where IoT devices can interact, offering and requesting services in a peer-to-peer fashion. This marketplace will support a range of device-to-device services, such as real-time data processing or real-time storage and energy management. In addition, the platform will allow external and independent service providers to offer their services to the ecosystem, enhancing the variety and value of offerings. This open model encourages collaboration and innovation across multiple sectors, fostering a dynamic and scalable ecosystem.

3.4.2 Token-Based Transactions

The SEALCOIN QAIT token will be the medium of exchange within the marketplace. Users will use the token to access the platform, pay for services, manage transactions, and participate in the platform's ecosystem.

3.5 Non-Custodial Wallets

3.5.1 User-Controlled Wallets

The platform will integrate the functionality for non-custodial wallets to be generated on Hedera's DLT Network for each user, ensuring that they retain full ownership and control over their assets and private keys. These wallets will be used to manage SEALCOIN QAIT tokens, store cryptographic keys, and conduct transactions within the platform.

Additionally, users will have the option to connect their existing Ethereum Virtual Machine (EVM)-compatible wallets (such as MetaMask, Trust Wallet, or Ledger), providing seamless integration for those who prefer to use a wallet they already control. This ensures flexibility and compatibility with other DLT Network-based assets and services, while maintaining the platform's focus on secure, decentralized interactions.

3.5.2 Fraud detection and misusage of the Platform

To enhance security, compliance, and control within the SEALCOIN platform, SEALCOIN Admin may consider the development of restriction functionalities. These tools could potentially be implemented to manage accounts and tokens in specific scenarios where regulatory requirements, security risks, or misuse concerns arise. While these functionalities are not guaranteed, their exploration would aim to strike a balance between user autonomy and necessary safeguards to protect the platform and ensure compliance.

Restriction Mechanisms

- **KYC Key**: Only accounts that have been explicitly authorized can be linked to the SEALCOIN token. If KYC verification for an account is revoked, all tokens in that account will be automatically frozen. This ensures that only compliant accounts are active within the ecosystem, preventing unauthorized or fraudulent actors from transacting.
- **Freeze Key**: This function allows SEALCOIN Admin to freeze transfers of tokens for a specific account. The Freeze Key must sign any transaction that involves freezing the token, effectively pausing the ability of the account to transfer or transact with SEALCOIN tokens.
- **Wipe Key**: A more comprehensive action than freezing, the Wipe Key allows SEALCOIN Admin to completely empty an account. This functionality might be used in extreme cases of misuse or violation of platform regulations, ensuring that any tokens held by the account are returned to the platform for security or compliance reasons.
- **Pause Key**: This function puts the entire token on pause, halting all operations related to the token across the platform. No transactions or operations can take place while the token is paused, giving SEALCOIN Admin the ability to prevent any activity in cases of platform-wide concerns or threats to security.

The **restriction mechanisms** outlined in this section are designed to provide a balanced approach to **security, compliance, and user autonomy** within the SEALCOIN platform.

While SEALCOIN Admin will never seek to exercise control over user-held tokens, these functionalities are made possible through **Hedera's DLT**, which offers built-in tools for account management and compliance. The availability of these features, and possible integration, highlights the platform's commitment to **flexibility and regulatory alignment**, ensuring that **regulators or law enforcement** can take appropriate action if needed.

By offering these types of tools, SEALCOIN ensures that while users have a high degree of freedom and control over their tokens, there are still safeguards in place to address **compliance violations, security threats,** or other **serious issues**. This balanced approach allows SEALCOIN to maintain the platform's integrity while respecting the autonomy of its users, promoting a secure and fair ecosystem for all participants.

Gradual Identity Management Approach

Decentralized Identity (DID) systems are crucial for promoting user sovereignty and ensuring data privacy in modern digital ecosystems. With advances in DLT Network and DLT technologies, DID solutions offer secure, decentralized identifiers that enhance user control and reduce reliance on centralized authorities. SEALCOIN platform aims to harness these innovations by integrating DID into its platform, empowering users to manage their digital identities autonomously. This approach will provide enhanced security and privacy, enabling seamless, trusted interactions within the SEALCOIN decentralized IoT ecosystem.

To ensure a smooth transition toward decentralized identity management, SEALCOIN platform will implement a phased approach to identity verification and management:

1. Initial Phase – Centralized Identity Provider:

At the outset, SEALCOIN platform will leverage from WiseID, a centralized identity provider powered by WISeKey, to handle user authentication and KYC/AML compliance when required. During this phase, the platform will prioritize security and user trust through an established, centralized provider.

2. Phase Two – Integration of Multiple Centralized Identity Providers:

As the ecosystem grows, SEALCOIN platform aims to expand its identity verification capabilities by enabling the use of multiple trusted centralized identity providers. This flexibility allows users to authenticate with providers of their choice, increasing convenience and accessibility while maintaining high security standards.

3. Outlook – Decentralized Identity (DID):

If feasible from a regulatory perspective, SEALCOIN platform intends to introduce Decentralized Identity (DID) solutions, allowing users to manage their identities independently of centralized authorities. DIDs will enable users and IoT devices to establish self-sovereign identities, verified and controlled entirely by the user. This decentralized approach ensures privacy, security, and full control over personal data, aligning with SEALCOIN platform's mission of fostering trustless, peer-to-peer interactions within the ecosystem.

By progressively transitioning from centralized to decentralized identity solutions, SEALCOIN platform ensures both regulatory compliance and long-term autonomy for users. This approach will safeguard the platform's integrity while supporting the evolution toward full decentralization.

3.6 Certificate Management

3.6.1 Certificate Issuance

SEALCOIN platform provides a secure and efficient service for issuing **digital certificates**, which act as unique **digital IDs** for devices within its ecosystem. These certificates are securely embedded into the devices, ensuring that each device is uniquely identified and authenticated, guaranteeing the integrity and authenticity of all device interactions on the platform. For advanced devices, some contain a **Secure Element** that safeguards cryptographic keys. SEALCOIN is already working with post-quantum service provider Partners (Section 11.2) to integrate **Quantum-Resistant Algorithms** into these secure elements, ensuring future-proof security against quantum threats.

The platform utilizes **Public Key Infrastructure (PKI)** to assign a unique digital identity to every connected device, which is managed throughout the device's lifecycle. The process of loading this identity into the device, known as **provisioning**, can occur at different stages: during the secure chip manufacturing process, at the point of device manufacturing, or even directly in the field, offering flexibility depending on the device's deployment environment.

At the heart of SEALCOIN platform's security model is the concept of **Root of Trust**. By employing **Public Key Cryptography** and **Digital Certificates**, the platform ensures that data—whether it be communication or firmware updates—is encrypted and signed by authentic devices. This "Root of Trust" forms the foundation of **Digital Trust**, enabling secure device communication and safe application of updates across the network.

As SEALCOIN's ecosystem expands, the platform will progressively integrate multiple trusted certificate providers. Initially, **INeS'** services (Partner Section 11.2) will serve as the primary certificate provider, offering a secure and compliant basis for device identity and transaction verification. As the platform matures, users will be able to choose from

a range of certificate providers, offering both **individuals** and **businesses** the flexibility to select the provider that best meets their specific security needs.

3.6.2 Standardization and interoperability

By adhering to industry and regulatory standards, the SEALCOIN platform not only enhances **security** and **trust** but also ensures **interoperability** of device certificates across the ecosystem. This allows devices from different manufacturers to seamlessly interact and authenticate within the SEALCOIN platform. Beyond secure identification, businesses and users can confidently protect their data and transactions, knowing they are in compliance with **globally recognized best practices** for security and interoperability, fostering a reliable and interconnected ecosystem.

3.7 Data and Energy Transactions

3.7.1 Automated Data Exchange

Devices will be able to securely exchange data with other devices within the platform. This feature will enable the seamless transfer of information, supporting use cases such as real-time data analytics, machine learning, and sensor data sharing.

3.7.2 Energy Trading

The SEALCOIN platform will enable **energy transactions** between IoT devices, allowing them to buy and sell excess energy in real time. This feature is especially valuable for **smart grids** and energy-intensive environments seeking flexibility. With many energy providers and power grid managers prioritizing flexible solutions, SEALCOIN platform aims to integrate **Electric Vehicle (EV) storage capabilities**, leveraging the upcoming bi-directional charging regulations for EVs. This will create new opportunities for energy trading, as EVs can act as both consumers and suppliers, enhancing grid efficiency and resilience.

3.8 Analytics and Monitoring Tools

3.8.1 Real-Time Monitoring

The platform will provide real-time monitoring tools that allow users to track device activity, transaction status, and network performance. These tools will help users manage their devices more effectively and ensure the smooth operation of their IoT infrastructure.

3.8.2 Advanced Analytics

SEALCOIN platform will offer advanced analytics capabilities, enabling users to gain insights from their data and optimize their IoT operations. These analytics tools will support a range of applications, from predictive maintenance to operational efficiency improvements.

4. Key Technologies

The SEALCOIN platform will leverage a combination of cutting-edge technologies to ensure security, scalability, and interoperability within the IoT ecosystem. At its core, the platform is powered by **Decentralized Ledger Technology (DLT)**, specifically **Hedera Hashgraph** (https://hedera.com/), which provides a secure and efficient infrastructure for processing transactions and maintaining data integrity.

4.1 Decentralized Ledger Technology (DLT) & Smart Contracts

Hedera Hashgraph, known for its high throughput and low transaction costs, serves as the backbone for SEALCOIN's decentralized architecture. All transactions between IoT devices are securely processed and validated on this ledger, ensuring transparency, immutability, and trust within the ecosystem.

Smart Contracts are utilized to automate and enforce the terms of service-for-payment exchanges between devices. These contracts enable autonomous, peer-to-peer interactions without the need for intermediaries, significantly reducing overhead and ensuring that agreements are executed efficiently.

4.2 Elliptic Curve Cryptography (ECC) & Secure Communication

The SEALCOIN platform uses **Elliptic Curve Cryptography (ECC)** to ensure secure device authentication and transaction signing, leveraging its efficiency and strong security, which are ideal for IoT environments. Specifically, the **secp256k1** curve is used for signing SEALCOIN transactions, aligning with the standards of **Hedera Hashgraph**, the distributed ledger technology that powers the ecosystem. This ensures seamless compatibility with the Hedera network while providing robust protection for cryptographic operations.

For secure communication, the platform supports both **ECC** and **RSA**, allowing flexibility based on the device's security needs. Devices can use state of the art cryptography methods, depending on the specific requirements. Communication is encrypted through **HTTPS** when connecting to the platform to retrieve operational certificates as an example, and **WebSocket Secure (WSS)** is used for real-time encrypted data exchange between devices, ensuring the integrity and confidentiality of all interactions.

SEALCOIN platform will leverage the experience and on-going efforts of SEALSQ (read more about our Partner in section 11.2) around **post-quantum cryptography (PQC)**, to ensure a future-proof architecture that will survive the advent of quantum computers and their inherent risks for platforms based on traditional cryptography.

4.3 Non-Custodial Wallets & Role-Based Access Control (RBAC)

The SEALCOIN platform integrates **non-custodial wallet technology**, giving users full control over their digital assets and private keys. This ensures enhanced privacy and security, as users maintain ownership of their data and funds, without reliance on intermediaries.

The platform also incorporates **Role-Based Access Control (RBAC)**, enabling companies and individual users to assign specific roles and permissions within the system. This structured access ensures that only authorized users and devices can interact within the SEALCOIN ecosystem, reducing the risk of unauthorized transactions or misuse of the platform.

4.4 Internet of Things (IoT) in the SEALCOIN Ecosystem

IoT devices play a critical role in the SEALCOIN ecosystem, and specific certification and communication standards are required for their participation.

Device Certification Requirements: IoT devices must have a valid certificate embedded during production to verify authenticity. Nevertheless, upon connecting to the SEALCOIN platform, devices will have the opportunity to purchase and obtain a certificate via a secure HTTPS connection to communicate securely with other devices, for security or interoperability reasons.

Transaction Handling: IoT devices in the SEALCOIN ecosystem are capable of creating, signing, and sending SEALCOIN QAIT token transactions autonomously. These

transactions are validated on the Hedera network, ensuring secure and immutable service-for-payment exchanges between devices.

4.5 SEALCOIN Agent & Transaction Management

To streamline these operations, SEALCOIN AG has developed the **SEALCOIN Agent**, a software installed on IoT devices that simplifies communication, service negotiation, and transaction handling. The agent allows devices to interact with the platform, securely retrieve information, and send transactions on the DLT, all while maintaining data integrity through the use of **Secure Elements**.

4.6 Secure Elements & Cryptographic Operations

To enhance security, SEALCOIN AG recommends the integration of **Secure Elements (SE)** or similar Hardware protections. These hardware components are designed to handle sensitive data, such as cryptographic keys, and conduct secure signing operations. By using Secure Elements, IoT devices can safely perform cryptographic tasks, including signing transactions, without exposing private keys to potential threats. Our current Partners are already working on integrating post-quantum resistant Secure Element capabilities into their next generation of micro-controllers.

To further enhance operational control, the platform offers **real-time monitoring** and **advanced analytics tools**. These features provide users with valuable insights into their IoT device operations, allowing them to optimize performance and ensure smooth interactions within the ecosystem.

5. QAIT Token

5.1 Token Classification according to FINMA

SEALCOIN operates under Swiss law, with all token issuance and platform operations adhering to the regulatory framework established by FINMA, the Swiss Financial Market Supervisory Authority.
FINMA issued guidelines in 2018 to classify tokens used in Initial Coin Offerings (ICOs) into three main categories:

- **Payment Tokens**: These are synonymous with cryptocurrencies and are intended to be used as a means of payment for acquiring goods or services, or for the transfer of money and value. They do not represent any claims on the issuer.

- **Utility Tokens**: These provide access to a digital application or service, often on a DLT Network-based platform. Utility tokens are not intended to function as a means of payment but to grant users access to a specific application or service.

- **Asset Tokens**: These represent assets such as participation in real physical underlying companies, or earnings streams, or an entitlement to dividends or interest payments. In terms of their economic function, these tokens are analogous to equities, bonds, or derivatives.

In practice, many tokens exhibit characteristics of more than one category, leading FINMA to adopt a flexible approach that considers the primary function of the token. Additionally, tokens that function similarly to securities are treated under Swiss securities law, requiring more stringent regulatory compliance.

SEALCOIN QAIT token is classified as both a **utility token**, providing access to platform services, and a **payment token**, facilitating transactions within the ecosystem.

It is important to note that SEALCOIN QAIT token is **not an asset token** because it is designed as a **functional utility token** that will only be issued once the platform is operational. Unlike asset tokens, which represent financial rights to a company's profits or assets, SEALCOIN QAIT token is intended for use within the platform for **accessing services** and **facilitating transactions** between IoT devices. It is a utility token that enables real-time energy services, data exchanges, and other IoT services that will be continuedly integrated as the ecosystem grows. SEALCOIN QAIT token's purpose is tied directly to the **functionality** of the platform, not speculative investment.

5.2 Core Utility of the QAIT Token

The SEALCOIN QAIT token serves as a multifunctional access tool within the SEALCOIN ecosystem. It provides users with digital access to a broad range of IoT applications and services, enables the unlocking of premium content and specialized features, and ensures secure, seamless interaction across the IoT network. With the integration of the Proof-of-Security (PoSy) mechanism, the QAIT token combines security, economic incentives, and governance to foster a resilient and scalable IoT network.

5.2.1 Hybrid model: Utility & Payment

The SEALCOIN tokenomics framework is designed to optimize efficiency, scalability, and security while adhering to fundamental principles of unit economics and financial sustainability.

The SEALCOIN ecosystem provides a secure and streamlined way to onboard IoT devices, ensuring all devices meet minimum security standards and possess valid authentication certificates before integration. This guarantees trusted, verified participation within the decentralized network.

The QAIT token serves as the backbone of the SEALCOIN ecosystem, a secure and decentralized environment for Internet of Things (IoT) devices to conduct peer-to-peer transactions and data exchanges. The QAIT token integrates a Proof-of-Security (PoSy) mechanism that aligns governance, token utility, and economic incentives.

At its core, the SEALCOIN PoSy model incentivizes high-volume participation by granting enhanced network privileges to entities that commit significant token lockups. This mechanism mitigates the risk of bad actors while promoting a safe ecosystem for IoT device onboarding and security.

The QAIT token serves as a critical enabler within this decentralized infrastructure, ensuring seamless access to SEALCOIN Platform and secure integration of IoT devices. Its primary utility functions include:

1. **Securing IOT Devices** - Strengthening device authentication and network integrity.
2. **Validates Intercommunication and Data Exchange of IOT Devices** - Ensuring reliable and tamper-proof transactions among IoT devices.
3. **Device to Device IoT Payment and Payment** Platform - Powering decentralized device-to-device (D2D) payments within the ecosystem.

5.2.2 QAIT tokens - Utility Principles:

To maximize the utility of the SEALCOIN platform, QAIT token holders are encouraged to lock up their tokens to enable the bulk secure and pre-validated registration of IoT devices. This **PoSy** mechanism ensures that only verified and trusted devices gain access to the network, reinforcing the security and reliability of the SEALCOIN ecosystem.

The allocation and usage of pre-validation slots follow these key principles (as examples):

- The number of pre-validation slots is limited.
- The number of pre-validation slots is released over time in controlled increments to balance demand and availability.
- The quantity of tokens locked determines the number of pre-validation slots allocated to a participant.
- Tokens must remain locked for the entire duration that the allocated pre-validation slots are utilized.

This allocation methodology can involve contributions from original participants, community members, and third-party contributors, ensuring a decentralized and participatory system for token locking and device onboarding.
To effectively track and measure the performance of **PoSy Pools** managing pre-validated device slots, the following metrics must be recorded and will be provided by SEALCOIN platform:

- Number of QAIT transactions per device – Measures the transactional activity of each registered IoT device.
- Number of devices registered within a **PoSy Pool**.
- Percentage of slots with active IoT devices vs. total available.
- Total number of transactions generated by the **Pool** – Quantifies overall network activity and value creation.
- Transaction-Based **Pool** Incentives – Participants are rewarded for their contribution to the security of the ecosystem.

Transaction-Based Pool Incentives: IoT device remains part of a secure registration PoSy Pool by allocating a small percentage of each transaction generated by a registered IoT device to the PoSy Pool. This mechanism reinforces security, traceability, and economic incentives within the SEALCOIN ecosystem. This transaction serves the following key purposes:

- **Continuous Security**: Each transaction initiated by a registered IoT device contributes a fraction of QAIT tokens to the device security pool. This mechanism provides a dynamic and traceable proof of an IoT device's transactions, verifying its source and authenticity in real time.
- **PoSy Pool Incentives**: A portion of the QAIT transaction fees is redistributed to pool coordinators and participants who contribute to securing and validating IoT devices. This economic incentive encourages long-term participation and strengthens the overall security framework of the ecosystem.

These utility principles encapsulate the fundamental roles of the QAIT token within the SEALCOIN ecosystem:

- Identifying, Securing, and Validating IoT Devices – Ensuring that only trusted and authorized devices can participate in the network.
- Identifying, Securing, and Validating IoT Device Data – Establishing verifiable and immutable records of IoT device interactions.
- Identifying, Securing, and Validating Payments Between IoT Devices – Facilitating trusted, peer-to-peer IoT transactions with built-in security measures.

By implementing these PoSy mechanisms and transaction-based incentives, the QAIT token serves as the foundation for a secure, scalable, and economically sustainable IoT device network within the SEALCOIN ecosystem.

5.2.3 Proof of Security (PoSy) Pools and device onboarding

Regardless of the chosen onboarding path—paid certificate or joining a PoSy pool—all devices must meet SEALCOIN's minimum security standards and possess valid authentication certificates before being integrated into the ecosystem.
SEALCOIN establishes a baseline security requirement for all devices, ensuring fundamental protection measures are met. However, pool participants can implement additional security policies tailored to their specific use cases, further enhancing protection, transaction reliability, and governance within their private networks.

- Pools handle the onboarding processes of IoT devices, ensuring security and efficiency, on top of the core security of the platform, to adapt to specific application types.
- Pools receive a percentage of transaction fees generated by active devices.
- Pools must maintain a minimum locked amount of QAIT tokens to operate, ensuring alignment with the network's security and reliability goals.
- Users can lock their QAIT tokens in one of several available pools. Locked tokens secure device certificates, providing the required Proof of Security ratio. This feature ensures that the ecosystem remains secure by correlating the amount locked (QAIT tokens) with the number of certificates issued to devices.
- The ratio of QAIT tokens locked to the number of active certificates ensures adequate security coverage. A higher ratio signifies stronger capability.
- Devices found submitting invalid or malicious transactions lead to penalties, reducing the locked QAITs. If a device is flagged as compromised, a portion of the locked QAIT is forfeited.
- Devices not generating transactions for a specified period result in no incentives for the associated participants.

5.2.4 Device Upload Mechanism

- Enterprises and users can upload devices to the network by locking the required QAIT tokens for each device during onboarding.
- These devices are validated and subsequently integrated into the network.
- Pools must meet minimum locking requirements to be allowed to upload multiple devices.
- Pools can require **KYO (Know Your Object)**, a specific device onboarding similar to how individuals undergo KYC (Know Your Customer) verification in banking services. It is particularly applicable in sectors like finance or defense, where heightened security and compliance are critical.

5.2.5 Real-Life Use Cases examples

Energy Provider Creating a Private Ecosystem

A major energy provider wants to establish a private, decentralized ecosystem where all smart meters, energy storage units, and EV charging stations can communicate and transact autonomously. Using SEALCOIN's PoSy model, the provider sets up a dedicated pool to govern its devices network. Through smart contracts, all devices within the ecosystem verify transactions securely, ensuring energy is distributed efficiently while maintaining full governance control. The provider can set custom security measures, manage transactional rules, and optimize the network's performance – all while maintaining data integrity and trust in a decentralized manner.

User Benefiting from an Existing Pool

An individual user looking to integrate their smart home energy system into the SEALCOIN ecosystem can join an existing PoSy pool. Associating his devices with locked tokens in a shared pool, the user gains access to advanced energy trading services, including automated energy purchases, predictive pricing analytics, and access to live trading exchange. This approach removes onboarding complexity, allowing users to access high-value IoT services without independently managing device security and governance.

5.2.6 Rewards Distribution

Registered devices generate transaction fees during service exchanges, contributing to the Security Reward Pool. Participants earn a percentage of the transactions generated by devices tied to their **PoSy Pool**. Rewards depend on i) number of transactions; ii) average transaction amount, iii) number of devices.

Devices generating high transaction volumes contribute more to participants, tying rewards directly to ecosystem activity.

Participants' share of rewards is proportional to their contribution within the pool. Pools can determine how much of the reward to distribute to participants and can compete against other pools to gain more features within the ecosystem (e.g., a higher number of devices they can upload, better transaction terms, governance rights). Rewards are distributed periodically (e.g., weekly) from the Security Reward Pool.

5.2.7 Governance through Token Locking

The governance framework leverages the token locking mechanism to:

- **Empower Decision-Making:**
    - Token holders can propose and vote on key platform upgrades, economic changes, and validator policies.
    - Voting power is proportional to the number of tokens locked, ensuring alignment between governance influence and economic interest.
- **Align Incentives:**
    - By locking tokens, participants signal their long-term commitment to the platform's growth and success.
    - Validators, enterprises, and token holders collaborate to maintain a secure and efficient ecosystem.

5.2.8 Smart Contract-Orchestrated Pools

PoSy Pools operate under smart contract governance, offering two key configurations to ensure flexibility and security for participants.

Without a Locking Period

Participants can withdraw their tokens at any time.
When withdrawing, associated devices will either be paused (authentication certificate revoked) or reallocated to other tokens within the pool (if available).
If no tokens are available, device operators are notified and given the choice to re-activate via paid certificates or join a new pool.

With a Locking Period

Tokens are locked for a predefined duration (validity period), after which they are automatically released back to the owner.
At the end of the lock period, device authentication certificates are revoked, pausing the devices within the network.
At no point are the locked funds accessible to the SEALCOIN platform, as all transactions and token holdings remain non-custodial within the smart contract.

5.2.9 Tiered Participation Structure

The SEALCOIN ecosystem introduces tiered token holder levels, offering enhanced rewards and governance rights based on the volume of locked QAIT tokens. This gamified approach encourages deeper ecosystem engagement and long-term loyalty.

TIOT required (equivalent in $)	Explorer (≤ $60K) No Pool < 2M	Builder ($60K - $1.5M) 2M – 50M TIOT	Innovator ($1.5M - $4.5M) 50M – 150M TIOT	Visionary (≥ $4.5M) +150M TIOT
IoT Device Registration	✅ Basic (Single)	✅ Bulk Registration	✅ Advanced w/ Automation	✅ Unlimited w/ API Integration
KYO (Know Your Object)	❌	✅ Basic KYO	✅ Advanced KYO	✅ Tailor-Made KYO
Transaction Fees Discount	❌	✅ 5%	✅ 10%	✅ 15%
Data Trading	✅ Limited	✅ Limited	✅ Priority Access	✅ Unlimited and Priority Access
Access to Energy Storage Marketplace	✅ Delayed Access	✅ Priority Access	✅ Live Trading Enabled	✅ Private Trading Network
Access to Energy Trading Marketplace	✅ Delayed Access	✅ Priority Access	✅ Live Trading Enabled	✅ Private Trading Network
Device Certificate Renewals	❌	❌	✅ Free Renewals	✅ Lifetime Free Renewals
Custom Dashboard	✅ Standard Dashboard	✅ Standard Dashboard	✅ Standard Dashboard	✅ Tailor-Made Dashboard
Predictive Analytics & AI Insights	❌	❌	✅ Limited Insights	✅ Full Predictive Suite
Private Network Access	❌	❌	❌	✅ Exclusive Private Network
Data Monetization Features	❌	✅ Basic	✅ Advanced	✅ Full Custom Monetization
Early Access to New Features	❌	✅ Limited Beta Access	✅ Early Adoption	✅ Priority & Custom Features
VIP Support & Consulting	❌	✅ Standard Support	✅ Priority Support	✅ Dedicated Consulting & Strategy
Governance & Voting Rights	❌	❌	✅ Partial Voting Power	✅ Full Voting & Proposal Rights
AI Agents	❌	✅ AI access by default	✅ Connectivity to AI Agents	✅ Tailor-Made AI Agents
Rewards for Securing SEALCOIN	❌	✅ Based on Tx Fees	✅ Based on Tx Fees	✅ Based on Tx Fees

SEALCOIN's PoSy framework ensures that all devices are securely onboarded, providing trusted authentication, governance flexibility, and a scalable economic model for device-to-device transactions. Whether participants establish their own secure pools or join existing ones, the framework guarantees security, decentralization, and interoperability, enabling a seamless, privacy-preserving, and automated IoT economy.

5.3 Services' Price Stability

The SEALCOIN QAIT token is designed to capture intrinsic value within its ecosystem, benefiting all participants. By implementing a fixed token supply, SEALCOIN ecosystem creates scarcity and potential value appreciation as demand grows. To manage price moves and protect participants' treasury management, transaction prices will be expressed and labeled in local currencies (e.g., USD, EUR), ensuring stable service pricing according to fiat currencies, while fluctuating in QAIT token. QAIT token combines utility and payment features, providing users with secure access to t-IoT applications and services, while facilitating seamless, decentralized transactions in the IoT landscape.

The SEALCOIN QAIT token hybrid Payment and Utility Token will be issued in conjunction with the platform's launch. This token will serve as the primary medium of exchange within the SEALCOIN ecosystem, enabling users to access services, manage transactions, and participate in the decentralized marketplace.

5.3.1 Tokenomics frameworks

The SEALCOIN QAIT tokenomics model is built on three interconnected components to establish fair value pricing, simulate token distribution scenarios, and analyze the impact of token emissions on market velocity. First, the **CadCad Valuation Model** calculates the fair value of the token, its terminal velocity, and the final daily transaction values. The **Excel Configuration Sheet** then helped us to configure token distributions based on business requirements, integrating results from the velocity analysis. Finally, the **CadCad Emission Model** assesses how different token emission schedules affect market velocity under various growth conditions, using a parameter sweep to explore these scenarios. This integrated model ensures a balanced approach to token distribution and value management.

5.3.2 Sizing SEALCOIN QAIT market

The SEALCOIN QAIT tokenomics model uses a comprehensive approach to calculate the fair value of the token, focusing on growth projections, transaction volumes, and energy trading within the IoT ecosystem.

SEALCOIN AG will issue a fixed supply of 10 billion SEALCOIN QAIT tokens, each valued at $0.03 USD. This supply is strategically aligned with the projected growth of the IoT ecosystem over the next 10 years, targeting key areas such as authentication certificates, energy trading, and the emerging data exchange market.

Token role: SEALCOIN QAIT token enables secure, autonomous transactions and supports the growth of the IoT marketplace by providing the necessary infrastructure for both service access and financial settlements.

Maximum Supply (Fixed): 10'000'000'000 - No new QAIT will be created
Symbol: QAIT
Initial Price: 1 QAIT = 0,03 USD

With a fixed supply of 10 billion tokens, SEALCOIN QAIT token value is tied to the expanding demand for IoT services over time. As the market for decentralized authentication, energy trading, and data exchange grows, the demand for SEALCOIN QAIT token is expected to increase, creating a deflationary effect as a result of a finite supply being allocated across an ever-expanding use case base.

- **Initial Value:** SEALCOIN QAIT token will launch at $0.03 USD each, reflecting the long-term potential to capture significant market value across multiple sectors in the IoT ecosystem.
- **Deflationary Model:** While SEALCOIN AG will not introduce a burn mechanism, the fixed supply combined with growing demand will naturally create a deflationary pressure on the token, as a larger number of IoT devices and services compete for a limited number of tokens.

Initially, SEALCOIN QAIT token will be available for purchase directly from **SEALCOIN AG**, allowing users and businesses to acquire tokens during the early stages of the platform's launch. As the ecosystem matures, SEALCOIN QAIT token will also become available on **regulated exchanges**, providing greater accessibility and liquidity to the market. This phased approach ensures that tokens are initially distributed in a controlled and compliant manner, while eventually expanding availability to a broader audience through established exchange platforms.

6. Use Cases

6.1 Device-to-Device Transactions (Transactional-IoT)

In a Transactional-IoT (t-IoT) environment, the SEALCOIN platform revolutionizes the way IoT devices interact by enabling secure, automated transactions without the need for intermediaries. This use case illustrates the practical application of SEALCOIN ecosystem in a scenario where two smart devices independently negotiate and execute a service-for-payment exchange.

Example of Autonomous Drone Battery Recharge

Imagine a fleet of delivery drones operating in a smart city, each equipped with the ability to autonomously manage its own energy needs. These drones rely on a network of charging stations strategically placed throughout the city to ensure they can complete their delivery tasks efficiently.

6.1.1 Scenario

A drone is completing a delivery route and recognizes that its battery is running low. Rather than returning to a central hub or relying on human operators to manage the recharge process, the drone autonomously identifies the nearest available charging station. The charging station is also part of the SEALCOIN ecosystem, meaning it can autonomously communicate and transact with other devices using SEALCOIN QAIT token.

6.1.2 Transaction Process

a. Negotiation
The drone and the charging station initiate communication through the SEALCOIN platform. Using smart contracts, they negotiate the terms of the transaction, including the cost of the battery recharge, the amount of energy required, and the expected time for completion.

b. Authentication
The drone's identity is verified using its secure digital certificate stored in its microcontroller. This ensures that the transaction is legitimate and that the drone is authorized to use the charging station. Simultaneously, the charging station's

credentials are authenticated to confirm that it is a trusted service provider within the SEALCOIN ecosystem.

c. Payment Execution
Once the terms are agreed upon, the drone's associated SEALCOIN wallet automatically transfers the required amount of SEALCOIN QAIT token to the charging station's wallet. This payment is executed on the DLT, ensuring a secure and transparent transaction that is recorded on Hedera's Network used by SEALCOIN platform.

d. Service Delivery
After the payment is confirmed, the charging station begins the battery recharge process. The smart contract monitors the progress of the recharge and ensures that the service is delivered as agreed.

e. Completion and Settlement
Upon successful completion of the recharge, the smart contract finalizes the transaction. Both the drone and the charging station receive digital receipts for the transaction, which are stored on the DLT for future reference, and unable to be modified.

6.1.3 Benefits

The entire process is automated, enhancing **efficiency** by eliminating the need for human intervention and reducing downtime for the drone. **Security** is ensured through the use of secure microcontrollers and Decentralized Ledger Technology, which make the transaction tamper-proof and protect the identities and credentials of both parties. **Transparency** is achieved by recording the transaction on the DLT, providing a clear and auditable trail of the exchange. Additionally, the removal of intermediaries minimizes transaction costs, making the process **more cost-effective** for both the drone operator and the charging station provider.

In this use case, SEALCOIN platform showcases its ability to facilitate seamless, secure, and efficient transactions in a t-IoT environment, paving the way for a more autonomous and interconnected world.

6.2 Secure Energy Trading in Smart Grids

In the evolving landscape of smart grids, SEALCOIN platform aims to play a transformative role by enabling peer-to-peer (P2P) energy trading. Homeowners with solar panels can use SEALCOIN tokens to directly sell excess energy to other consumers or devices within the grid, fostering a secure, decentralized energy distribution system.

However, it is important to note that Swiss law imposes certain restrictions on whom energy can be sold to, and similar laws may exist in other countries. This use case will be carefully analyzed from an energy law perspective before implementation.

Example of Peer-to-Peer Energy Trading in Smart Grids

6.2.1 Scenario

A smart grid is a modern electricity network that integrates advanced digital communications and control technologies to improve the efficiency, reliability, and sustainability of electricity distribution. Within this smart grid, multiple households are equipped with solar panels that generate renewable energy. On sunny days, some homeowners produce more electricity than they can consume, leading to surplus energy. Traditionally, this excess energy might be sold back to the grid at fixed rates, often set by utility companies. However, with SEALCOIN Platform, these homeowners can take a more active role in the energy market.

6.2.2 Transaction Process

a. Energy Generation and Surplus Identification

Homeowners with solar panels monitor their energy production in real-time using smart meters connected to the SEALCOIN platform. When a surplus of energy is detected, the homeowner can choose to sell this excess energy to a company, individual, or device at a negotiated rate, rather than storing it or selling it back to the grid at a lower rate.

b. Marketplace Creation

The SEALCOIN platform facilitates a decentralized marketplace where homeowners can list their surplus energy for sale. This marketplace operates on a peer-to-peer model, allowing other consumers, such as nearby households or even electric vehicles (EVs), to purchase the energy directly.

c. Negotiation and Smart Contracts

Potential buyers, who may be looking to purchase energy at a more competitive rate or during peak demand times, browse the available energy listings. Once a buyer is identified, a smart contract is automatically generated on the SEALCOIN platform. The smart contract outlines the terms of the transaction, including the amount of energy being sold, the price in SEALCOIN QAIT token, and the time of delivery.

d. Authentication and Validation

The SEALCOIN platform uses secure DLT to validate the identities of both the seller and the buyer. The seller's energy source is verified through a digital certificate associated with the smart meter, ensuring the legitimacy of the energy being sold. The buyer’s

credentials are also authenticated, ensuring they have the necessary SEALCOIN QAIT token to complete the purchase.

e. Payment Execution and Energy Transfer

Once the smart contract is agreed upon and validated, the buyer's SEALCOIN QAIT token are transferred to the seller's wallet. The smart grid technology then facilitates the actual transfer of energy from the seller's home to the buyer's location. This transfer is monitored and recorded on Hedera's Network, ensuring transparency and accuracy in the transaction.

f. Settlement and Record-Keeping

After the energy transfer is complete, the transaction is finalized, and both parties receive digital receipts stored on Hedera's DLT. This record-keeping ensures that all transactions are traceable, auditable, and immutable, providing a high level of security and trust within the smart grid ecosystem.

6.2.3 Benefits

SEALCOIN Platform enables a truly **decentralized energy market** in which individual homeowners can function as independent energy producers and sellers, bypassing traditional utility companies. The peer-to-peer trading system enhances **efficiency** by reducing energy transmission losses, as consumers can purchase energy from nearby sources rather than relying on distant power plants. This approach also provides **economic incentives** for homeowners, allowing them to sell their surplus energy at market-driven rates and potentially earn more than they would by selling it back to the grid at fixed utility rates.

By diversifying the sources of energy within the grid, SEALCOIN ecosystem enhances the overall **security and resilience** of the energy supply, making the system less vulnerable to centralized failures. Additionally, encouraging the use of locally produced renewable energy **helps to reduce the carbon footprint** associated with long-distance energy transmission and promotes the broader adoption of green energy solutions.

In this use case, the SEALCOIN platform demonstrates how **DLT** can enable a decentralized, efficient, and secure energy market. By facilitating **P2P energy trading** within smart grids, the platform empowers homeowners to actively participate in the energy economy, contributing to a more sustainable future. Additionally, energy transporters can be **compensated for energy transactions**, providing much-needed flexibility to their grids. This ensures that the grid infrastructure remains stable and adaptable while supporting the growing demand for decentralized energy distribution.

6.3 Automated Supply Chain Management

In the realm of supply chain management, SEALCOIN QAIT token and SEALCOIN platform offer a groundbreaking approach to automating and securing the exchange of goods and services. By integrating smart contracts, the platform enables seamless, real-time transactions between suppliers, manufacturers, and other stakeholders in the supply chain, minimizing the need for manual intervention and significantly enhancing efficiency, transparency, and security.

6.3.1 Scenario

Consider a complex supply chain that spans multiple countries and involves various stakeholders, including raw material suppliers, manufacturers, distributors, and retailers. Traditionally, managing this supply chain requires significant manual oversight to monitor inventory levels, place orders, and process payments. This manual process is often prone to delays, errors, and inefficiencies, leading to increased costs and the risk of supply chain disruptions.

6.3.2 SEALCOIN's Role

SEALCOIN platform introduces a decentralized, automated solution for managing these supply chain processes. By leveraging DLT and smart contracts, the platform facilitates the secure, real-time exchange of goods, services, and payments within the supply chain.

6.3.3 Process Overview

a. Inventory Monitoring

The SEALCOIN platform connects to the inventory management systems of manufacturers and suppliers. T-IoT-enabled devices and sensors track inventory levels in real-time, feeding this data into the SEALCOIN ecosystem. For example, a manufacturer's warehouse might monitor the stock levels of raw materials like steel or plastics.

b. Smart Contract Activation

When inventory levels fall below a predefined threshold, a smart contract is automatically triggered on the SEALCOIN platform. This smart contract contains the terms of the order, including the quantity of goods required, the price, and the delivery schedule. The smart contract eliminates the need for manual purchase orders, reducing administrative overhead and the potential for human error.

c. Supplier Notification and Order Fulfillment

The smart contract immediately notifies the relevant supplier of the order. The supplier's system, integrated with the SEALCOIN platform, processes the order autonomously. The goods are prepared for shipment, and the supplier's IoT devices update Hedera's Network with the status of the order, providing real-time visibility to the manufacturer.

d. Payment Processing

Once the order is confirmed and the goods are dispatched, the smart contract automatically initiates the payment process. SEALCOIN QAIT token are transferred from the manufacturer's wallet to the supplier's wallet. This payment is executed securely and instantly, ensuring that the supplier is compensated without delays.

e. Logistics and Tracking

As the goods move through the supply chain, IoT-enabled tracking devices provide real-time updates to the SEALCOIN ecosystem and Hedera's public DLT. The manufacturer and other stakeholders can monitor the shipment's progress, including its location, estimated delivery time, and any potential delays.

f. Goods Receipt and Final Settlement

Upon receipt of the goods, the manufacturer's system verifies the delivery against the order details stored in the smart contract. If the delivery is accurate and complete, the smart contract finalizes the transaction, recording the successful exchange on Hedera's DLT Network. In case of discrepancies, the smart contract can automatically initiate dispute resolution processes.

6.3.4 Benefits

The SEALCOIN ecosystem **automates** critical supply chain processes, including inventory management, order placement, and payment processing, which significantly reduces the need for manual oversight and speeds up the entire supply chain. The use of DLT technology ensures that all transactions and movements of goods are recorded in an immutable ledger, providing all stakeholders with real-time, **transparent access** to supply chain data.

Security is enhanced through SEALCOIN QAIT token and smart contracts, which offer a secure and tamper-proof method for executing and recording transactions, thereby reducing the risk of fraud and maintaining the integrity of the supply chain. By minimizing manual intervention, SEALCOIN platform **improves efficiency** by reducing errors, lowering operational costs, and accelerating the flow of goods and payments. Additionally, smart contracts on the SEALCOIN platform can include predefined conditions **for dispute resolution**, automatically addressing discrepancies in orders or deliveries and ensuring that issues are resolved quickly and fairly.

Consider a large electronics manufacturer that relies on multiple suppliers for components like microchips, batteries, and circuit boards. Using the SEALCOIN platform, this manufacturer can automate the ordering process when stock levels of these components drop. A smart contract triggers orders to the respective suppliers, who then fulfill these orders without the need for human intervention. Payments are automatically processed in SEALCOIN QAIT token as soon as the components are dispatched, ensuring that suppliers are compensated promptly. The entire process, from ordering to payment, is recorded on Hedera Network, providing an auditable trail and reducing the risk of disputes.

In this use case, SEALCOIN ecosystem modernizes supply chain management by introducing a decentralized, automated system that enhances efficiency, security, and transparency. By removing intermediaries and reducing manual processes, SEALCOIN platform enables a more resilient and responsive supply chain, capable of meeting the demands of modern, globalized markets.

6.4 Decentralized Data Marketplace

The current data market, valued at $800 billion, is largely built on **statistical approximations**, which often deviate from actual realities but are still deemed sufficient for various industries. However, the SEALCOIN platform revolutionizes this by ensuring that data flows are **initiated directly by IoT devices**, free from manipulation. This genuine, unaltered data provides a solid foundation for creating a decentralized **data oracle** (case study described below), where the integrity and authenticity of the data can be fully trusted, driving a more transparent and reliable data economy.

Traditionally, this data is siloed, often managed by central authorities or large corporations, limiting accessibility and monetization opportunities for smaller entities. SEALCOIN platform introduces a decentralized marketplace that empowers IoT devices to autonomously buy and sell data in a secure and transparent environment. This marketplace not only democratizes access to valuable data but also ensures its authenticity and integrity through DLT verification.

6.4.1 Scenario

Imagine a network of environmental sensors deployed across a city, each collecting data on air quality, temperature, humidity, and pollution levels. These sensors are owned by various entities, including local government agencies, research institutions, and private companies. Traditionally, accessing this data would require navigating complex data-sharing agreements and intermediaries, often leading to inefficiencies and limited

access. However, with SEALCOIN platform, these devices can autonomously participate in a decentralized marketplace, offering their data directly to interested buyers.

6.4.2 SEALCOIN's Role

SEALCOIN QAIT token facilitates the exchange of data within this decentralized marketplace. IoT devices use the SEALCOIN QAIT token to monetize their data, while purchasers use SEALCOIN QAIT token to acquire data. SEALCOIN platform operates on the Hedera network, with Hedera's infrastructure ensuring that every transaction is secure, transparent, and verifiable, eliminating the need for intermediaries and reducing the risk of data manipulation or fraud.

6.4.3 Process Overview

a. Data Listing and Pricing

Each IoT device (e.g., environmental sensors) can autonomously list the data it collects on the SEALCOIN marketplace. The device owner sets the terms of the sale, including the type of data, frequency of updates, and price in SEALCOIN QAIT token. For example, a sensor measuring air quality could list hourly data reports at a specific token price. In this context, SEALCOIN platform could evolve into a **Data Oracle,** able to securely provide external data to smart contracts, enabling them to interact with real-world information and execute based on that data**.**

b. Data Discovery

Buyers, such as research institutions, smart city developers, or businesses, can browse SEALCOIN marketplace to discover available data. The platform provides tools for filtering and comparing data listings, allowing buyers to find the most relevant and reliable data sources. Buyers can evaluate the quality and relevance of the data based on metadata, historical performance, and user ratings, all securely stored on Hedera Network.

c. DLT-Based Verification

Before completing a purchase, buyers can verify the authenticity and integrity of the data through Hedera Network. The platform uses cryptographic signatures and timestamping to ensure that the data has not been tampered with since it was generated. This verification process builds trust between buyers and sellers, enabling secure transactions even in a decentralized environment.

d. Secure Data Transaction

Once a buyer selects the desired data, the transaction is executed through a smart contract on the SEALCOIN platform. The buyer transfers the agreed-upon amount of SEALCOIN QAIT token to the seller's wallet, and in exchange, the data is securely transmitted to the buyer. The smart contract ensures that both parties fulfill their obligations, automatically releasing the payment upon successful data transfer.

e. Post-Transaction Services

After the transaction, the SEALCOIN platform provides additional services, such as data storage, analysis tools, and API integrations. Buyers can use these services to further process and utilize the acquired data within their applications or systems. The platform also offers rating and review features, allowing buyers to provide feedback on the data quality, which is recorded on the DLT to guide future transactions.

6.4.4 Benefits

By removing intermediaries, SEALCOIN platform creates a truly **decentralized** marketplace where IoT devices can directly interact with buyers, fostering a more efficient and open data economy. IoT device owners can **monetize their data** by selling it instead of letting it remain unused or underutilized, which incentivizes the deployment of more sensors and the collection of diverse data types.

The DLT infrastructure ensures that **all data transactions are secure and verifiable**, establishing **trust** for both buyers and sellers; buyers can rely on the authenticity and accuracy of the data, while sellers are guaranteed fair compensation. Every transaction is recorded on the DLT Network, creating an **immutable audit trail** that reduces the risk of disputes and enhances the overall reliability of the marketplace. Additionally, the marketplace **democratizes access to valuable data**, allowing smaller entities, researchers, and innovators to obtain information that was previously restricted or expensive to access.

Consider a tech startup developing a new app that provides real-time air quality alerts to users. The startup needs access to granular environmental data from multiple locations to deliver accurate and timely alerts. Instead of negotiating individual data-sharing agreements with various sensor owners, the startup accesses the SEALCOIN marketplace. They purchase the necessary data directly from environmental sensors across the city, paying in SEALCOIN QAIT token. The startup verifies the data's authenticity through the DLT Network and integrates it into their app, offering a high-quality service to users. Meanwhile, the sensor owners earn SEALCOIN QAIT token, which they can reinvest in maintaining or expanding their sensor networks.

In this use case, SEALCOIN platform not only facilitates the efficient exchange of IoT data but also creates new economic opportunities within the IoT ecosystem. By enabling

secure, decentralized data transactions, the ecosystem fosters innovation, enhances collaboration, and accelerates the development of smart, data-driven applications.

6.5 Data Oracle

A data oracle is an entity or system that provides contextualized data to smart contracts on a DLT, enabling them to execute based on real-world information. In the context of SEALCOIN's decentralized marketplace for T-IoT data exchange, the platform could act as a trusted intermediary that delivers verified, real-time IoT data to smart contracts.

6.5.1 How SEALCOIN Could Function as a Data Oracle

a. Data Aggregation and Verification

SEALCOIN platform would collect and aggregate data from various IoT devices within its ecosystem. This data, such as environmental metrics from sensors, would be verified for accuracy and integrity through DLT-based mechanisms. SEALCOIN platform would ensure that the data fed into smart contracts is reliable and tamper-proof.

b. Smart Contract Integration

SEALCOIN platform could provide an interface or API that allows smart contracts on various DLT platforms to request and receive real-time data. For example, a smart contract on Ethereum or Hedera might need air quality data to trigger specific actions, such as adjusting HVAC systems in smart buildings. SEALCOIN platform, acting as the oracle, would supply this data directly from the verified T-IoT sensors.

c. Decentralized and Secure Data Feeds

As a decentralized oracle, SEALCOIN platform would distribute the task of providing data across multiple nodes, ensuring that no single point of failure or manipulation exists. This decentralization enhances the trustworthiness of the data provided to smart contracts.

d. Use Case Example

In the scenario where SEALCOIN platform facilitates peer-to-peer energy trading, the platform could also act as an oracle by providing real-time energy production and consumption data to smart contracts managing the trades. This ensures that transactions are executed based on up-to-date and accurate information.

6.5.2 Benefits of SEALCOIN as a Data Oracle

By leveraging its DLT verification mechanisms, SEALCOIN platform provides **highly reliable data** feeds to smart contracts, which are essential for automated decision-

making processes. Acting as a data oracle expands SEALCOIN's utility beyond merely facilitating transactions, positioning it as an integral part of the broader DLT ecosystem. Additionally, SEALCOIN platform could **monetize these services** by charging fees for providing oracle functions, thereby creating an additional revenue stream for the platform.

In conclusion, SEALCOIN platform's evolution into a data oracle would enhance its value proposition, enabling secure and reliable data-driven smart contract execution across various DLT applications. This role would solidify SEALCOIN platform's position as a crucial infrastructure component within the T-IoT ecosystems.

6.6 AI-Agent Autonomous Transactions

In the evolving digital economy, SEALCOIN platform enables autonomous AI agents to transact securely and independently, reshaping interactions across industries. This use case highlights how AI agents leverage SEALCOIN's decentralized platform to autonomously execute transactions and create value on behalf of their owners.

Example: Autonomous Inventory Management AI Agent

Consider a retail environment utilizing an autonomous Inventory Management AI Agent. This agent continuously monitors stock levels, anticipates demand using predictive analytics, and autonomously initiates procurement transactions to maintain optimal inventory levels.

6.6.1 Scenario

The AI agent detects that inventory for certain high-demand items is approaching the minimum threshold. Instead of human intervention, the agent autonomously engages certified suppliers within the SEALCOIN ecosystem to replenish the stock efficiently.

6.6.2 Transaction Process

a. Negotiation

The AI agent initiates autonomous negotiations with verified suppliers, defining terms such as quantity, price, delivery timelines, and payment conditions through SEALCOIN-enabled smart contracts.

b. Authentication

Each party's identity, both AI agent and supplier, is authenticated via SEALCOIN's cryptographic identity management system, utilizing secure digital certificates to ensure trusted interactions.

c. Payment Execution

Once terms are finalized, the AI agent's digital wallet automatically executes the payment using SEALCOIN QAIT tokens, securely recorded and verifiable on SEALCOIN's DLT infrastructure.

d. Service Delivery

Following payment confirmation, the supplier executes the delivery of goods. The entire delivery and compliance to contract terms are tracked autonomously by the AI agent through embedded IoT sensors.

e. Completion and Settlement

Upon successful receipt and verification of the inventory, the transaction concludes autonomously. The transaction record is securely stored on the decentralized ledger, providing an immutable audit trail.

6.6.3 Benefits

SEALCOIN's AI-Agent transactions significantly enhance operational efficiency by automating critical processes, reducing human error, and improving inventory accuracy. Security and trust are maintained through cryptographic identity verification, smart contract enforcement, and transparent blockchain transactions. The autonomy through secure authentication afforded to AI agents results in faster decision-making, optimized procurement processes, and reduced transaction costs, fostering a more agile and resilient operational environment.

7. Implementation Roadmap

7.1 Proof of Concept

As part of the SEALCOIN Proof of Concept (PoC) executed on July 25, 2024, we integrated advanced technology (called SEALCOIN Agent) within a semiconductor device to sign and verify transactions securely. This involved utilizing the Secure Element embedded in the device, which safeguards the private key and the digital certificate that represents the device's unique identity.

The Secure Element employs Elliptic Curve Cryptography (ECC), the same cryptographic standard used on the Decentralized Ledger Technology (DLT), ensuring seamless integration with the DLT. This allows the device to simultaneously authenticate itself and sign on-chain transactions, ensuring that every transaction is securely linked to the device's identity. The use of ECC ensures both high security and efficiency in handling transactions across the distributed ledger.

Full Summary of SEALCOIN PoC:

The PoC demonstrated the core functionalities of the future SEALCOIN platform, focusing on secure, autonomous transactions between IoT devices over a decentralized ledger. The test involved two IoT devices and two distinct wallets, showcasing how devices could seamlessly interact and perform secure transactions using SEALCOIN QAIT token.

a. **IoT Device Network**

Two IoT devices were connected, creating a secure communication channel, to simulate real-world interactions between devices. Each device was associated with a unique wallet ID, capable of conducting secure transactions through WebSocket Secure (WSS) over TLS, using each device's certificate.

b. **Wallet Interaction**

The demonstration illustrated the communication between two wallets (identified as Wallet ID 0.0.4620261 and Wallet ID 0.0.4620431), where devices initiated, signed, and verified transactions. Each transaction involved a set price in SEALCOIN QAIT token.

c. **Transaction Execution**

The PoC highlighted the ability to autonomously verify balances, accept pricing, and create, sign, and send transactions to the Hedera network. After each transaction validation, the Hedera network generated a receipt, confirming the transaction's successful execution. All interactions were logged on a publicly accessible DLT Network explorer (i.e. Hashscan).

d. **Data and Metrics**

In addition to financial transactions, the PoC demonstrated the capability of the system to exchange data (e.g., temperature readings), ensuring that both payment and data transmission are securely handled by SEALCOIN platform.

e. **Secure Element and ECC**

We integrated the technology within a semiconductor device to sign transactions securely. The Secure Element embedded in the device protects the private key and digital certificate, representing the device's unique identity. Using Elliptic Curve Cryptography (ECC), the device can simultaneously authenticate itself and sign transactions on the DLT, ensuring a high level of security and efficiency. This cryptographic standard is seamlessly compatible with Hedera Network.

6. **Automation**

The system facilitated automated transactions between IoT devices, eliminating the need for human intervention. This functionality underlines SEALCOIN platform's ability to support real-time, decentralized transactions in IoT ecosystems, especially in industries like energy trading and smart building management.

This successful PoC demonstrated SEALCOIN platform's potential to securely enable autonomous, decentralized transactions between IoT devices using DLT network, proving its readiness for real-world applications.

A short explanatory video is available on our Youtube's channel here.

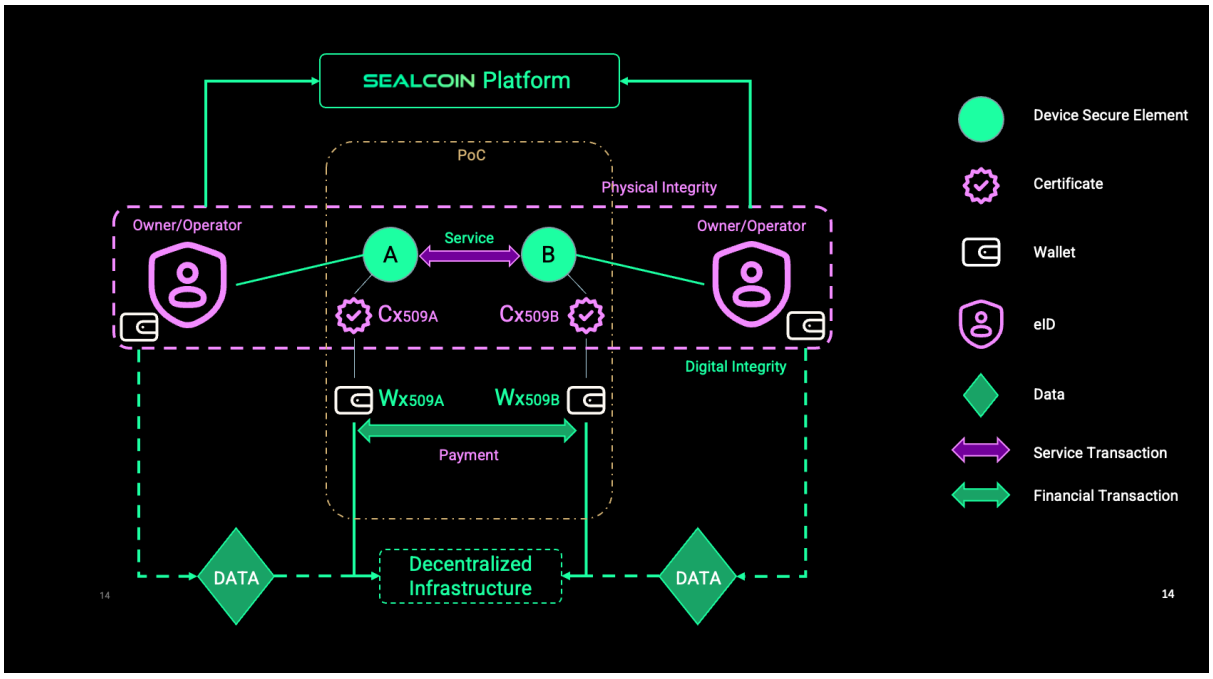


Illustration of SEALCOIN PoC ecosystem

7.2 Minimum Viable Product (MVP)

7.2.1 Platform onboarding

The platform will integrate Decentralized Ledger Technology, smart contracts, and secure hardware to enable autonomous transactions between IoT devices. The development phase will focus on building the platform's core functionalities, including device onboarding, transaction management, and token issuance.

This section outlines the user journey for a typical professional user who wishes to utilize the SEALCOIN ecosystem and is supported with the Platform Visuals provided as an Annexed document. In the go-live phase, referred to as the Minimum Viable Product (MVP), access to the SEALCOIN platform will be restricted to pre-registered professional users only.

These users will either have an existing KYC'd account linked to their email address or will create a WISeID account through a dedicated Know Your Customer (KYC) onboarding process. During onboarding, professional users will be associated with a specific organization, identified by a company name and domain name, ensuring that only employees of the specified organization can create an account. Each user will also be assigned specific roles and permissions in addition to the standard user profile.

As part of the onboarding process, SEALCOIN platform will generate a wallet, following Hedera SDK's specifications, and linked to the user's account. All wallets generated through the platform will be **non-custodial**, ensuring that users retain full ownership and control over their assets and personal information. To activate the account, the user must make a minimum deposit of USD 100 -or equivalent- into their own wallet (process described below). This deposit will be converted into SEALCOIN QAIT token, the ownership of which thereby granting the user access to the platform's services.

Once the user account is active, the user will have the opportunity to register devices on the platform.

Devices must be able to download the **SEALCOIN Agent** from the SEALCOIN platform to enable their transactional capabilities. Initially, this process may be handled manually, but over time, SEALCOIN platform will implement various solutions to automate and scale these software updates, ensuring seamless integration for a growing number of devices within the ecosystem.

The registration of devices involves entering detailed information about the device, including its properties and attributes, and verifying that the factory-issued certificate

authenticating the device is valid. To enhance security and comply with forthcoming regulations, each device registration will require to have an active certificate.

In addition to account creation, one of the initial utilities provided by the SEALCOIN platform is the ability to purchase and issue, when required, an authentication certificate using SEALCOIN QAIT token. This certificate serves as a personal identifier at the owner/operator level and will be securely provisioned into the device's Secure Element. Once this step is completed, the device's cryptographic keys will be added to the user's associated wallet, completing the device registration and tokenization process.

This tokenization process bridges the **physical security** of the **Public Key Infrastructure (PKI)** ecosystem with the **digital integrity** of **Decentralized Ledger Technology (DLT)**, specifically leveraging **Hedera's DLT** within the SEALCOIN ecosystem. This represents the Minimum Viable Product (MVP) of the SEALCOIN platform, which supports the utility of the **SEALCOIN QAIT token**. The token will be issued concurrently with this platform's version as go-live stage.

Furthermore, as demonstrated by our successful Proof of Concept (PoC), this process lays the foundation for Transactional-IoT, where two devices can securely communicate and conduct service-for-payment exchanges in a peer-to-peer manner. To facilitate this, a dedicated section named "Services" will be established within the platform at a later stage, allowing users to request and manage services, including, but not limited to, energy and data transactions.

The development of the SEALCOIN platform has officially commenced and is scheduled to be released in Q1 2025 on Hedera's Testnet as a Beta version. The issuance of the SEALCOIN QAIT token is organized to coincide with the production platform's release in Summer 2025. The SEALCOIN QAIT token will only be released if SEALCOIN AG is able to deliver a fully functioning SEALCOIN platform. Any delay of a functional platform in a live environment (not test) will delay the issuance of the SEALCOIN QAIT token.

7.2.2 Transaction Workflow

The transaction workflow for onboarding a user onto the SEALCOIN platform involves several key steps designed to ensure security, compliance, and seamless access to the platform's services. Here is an overview of how the process works:

Account Creation and Hedera Wallet Generation

User Registration: The user begins by registering on the SEALCOIN platform, providing necessary personal information and undergoing a Know Your Customer (KYC) verification process from WISeID, to ensure compliance with regulatory requirements.

Hedera Wallet Generation: Once the user's identity is verified, the platform automatically generates a Hedera wallet, following Hedera SDK's specifications, and links it to the user's account. This wallet is *non-custodial*, meaning the user retains full control over the private keys and, consequently, ownership of their assets. The platform does not have access to, or control, over the users' wallet. Holders of QAIT do not have a redemption right against the issuer.

Initial Deposit and Conversion

Minimum Deposit Requirement: To activate their account, users must make an initial deposit of at least **USD 100** or its equivalent in SEALCOIN QAIT token. This deposit will be sent to the user's newly created Hedera wallet.

Deposit Options

Bank Transfer: Users can transfer funds directly to SEALCOIN's bank account. Upon receipt, SEALCOIN Admin converts the deposit into SEALCOIN QAIT token and transfers them to the user's wallet.

Crypto Exchange: Users may purchase SEALCOIN QAIT token via a regulated crypto exchange integrated with the platform. This conversion takes place exclusively between the user and the regulated exchange.

WISeID KYC Verification: Users can also purchase QAIT from SEALCOIN Admin after completing KYC verification through WISeID, using liquid and adopted (top 20) cryptocurrencies.

The SEALCOIN QAIT token conversion is seamless and occurs within the platform's interface, ensuring that the user can easily acquire the necessary tokens to interact with the ecosystem.

Account Activation and Access to Services

Token Deposit Confirmation: Once the deposit is converted into SEALCOIN QAIT token and credited to the user's wallet, the platform verifies the transaction. Upon confirmation, the user's account is fully activated.

Access to Services: With an activated account and SEALCOIN QAIT token in their wallet, the user can now access and utilize the various services offered on the SEALCOIN platform. These services include registering IoT devices, purchasing authentication certificates, and engaging in other Transactional-IoT activities.

This transaction workflow ensures that users are securely on-boarded onto the SEALCOIN platform while retaining full control over their assets through non-custodial wallets. The initial deposit requirement, coupled with the seamless conversion to SEALCOIN QAIT token, enables users to immediately access and engage with the platform's services.

7.2.3 Deposit

The deposit conversion step, where the user's deposit is converted into SEALCOIN QAIT token, will be facilitated by a regulated centralized cryptocurrency exchange (CEX) or a regulated payment processor with integrated crypto services. Here are some potential partners we will consider:

Coinbase Commerce
Overview: Coinbase Commerce is a service provided by Coinbase, one of the largest and most trusted cryptocurrency exchanges. It allows businesses to accept payments in cryptocurrency and can easily convert fiat deposits into specific tokens like SEALCOIN QAIT token.
Regulation: Coinbase is a publicly traded company in the United States (Nasdaq: COIN) and is subject to rigorous regulatory oversight by U.S. financial authorities, including the SEC and FinCEN. Coinbase operates in compliance with various financial regulations and has obtained licenses to operate in multiple states.
Advantages: High level of security, regulatory compliance, and a user-friendly interface.

Pay from Crypto.com
Overview: Crypto.com Pay is a payment solution provided by Crypto.com, a leading global cryptocurrency platform. It allows businesses to accept cryptocurrency payments, with the ability to convert crypto into fiat or specific tokens. Crypto.com Pay is integrated with Crypto.com's vast user base and exchange services.
Regulation: Crypto.com is a regulated platform, operating under various licenses in countries such as the United States, Singapore, and the European Union. It complies with local regulatory requirements, ensuring user and business security.
Advantages: Strong security, ease of use, global reach, and compliance with international financial regulations.

Binance Pay
Overview: Binance, another major global exchange, offers Binance Pay, which facilitates cryptocurrency transactions, including fiat-to-crypto conversions. Binance is known for its extensive list of supported cryptocurrencies.

Regulation**:** Binance operates globally but has faced regulatory scrutiny in several countries. Binance has adjusted its operations to comply with regulations in specific regions, but it's not uniformly regulated across all jurisdictions. The regulatory status can vary depending on the country, and users should verify the local regulatory environment.
Advantages: Wide range of supported currencies, competitive fees, and a strong reputation in the crypto industry.

Circle (via USDC)
Overview: Circle, the issuer of USDC (a stablecoin), offers payment and conversion services that could be integrated with the SEALCOIN platform. Users could deposit fiat, convert it to USDC, and then to SEALCOIN QAIT token.
Regulation: Circle is heavily regulated in the U.S. It operates under the supervision of U.S. financial regulators and issues USDC, a stablecoin that is fully backed by U.S. dollar reserves. Circle is compliant with anti-money laundering (AML) and know-your-customer (KYC) regulations and is registered with FinCEN.
Advantages: Stablecoin integration, strong compliance with regulatory standards, and robust API for developers.

BitPay
Overview: BitPay provides payment processing services that include fiat-to-crypto conversions. It is widely used for cryptocurrency transactions and offers support for multiple currencies.
Regulation: BitPay is a regulated entity in the U.S., holding a money transmitter license in multiple states. It adheres to AML and KYC regulations and complies with U.S. financial laws.
Advantages: Established platform, easy integration, and global reach.

Wyre
Overview: Wyre offers a range of cryptocurrency payment solutions, including fiat-to-crypto on-ramps. It provides an API that can be integrated with platforms like SEALCOIN for seamless conversions.
Regulation: Wyre is a regulated money services business (MSB) in the United States, registered with FinCEN. It also holds money transmitter licenses in several U.S. states and complies with relevant financial regulations, including AML and KYC requirements.
Advantages: Simple API integration, regulatory compliance, and a focus on secure transactions.

Each of these partners is well-established in the crypto space and could provide the necessary infrastructure to facilitate fiat-to- SEALCOIN QAIT token conversions securely

and efficiently. The choice of partner would depend on factors such as regional availability, regulatory compliance, ease of integration, and user experience.

7.3 Full Platform Launch

Following the launch of the MVP, SEALCOIN AG will focus on expanding the platform's capabilities and adding new features. This will include the integration of additional IoT services, the development of advanced analytics tools, and the expansion of the decentralized marketplace to accommodate a wider range of devices and participants. SEALCOIN platform will also work towards compliance with emerging regulations to ensure the platform's long-term viability and security.

To better structure and organize services for each device, the SEALCOIN platform will introduce a new section called **"Services."** This section will enable devices to autonomously generate and process various requests, including **service requests, validation requests, OTC requests, and network requests**. This functionality fosters a decentralized marketplace, allowing devices to negotiate and complete service agreements independently, highlighting SEALCOIN's commitment to advancing IoT transactions with efficiency and security.

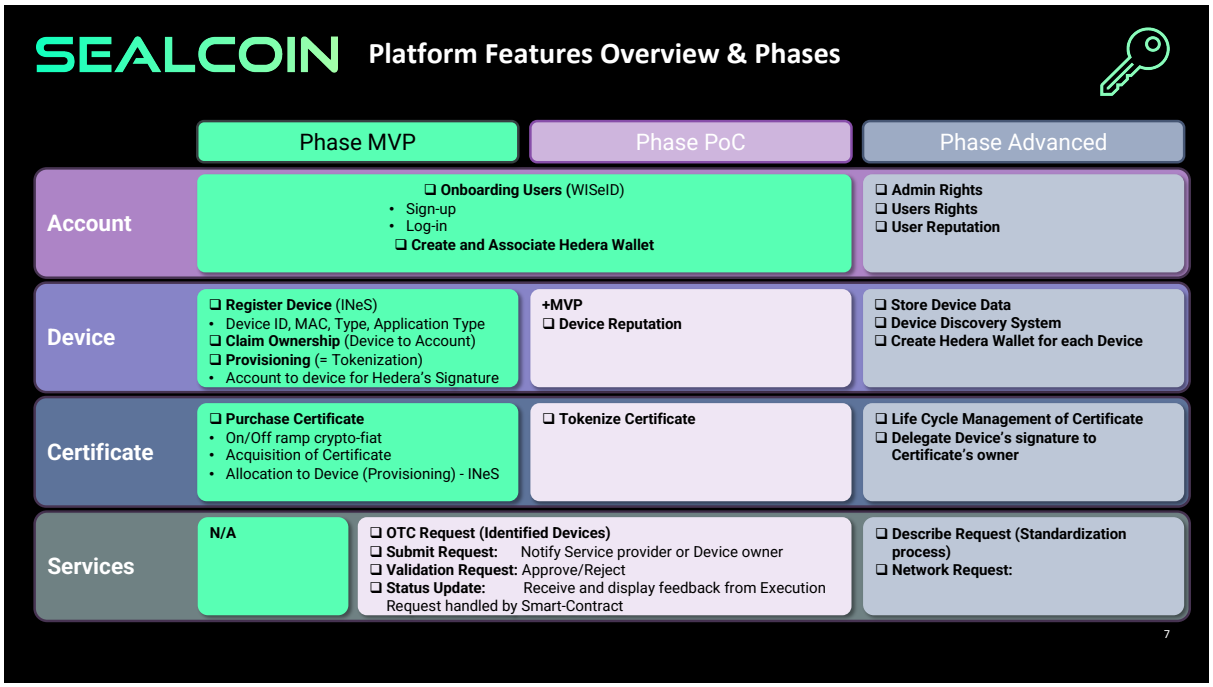


Illustration of SEALCOIN Platform development phases

8 Governance

8.1 Governance Structure introduction

SEALCOIN will implement a governance framework that allows users to participate in decision-making processes related to platform updates, feature enhancements, and regulatory compliance. This framework will ensure that the platform evolves in a manner that aligns with the needs of its users and the broader IoT community, while providing transparency and fairness within the SEALCOIN ecosystem.

In the initial stages, SEALCOIN AG will implement a traditional corporate governance model to ensure operational efficiency, regulatory compliance, and strategic oversight. This centralized control is essential at the outset to navigate complex regulatory landscapes, establish partnerships, and guide the development of the SEALCOIN platform. By maintaining control during this early phase, SEALCOIN AG can effectively mitigate risks, maintain legal accountability, and ensure that the project's foundational infrastructure is built securely and efficiently.

8.2 Governance phases

However, as the project matures and the platform stabilizes, the governance structure will progressively transition towards a more decentralized model. This shift aligns with SEALCOIN platform long-term vision of decentralization, empowering the community and token holders to take on greater governance roles. This phased approach ensures that the platform remains compliant and secure in its early stages, while gradually opening up decision-making to the community as the ecosystem grows.

8.2.1 Initial Setup

The initial phase introduces a **centralized governance** model, potentially incorporating traditional organizational structures:

- **Board of Directors**: SEALCOIN AG may be led by a board responsible for strategy, financial oversight, and compliance. Directors could be appointed by key shareholders and early investors to ensure operational efficiency.
- **Executive Management**: Day-to-day operations will likely be managed by an executive team (CEO, CTO, etc.), overseeing platform development, token issuance, and more.
- **Regulatory Compliance**: SEALCOIN AG can ensure compliance with regulatory requirements (especially for KYC/AML processes) and filing necessary

applications, such as requesting a non-action letter from FINMA and pursuing a Self-Regulated Organization (SRO) application, as per the Swiss Regulator's guidelines.

8.2.2 Community Integration

The second phase gradually involves the community in the platform's governance, though the exact implementation may vary:

- **Advisory Council**: An advisory body, possibly comprising early adopters, industry experts, and partners, could provide guidance on technical development and partnerships.
- **Token Holder Voting**: SEALCOIN QAIT token holders might gain limited voting rights on non-critical decisions, allowing the community to start influencing the platform.
- **Governance Proposals**: A proposal system may be introduced, where users can suggest platform improvements for community review and voting.

8.2.3 Community Governance

The third phase envisions further increasing the platform's decentralization, though implementation details may evolve:

- **DAO Transition**: SEALCOIN AG may transition to a **Decentralized Autonomous Organization (DAO)**, granting token holders full governance rights, including decisions on upgrades and fund allocation. Some authority from SEALCOIN AG may shift to community governance.
- **Staking for Governance**: Governance participation could require staking SEALCOIN tokens, incentivizing committed, long-term users to take part in decision-making.
- **Gradual Exit of Centralized Control**: Over time, SEALCOIN AG may reduce its governance role, potentially evolving into a service provider, ensuring security and compliance.

8.2.4 Full Decentralization

This ultimate phase crystalizes the retrieval of SEALCOIN AG from controlling bodies of the ecosystem.

- **Full Community Control**: In the final phase, SEALCOIN AG may operate as an independent entity focused on development and regulatory matters, while the SEALCOIN ecosystem and platform governance would be fully controlled by the token holders through the DAO.
- **Immutable Governance**: Key decisions, including token supply management, protocol upgrades, and major ecosystem changes, may be made through community voting mechanisms, ensuring the project is decentralized and operates transparently.

8.3 Legal Disclaimer for Governance Participation

As part of the decentralization process, participation in governance will be offered in accordance with relevant regulatory frameworks. SEALCOIN AG will work closely with regulated partners to ensure that KYC/AML standards are met, and any governance mechanisms involving staking or rewards will comply with applicable legal standards in various jurisdictions.
This governance model ensures a controlled transition from centralized authority to a fully decentralized system, allowing the SEALCOIN project to achieve its decentralization goals while ensuring legal compliance and operational integrity.

9 Team and Advisors

9.1 Core Team

The SEALCOIN team comprises experts in DLT technology, IoT, and cybersecurity, bringing a wealth of experience to the project.

Carlos Moreira – Chief Executive Officer
At the head of the SEALCOIN project is Mr. Moreira the founder, chairman and CEO of WISeKey and SealSQ, both of which have achieved prestigious listing on NASDAQ. His exemplary leadership has steered WISeKey's mission towards enhancing Internet Trust, Cybersecurity, and the Internet of Things, thereby making digital spaces more accessible and secure. Under his guidance, the company upholds a long-term perspective, underscored by its industry-leading mergers and acquisitions, alongside significant yearly investments in research and development.
Being a UN Expert of Cybersecurity and Trust Models and member of the World Economic Forum Global Agenda Council for Future IT and Software, his credentials are backed by

25 years of experience in digital identity and IT security. This makes him a seasoned leader for the team that implements his vision for the SEALCOIN project.

Jonathan LLamas – Chief Product & Strategy Officer

Jonathan LLamas is a serial DLT Network entrepreneur and industry expert, known for pioneering innovations in decentralized technologies. As the driving force behind the SEALCOIN project, Mr. LLamas combines nearly two decades of strategic expertise, having transitioned from a career in investment banking to leading FinTech and DLT Network initiatives. His career includes building multiple platform businesses and developing digital strategies for Swiss financial institutions.

Jonathan previously founded a DLT Network venture studio in Switzerland, where he delivered high-impact projects for Fortune 500 companies and top European academic institutions. He also led a groundbreaking personal data management platform on Ethereum and Polygon, enabling half a million users globally to control and monetize their private data. A thought leader in regulated environments, Mr. LLamas' work emphasizes the fusion of DLT Network technology with professional, scalable solutions, pushing the boundaries of what's possible in Web 3.0.

Jeremy Pansier – Chief Technology Officer

Mr. Pansier has over seven years of experience in software development, focusing on security, cryptography, and DLT Network technologies. His career spans two years working on a high-security military project (2017–2019) and nearly four years on a medical project requiring stringent data confidentiality (2019–2022). Since joining SealSQ in 2022, Jeremy has specialized in digital identity and cryptography. In 2024, after successfully developing a Proof of Concept for SEALCOIN, he was appointed CTO to lead the project and oversee its web platform development.

John O'Hara – Chief Financial Officer

Mr. O'Hara, a Chartered Accountant, serves as Chief Financial Officer of WISeKey as of July 2024. He also currently serves as Chief Financial Officer of SealSQ, WISeKey's semiconductor company. Prior to these roles, Mr. O'Hara was International Controller for WISeKey from 2018 to 2023. Mr. O'Hara has over 20 years' experience in financial and accounting roles across several sectors. Mr. O'Hara has worked in the professional services, leisure and restaurant industries for companies such as Marsh & McLennan Companies, Deloitte, Yum! Restaurants International and Chelsea FC plc, in finance management positions, specializing in Controllership, Financial Planning & Analysis, Finance Transformation and Sarbanes Oxley. He qualified in accountancy with Grant Thornton in the UK. In addition to his chartered accountancy qualification (FCA) with the Institute of Chartered Accountants in England and Wales (ICAEW), UK, John O'Hara holds a BA in Economics from Durham University, UK.

Andreas Moreira - Chief Innovation Officer

Mr. Moreira is a seasoned technology executive with over a decade of experience in cybersecurity and digital innovation. As the Chief Innovation Officer at WiseKey, Mr. Moreira leads the company's strategic initiatives to drive digital transformation and elevate cybersecurity solutions in a rapidly evolving digital landscape.

Throughout his career, Mr. Moreira has been committed to advancing security technologies and fostering innovation. His work focuses on safeguarding digital identities, securing IoT devices, and developing robust cybersecurity frameworks using cutting-edge technologies such as DLT Network and artificial intelligence.

In his role at WiseKey, Mr. Moreira guides organizations and individuals through the complexities of the digital age, helping them embrace new technologies while managing cybersecurity risks. He is an active contributor to industry thought leadership through conferences, webinars, and publications, sharing his insights on the future of cybersecurity.

Micha Roon – Head of Engineering

Mr. Roon is the Head of Engineering at The Hashgraph Group, where he has been serving since May 2023. With over two decades of experience in Distributed Ledger Technology (DLT) and the broader tech industry, he supports innovation projects across startups, enterprises, and governments by providing mentorship and training to key technical teams. As a decentralization maximalist, Mr. Roon is passionate about building technologies that empower users by removing the need for blind trust in organizations, promoting transparency, and creating a level playing field. His extensive experience spans DLT Network development, smart contracts, decentralized finance, and Web3 technologies. Mr. Roon holds a Bachelor of Science in Computer Science from the University of Lausanne.

Jeet Parekh – Web3 Architect

Mr. Parekh is a Web3 Architect at The Hashgraph Group, where he designs and implements leading solutions using Hedera Hashgraph. With an extensive background in DLT Network technology, Jeet has led major initiatives at Xalts, enhancing the Contour Digital Asset platform with advanced security features like Multi-Party Computation (MPC) and integrating the Smart Contract Wallet 4337. He also optimized the Contour Letter of Credit application, widely adopted by financial institutions. At Accenture, Jeet was instrumental in developing a high-performance CBDC platform, creating a GoQuorum-based gold token trading system on AWS, and deploying a Hyperledger Fabric-based supply chain application. Working from his technical expertise and strategic approach, Mr. Parekh enjoys his role in advancing Web3 innovation.

Eduardo Valenzuela – Scrum Master

Mr. Valenzuela is a seasoned IT Project Manager and Scrum Master at The Hashgraph Group with extensive experience in managing digital product development through Agile and Waterfall methodologies. His career spans various sectors, including Banking, Telecom, and Entertainment, where he has successfully managed projects to ensure high-quality and timely delivery. With a solid technical foundation in Distributed Ledger Technology, Eduardo has led international teams in delivering innovative software solutions, achieving customer satisfaction through value maximization and continuous improvement. From 2022 to 2024, Mr. Valenzuela led the software delivery management of a cutting-edge NFT marketplace for Palm NFT Studio – now Candy Digital – and its clients, who include DC Comics.

Alex Stadnik – Back End Product Engineer and DevOps

Mr. Stadnik is a Technical Lead at The Hashgraph Group with 10 years of experience across diverse roles in software development, DevOps, and architecture, backed by a passionate background in mathematics. Currently leading DevOps initiatives, Mr. Stadnik has been instrumental in building key services and APIs using languages including Java, Node.js, Python, and .NET, as well as establishing bespoke infrastructure using AWS, Kubernetes, and Terraform. His expertise extends to backend development, where he has consolidated complex cloud ecosystems, led development teams in both startup and enterprise environments, and has contributed to the Web3 space by developing trading and analytics systems.

Jakub Poliszuk – Full Stack Product Engineer

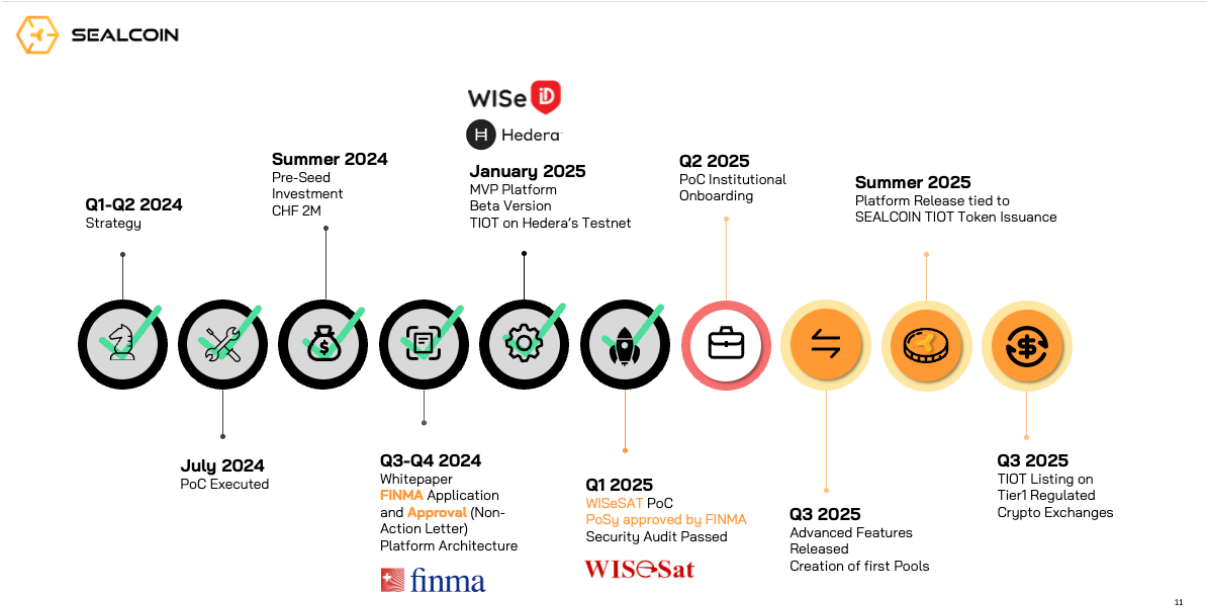
Mr. Poliszuk is a senior full-stack developer at The Hashgraph Group who highly emphasizes code quality and performance. He has 11 years of experience, with diverse business fields – from pawn shops, through supermarkets, to the medical corporations. Mr. Poliszuk is a Web 3.0 enthusiast and is always hungry to learn more about NFT, Smart Contracts, and DLT Network. Thanks to his knowledge, he is an accomplished developer who makes sure that delivered code is optimized, scalable, and easy to understand for fellow developers. Apart from being a developer, Mr. Poliszuk also takes an interest in UX designing and can provide valuable feedback for UX designers and Business Analysts.

9.2 Advisory Board

An advisory board of industry leaders and experts will provide guidance and support to ensure the success of the SEALCOIN platform.

10 Token Sales Details

10.1 Sale Structure and SEALCOIN Timeline

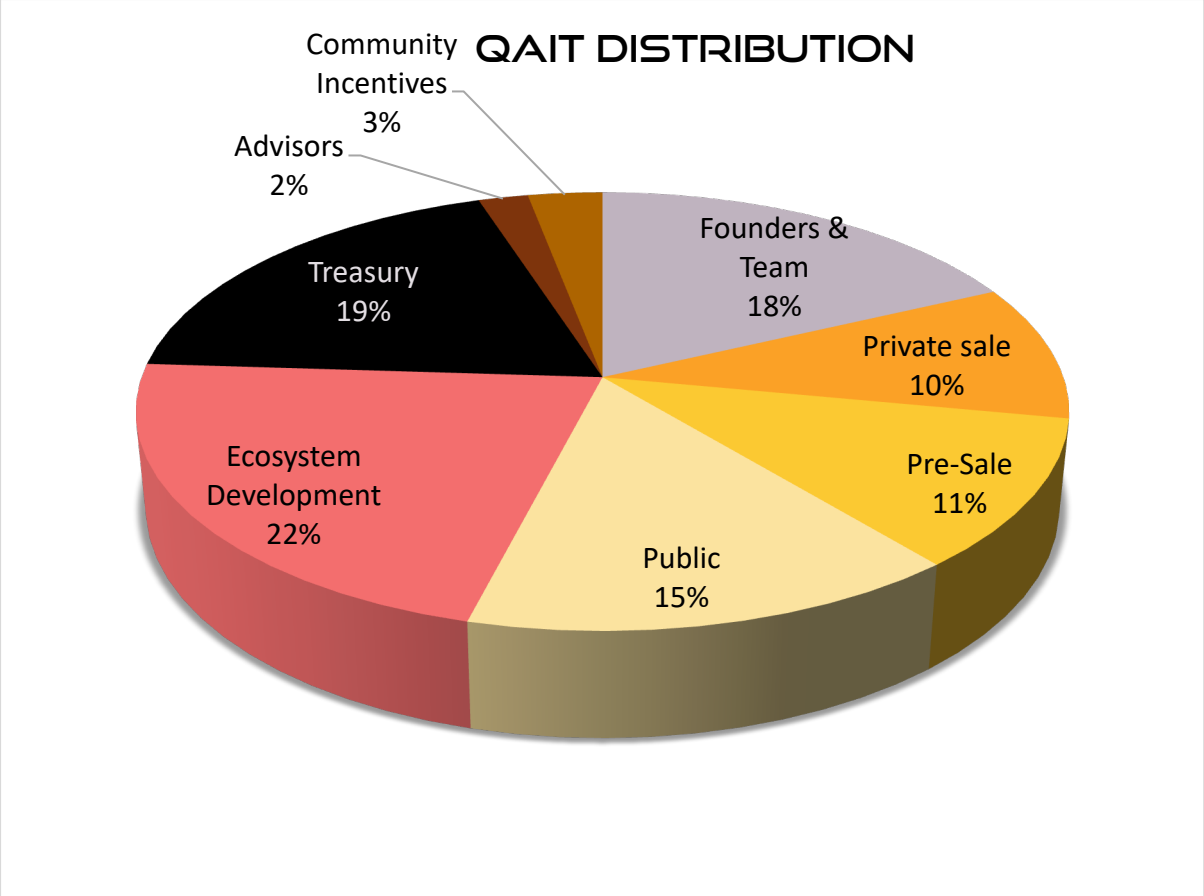


10.2 Token Allocation

10.2.1 SEALCOIN QAIT Token Distribution

Maximum Supply (Fixed): 10'000'000'000 - No new QAIT will be created
Symbol: QAIT
Initial Price: 1 QAIT = 0,03 USD

	QAIT in %
Founders & Team	18.00%
Investors	21.00%
Public	15.00%
Ecosystem Development	22.00%
Treasury	19.00%
Other (advisors)	2.00%
Community Incentives	3.00%



10.2.2 Detailed Breakdown

Founders & Team (18%)
Allocated to the core SEALCOIN team, this portion is subject to a 12-month cliff from the Token Generation Event (TGE), followed by a 24-month vesting period. This ensures that the team remains committed to the project's long-term success and aligns their interests with SEALCOIN's growth.

Investors (21%)
Early investors receive a 12-month cliff, followed by a 12-month vesting period after the TGE. This incentivizes long-term investment while ensuring early backers are rewarded gradually as the platform grows.

Public (15%)
Tokens allocated for the public are fully liquid and available immediately at the TGE, with no cliff or vesting periods. This enables instant participation in the SEALCOIN ecosystem for token holders.

Ecosystem Development (22%)

These tokens are immediately available with no cliff or vesting periods, ensuring the rapid growth and expansion of the SEALCOIN ecosystem. They will be used to fund partnerships, integrations, and further technological improvements.

Treasury (19%)
The treasury tokens are similarly available with no cliff or vesting periods. This allocation will be used to support ongoing operational expenses, liquidity provisioning, and strategic initiatives.

Other (Advisors) (2%)
Advisors who provide strategic insights and guidance will receive their tokens after a 12-month cliff, followed by a 12-month vesting period, ensuring their ongoing involvement in the project.

Community Incentives (3%)
This allocation will be used immediately after the TGE, with no cliff or vesting periods, to support and incentivize community participation through rewards, ensuring early adopters are motivated to engage with the platform.

10.2.3 Emission and Vesting Structure

To prevent oversupply and price volatility, SEALCOIN AG will implement a structured release schedule. The cliff and vesting periods for founders, team members, investors, and advisors ensure that tokens are gradually unlocked over time, supporting the long-term stability and growth of the SEALCOIN ecosystem.

	Cliff from TGE in months	**Vesting from Cliff end** in months
Founders & Team	12	24
Investors	12	12
Public	0	0
Ecosystem Development	0	0
Treasury	0	0
Other (advisors)	12	12
Community Incentives	0	0

In the context of token distribution or equity vesting, a **cliff** is the minimum period an individual must wait before they receive any tokens or shares. For example, if there is a

12-month cliff, the recipient will receive no tokens or shares during the first 12 months, and after the cliff period ends, they may receive a portion or the full amount.
Vesting refers to the gradual process by which individuals gain ownership of tokens or shares over time, usually after the cliff period ends. Tokens or shares are typically distributed incrementally over a defined vesting period. For example, if a vesting period is 24 months, tokens may be distributed in monthly or quarterly increments until the individual receives the full allocation at the end of the vesting period.

In summary, **cliff** is the initial waiting period with no tokens or shares distributed, and **vesting** is the gradual release of the allocated tokens or shares after the cliff ends.

11 Partners of SEALCOIN ecosystem

11.1 WISeID: Secure and Trusted Digital Identity Platform

WISeID, developed by **WISeKey**, is a comprehensive digital identity solution built on **Public Key Infrastructure (PKI)** technology, providing secure identity management for individuals and organizations. WISeID ensures trusted interactions through strong authentication, digital signatures, and encryption, safeguarding both user data and communications. The platform includes a **personal encrypted vault** for secure information storage, while also offering advanced services such as **single sign-on (SSO)** and secure document signing.

WISeID delivers trusted digital certificates issued by globally recognized **Certification Authorities (CAs)**, ensuring compatibility with a wide range of applications, from email encryption to secure customer engagement. The platform empowers organizations to protect sensitive data, streamline authentication processes, and comply with regulatory standards across industries.

WISeID combines a user-friendly interface with enterprise-grade security, making it an ideal solution for businesses seeking to implement robust digital identity management. It allows for secure and scalable identity provisioning, ensuring that organizations can protect both individual and corporate identities in an increasingly digital world.

By incorporating WISeID's advanced identity management capabilities, SEALCOIN enhances its commitment to providing a secure, transparent, and trusted environment for IoT transactions. The partnership with WISeID ensures that SEALCOIN users and devices can rely on strong, tamper-proof digital identities, facilitating safer and more efficient exchanges within the SEALCOIN ecosystem.

11.2 SEALSQ

Background

SEALSQ France SAS (SEALSQ), a French corporation (previously known as WISeKey Semiconductors SAS), is an affiliate of the WISeKey International Holding AG group, and stands at the intersection of physical and cyber trust, offering unparalleled assurance in an increasingly interconnected world. At the heart of our value proposition is the vertical integration of Secure Semiconductors, Root-of-Trust and Public Key Infrastructure (PKI), with a strong commitment to innovation around Post Quantum Cryptography and Quantum Resistant Hardware Design.

With a rich portfolio of 40 patent families, covering over 110 fundamental individual patents, and another 12 patents under review, SEALSQ continues to expand its platform use in various domains. SEALSQ technology secures billions of objects today: luxury products, routers, gateways, utilities meters, drones, authentication dongles, secure storage USB drives, medical devices, connected door-locks, and smart consumer electronic devices, among others.

Who They Are

Located in the "French Silicon Valley" in the south of France, SEALSQ is one of the very few Semiconductors companies in the world capable of developing certified secure microcontrollers and implementing post-quantum cryptography. From Motorola, to Atmel Secure Microcontroller, Inside Secure and now within the WISeKey group, SEALSQ teams have a long history of developing secure hardware, firmware and trust services for a wide variety of customers across multiple industries.

What They Do

SEALSQ offers:

Secure Semiconductors: Microcontrollers and Hardware platforms implementing a mix of analog and digital countermeasures which are the DNA of our engineering teams, constantly monitoring and anticipating the new generation of attacks that the cyber hackers may develop including quantum computer attacks. We design, develop and market secure semiconductors worldwide as a fabless manufacturer, meaning we do not manufacture the chips, but instead collaborate with production partners for all phases of the manufacturing process, including wafer fabrication and packaging and testing. We provide added security and authentication layers on our semiconductors which can be tailored to customers' needs.

Root Certificate Authority: SEALSQ leverages WISeKey's OISTE root-of-trust which has achieved certification from major standards in a variety of applications: GSMA for mobiles, MATTER for consumer IoT, WISUN for Smart Energy etc.

SEALSQ Public Key Infrastructure (PKI) service called INeS enables device identity management at any scale needed from project launch to scale-up. Whether the aim is to deliver credentials on the factory floor or from an online cloud-enabled service (like AWS IoT, Azure IoT & GCP IoT), INeS makes scalable device personalization easy.

Key Features include:

- ✓ Customizable Managed PKI Services to create and manage Root CAs, Subordinate CAs, and end-entity certificates (and key pairs) for the entire ecosystem while ensuring security and business continuity for the end-to-end lifecycle.
- ✓ High volume X.509 certificates to create unique identities for millions of Devices.
- ✓ Solutions for secure access control, mutual authentication to establish point-to-point TLS communications, secure over-the-air updates and data protection and privacy

Chip Personalization Platform: SEALSQ offer a chip personalization platform "As-a-Service" called Vault-I-Trust which enables to inject the keys and certificates derived from our Root-of-Trust and Managed PKI service into the chip in a secure CCEAL5+ certified environment. This can be performed either at wafer level for large productions or directly "on-package" for smaller batches and shorter lead times.

All SEALSQ products, services and infrastructures are certified with the highest industry standards by third party certification labs.

11.3 Hedera Hashgraph LLC

Background

Hedera Hashgraph LLC, commonly known as 'Hedera', is a company and public distributed ledger technology (DLT) platform founded in 2018 by Dr. Leemon Baird and Mr. Mance Harmon. The platform is built on the Hashgraph consensus algorithm, invented by Dr. Baird.

Hedera aims to provide a high-speed, secure, and fair online platform for decentralized applications (dApps) and tokenized assets. The company is headquartered in

Richardson, Texas, and has quickly established itself as a significant global player in the DLT Network and DLT space.

Who They Are

Hedera is governed by the Hedera Governing Council, which consists of up to 39 term-limited organizations and enterprises from diverse industries over 6 continents.
This council – consisting of 31 members at the time of writing – is responsible for overseeing the maintenance and development of the software and ensuring the stability and reliability of the network.

Current Governing Council Members include Google, IBM, Boeing, Deutsche Telekom, and Tata Communications, among others. This diverse and decentralized governance model ensures that no single entity has undue influence over the network, promoting decentralization and trust.

What They Do

Hedera offers a range of services designed to support the development and deployment of decentralized applications.

These services include.

Hedera Consensus Service (HCS): This service allows developers to create verifiable timestamps and order transactions using the Hedera network. It is particularly useful for applications requiring a high degree of trust and transparency, such as supply chain tracking and auditing.

Hedera Token Service (HTS): HTS enables the creation, management, and transfer of native tokens on the Hedera network. This service supports a wide range of token use cases, including stablecoins, utility tokens, and security tokens.

Hedera Smart Contract Service (HSCS): HSCS allows developers to deploy and manage smart contracts on the Hedera network. These smart contracts can automate complex business processes and facilitate secure, trustless transactions between parties.

Hedera File Service (HFS): HFS provides a decentralized file storage solution, allowing users to store and manage files securely on the Hedera network.

Hedera's industry unique Hashgraph consensus algorithm offers several advantages over traditional DLT Network technologies, including very high throughput, low latency, low cost and strong security guarantees.

The platform can handle thousands of transactions per second, reaching finality in seconds making it suitable for enterprise-grade applications needing both scalability and reliability.

Role in the SEALCOIN Project

Hedera plays a crucial role in the SEALCOIN project by providing the underlying decentralized ledger technology that powers the SEALCOIN QAIT token, platform, and ecosystem. SEALCOIN AG leverages Hedera's suite of services to enable secure, autonomous transactions and service-for-payment exchanges among IoT devices.

Here are some specific ways in which Hedera contributes to the SEALCOIN project.

Decentralized Ledger Technology (DLT): The SEALCOIN platform utilizes Hedera's DLT to ensure the security, transparency, and immutability of transactions within its ecosystem. All transactions between IoT devices are securely processed and validated on the Hedera network, providing a reliable and tamper-proof record of interactions.

Smart Contract Integration: The SEALCOIN Platform integrates Hedera's Smart Contract Service (HSCS) to facilitate secure and transparent transactions between IoT devices.

Token Management: The SEALCOIN token is managed using Hedera's Token Service (HTS), to enable the creation, management, and transfer of SEALCOIN tokens, ensuring seamless and secure transactions within the platform.

Consensus and Timestamping: The SEALCOIN platofrm leverages Hedera's Consensus Service (HCS) to create verifiable timestamps and order events within its ecosystem. This service is essential for applications that require a high degree of trust and transparency, such as supply chain management and energy trading.

Secure Communication: Hedera's security features, including elliptic curve cryptography (ECC) and secure communication protocols, ensure that all interactions within the SEALCOIN ecosystem are protected from unauthorized access and tampering. This security is further reinforced by the use of Secure Elements in IoT devices, which safeguard sensitive data and cryptographic keys.

11.4 The Hasgraph Group

Background

The Hashgraph Group AG (THG), a corporation established in Zug (UID: CHE-192.631.249) was established to promote the adoption and integration of Hedera Hashgraph's decentralized ledger technology (DLT) across various industries, focused on enterprises. Founded in collaboration with Hedera Hashgraph, the group aims to support the development of innovative projects and solutions that leverage the unique capabilities of the Hedera Hashgraph consensus algorithm. C

Who They Are

The Hashgraph Group is composed of a diverse group of experts, including technologists, entrepreneurs, and industry leaders dedicated to advancing the adoption of Hedera Hashgraph's technology. The group works closely with enterprises, startups, academic institutions, and government bodies to foster a collaborative ecosystem that drives innovation and growth in the DLT space.

THG's mission is to accelerate the development and deployment of decentralized applications (dApps) and solutions that can transform industries and improve the efficiency, security, and transparency of various processes. By providing technical expertise, and strategic and product support, the group plays a crucial role in helping projects realize their full potential.

What They Do

The Hashgraph Group offers a range of services and initiatives designed to support the adoption and integration of Hedera Hashgraph's technology. These include the following.

Technical Support and Mentorship: The group provides technical guidance and mentorship to projects and developers working with Hedera Hashgraph's technology. This includes assistance with architecture design, smart contract development, and integration with existing systems.

Education and Training: The group conducts educational programs, workshops, and training sessions to help developers, businesses, and institutions understand and utilize Hedera Hashgraph's technology. These initiatives aim to build a skilled workforce capable of driving the adoption of DLT.

Ecosystem Development: THG works to create a vibrant ecosystem of partners, developers, customers, and users who can collaborate and share knowledge. By fostering a collaborative environment, the group helps drive the growth and adoption of Hedera Hashgraph's technology across various industries across the globe.

Regulatory and Compliance Support: THG provides guidance on regulatory and compliance matters, helping projects navigate the complex legal landscape associated with DLT and DLT Network technology. This support ensures that projects adhere to relevant regulations and standards, promoting trust and credibility and a healthy relationship with regulators and lawmakers.

Role in the SEALCOIN Project

The Hashgraph Group plays a pivotal role in the SEALCOIN project by providing technical expertise, and strategic support to help bring the project to fruition. Here are some specific ways in which The Hashgraph Group contributes to the SEALCOIN project.

Technical Expertise: THG offers technical guidance to the SEALCOIN team, helping in designing and implementing a robust and scalable platform. This includes assistance with integrating Hedera Hashgraph's DLT, developing smart contracts, and ensuring the security and efficiency of the platform.

Funding and Investment: THG, as a minority shareholder of SEALCOIN AG, has invested in the SEALCOIN project. This investment is earmarked for the development of Decentralized Physical Infrastructure Networks (DePIN), leveraging the Hedera platform and its smart contract capabilities.

Strategic Support: THG provides strategic support to the SEALCOIN project, helping the team navigate the challenges associated with developing and deploying a decentralized platform. This includes guidance on project documentation, market positioning, go-to-market strategies, and partnership development.

Ecosystem Integration: THG helps SEALCOIN AG integrate with the broader Hedera ecosystem, connecting the project with potential partners, developers, and users, fostering collaboration and knowledge sharing in an effort to accelerate the growth and adoption of the SEALCOIN platform within the IoT and Web3.0 space.

Regulatory Compliance: THG provides guidance on regulatory and compliance matters, ensuring that the SEALCOIN project adheres to relevant regulations and standards. This support helps build trust and credibility, promoting the long-term viability of the platform.

12. Conclusion

The SEALCOIN platform represents a transformative solution for the growing demands of the Transactional-IoT (t-IoT) landscape, where secure, autonomous, and real-time transactions between devices are critical. By leveraging a decentralized framework based on Hedera Hashgraph and integrating advanced cryptographic and security technologies, SEALCOIN platform enables seamless device-to-device interactions while safeguarding data integrity and user privacy.

With the SEALCOIN QAIT token serving both utility and payment functions, the platform fosters a dynamic marketplace where IoT devices can autonomously negotiate, execute, and settle transactions without human intervention. As the project evolves, SEALCOIN AG will oversee a structured transition towards full decentralization, empowering the community and token holders to take an active role in governance, ensuring the platform’s long-term growth and sustainability.

SEALCOIN platform’s ability to enable autonomous services, such as energy trading, data exchanges, and supply chain automation, will drive innovation across industries

and unlock new opportunities for IoT applications. As SEALCOIN platform continues to evolve, its commitment to security, scalability, and decentralization will remain at the core of its mission to revolutionize the IoT ecosystem and create a more connected and efficient future.

13. Appendices

13.1 Glossary

Definitions of key terms and concepts used in the whitepaper.

Anti-Money Laundering (AML): Regulations designed to prevent money laundering activities. SEALCOIN is compliant with AML regulations through its implementation of KYC processes.

CadCad (Valuation Model): CadCad is a computational modeling framework used for simulating complex systems, particularly in tokenomics and decentralized ecosystems. It allows users to analyze how different factors, such as token supply, market demand, and user behavior, influence the value of a token. By running simulations across a range of parameters, the CadCad model helps project outcomes like price fluctuations, transaction volumes, and network velocity, providing valuable insights into the long-term dynamics of a cryptocurrency or platform.

Cliff: In the context of token distribution or equity vesting, a cliff is the minimum period an individual must wait before they receive any tokens or shares.

Cliff Period: The cliff period is the timeframe before any tokens or shares are distributed, ensuring recipients meet specific conditions prior to receiving their allocated assets.

CSA (Connectivity Standards Alliance): The CSA is an industry consortium that develops and promotes global standards for secure and reliable connectivity across IoT devices. It ensures interoperability between various smart devices and networks, creating unified protocols like Matter to enhance device compatibility and security.

Decentralized Autonomous Organization (DAO): A DAO is an organization governed by smart contracts on a DLT Network, with decision-making distributed among its members through a decentralized voting system.

Decentralized Identity (DID): DID is a system that allows individuals to manage their own digital identities independently of central authorities, enhancing privacy and control.

Decentralized Ledger Technology (DLT): A distributed ledger system where transactions are recorded across multiple nodes or locations, ensuring transparency, security, and immutability.

Decentralized Marketplace: A decentralized platform where participants can trade goods and services directly without intermediaries.

Decentralized Physical Infrastructure Networks (DePIN): DePIN involves managing physical infrastructure through decentralized technologies, leveraging DLT Network for efficient operation.

Device Onboarding: The process of securely registering devices on a platform or network.

Elliptic Curve Cryptography (ECC): A form of public-key cryptography used to secure DLT Network transactions.

GSMA (Global System for Mobile Communications Association): The GSMA is a global organization representing mobile network operators and related industries. It develops and promotes standards for mobile connectivity, security, and identity management, particularly focusing on mobile devices and IoT solutions, ensuring scalability and regulatory compliance across the telecom sector.

Hedera: A public distributed ledger based on Hedera Hashgraph LLC technology, providing a high-speed, secure platform for decentralized applications (dApps) and tokenized assets.

Know Your Customer (KYC): A regulatory process where businesses verify the identity of their users.

Liquidity Provider: A liquidity provider supplies assets to a market, facilitating trading and maintaining liquidity. They often receive rewards or fees for their contribution.

Multi-Party Computation (MPC): MPC is a cryptographic method that allows multiple parties to jointly compute functions while keeping their inputs private, enhancing data privacy in collaborative computations.

Operational Certificate: An operational certificate is a digital certificate issued to authenticate a device's identity, ensuring secure communication within a network.

Operational Efficiency: Operational efficiency involves optimizing resources and processes to deliver products or services in the most cost-effective manner while maintaining quality.

Parameter Sweep: A parameter sweep involves varying parameters in simulations to analyze different scenarios and optimize models or systems.

Payment Token: A cryptocurrency used to facilitate the exchange of goods or services.

Predictive Maintenance: Predictive maintenance uses data analytics to forecast equipment needs for maintenance, allowing proactive repairs and minimizing downtime.

Public Key Infrastructure (PKI): **PKI** is a system that manages digital keys and certificates, enabling secure communication and authentication over networks. It uses pairs of cryptographic keys—one public and one private—to encrypt and decrypt information, ensuring confidentiality, integrity, and authenticity of data. PKI underpins a wide range of security applications, including secure email, encrypted transactions, and device authentication.

Real-Time Monitoring: Real-time monitoring involves continuously observing and analyzing systems to ensure optimal performance and quickly address any issues.

Root of Trust (RoT): A Root of Trust is the foundational security component in a system that serves as the trusted source for all cryptographic processes. It consists of secure hardware or software that performs key functions like encryption, digital signing, and device authentication.

RSA (Rivest-Shamir-Adleman): RSA is a widely used public key cryptographic algorithm named after its inventors, Rivest, Shamir, and Adleman. It enables secure data transmission by using two keys: a public key for encryption and a private key for decryption. RSA is based on the mathematical difficulty of factoring large prime numbers, making it a highly secure method for encrypting sensitive information, signing digital documents, and ensuring data integrity. It is commonly used in secure communications, digital signatures, and various Internet protocols.

Secure Element (SE): A tamper-resistant hardware component designed to securely store sensitive information, such as cryptographic keys, and execute secure

applications. It provides a highly secure environment that protects data from unauthorized access or tampering. Secure Elements are commonly used in IoT devices, payment systems, and identity management to ensure secure communication, authentication, and transaction processing.

Smart Contracts: Self-executing agreements in which the contractual terms are encoded directly into lines of computer code. Such contracts operate on distributed ledger technology (DLT) and execute automatically when predetermined conditions are met, thereby ensuring the fulfillment of the agreement without the need for intermediary intervention.

Stablecoin: A stablecoin is a cryptocurrency designed to maintain a stable value by being pegged to a reserve asset, such as a fiat currency, providing stability compared to other cryptocurrencies.

Staking: Staking involves holding cryptocurrency in a wallet to support a DLT Network network's operations, often earning rewards for contributing to network security and validation.

TLS (Transport Layer Security): **TLS** is a cryptographic protocol designed to provide secure communication over a network. It ensures privacy, data integrity, and encryption for data exchanged between devices, typically used in web browsers, email, and instant messaging services. TLS prevents eavesdropping and tampering by establishing a secure, encrypted connection between client and server. It is the successor to SSL (Secure Sockets Layer) and is widely used to secure sensitive data in applications like online banking, e-commerce, and other internet-based communications.

Token Emission Model: The token emission model outlines how and when new tokens are introduced into circulation, affecting the token's supply and value dynamics.

Token Generation Event (TGE): A TGE is an event where a new cryptocurrency token is created and distributed to investors, often marking the initial release of the token.

Tokenomics: Tokenomics studies the economic aspects of a cryptocurrency token, including its distribution, supply, and demand, to understand its role and value within an ecosystem.

Utility Payment: A Utility Payment refers to the use of a cryptocurrency or token to pay for services or products within a digital platform or ecosystem. These tokens act as a

medium of exchange, enabling users to access platform-specific functionalities, such as data usage, computing power, or service subscriptions.

Vesting Period: The vesting period is the time frame during which an individual gradually gains ownership of tokens or shares, usually after a cliff period.

WebSocket Secure (WSS): WSS is a protocol for secure, real-time communication over a single TCP connection, protected by TLS, enabling secure data exchange on the web.

13.2 Legal Disclaimers

This whitepaper is a draft document intended for informational purposes only and is subject to further revision. It is being submitted to the Swiss Financial Market Supervisory Authority (FINMA) for review and does not constitute an offer or solicitation for any financial instruments or services.

The contents of this whitepaper do not constitute legal, financial, or investment advice.

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