

# SEZChain WHITE PAPER

EMPOWERING SPECIAL ECONOMIC ZONES GLOBALLY  
WITH AN EFFICIENT DIGITAL ECONOMIC OPERATING  
SYSTEM

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Note: In this publication, “\$” refers to US dollars.

# TABLE OF CONTENTS

[Contents](#)

[Definitions and Abbreviations \(Glossary\)](#)

[Abstract](#)

[1.0 Executive Summary](#)

[2.0 SPECIAL ECONOMIC ZONES](#)

[2.1 Economic Zone Overview](#)

[2.2 Common Problems in Economic Zones](#)

[2.3 The Solution: SEZCo](#)

[VALUE PROPOSITION.](#)

[THE LONG-TERM GOAL.](#)

[3.0 BENEFITS OF BLOCKCHAIN](#)

[4.0 THE CONSORTIUM \(SEZCo\)](#)

[4.1 SEZCo Overview](#)

[5.0 Governance](#)

[5.1 Constitution](#)

[5.2 Voting Examples](#)

[5.3 Protocol](#)

[6.0 SEZChain Token \(SEZC\)](#)

[6.1 SEZChain Token](#)

[6.2 SEZChain Asset Token](#)

[7.0 Transaction Model](#)

[7.1 UTXO Overview](#)

[7.2 Transaction Fees](#)

[7.3 Transaction Receipt Keys](#)

[7.4 Transaction Data](#)

[7.5 State Data](#)

[7.6 Multi-Signature Transactions](#)

[7.7 Asset Agnostic Transactions](#)

[8.0 Node Network](#)

[8.1 Node Network Overview](#)

[9.0 Consensus](#)

[9.1 Consensus Overview](#)

[9.2 Benefits](#)

[9.3 Backups](#)

[10.0 Identity & Privacy](#)

[10.1 Identity Overview](#)

[10.2 User Types](#)

[10.3 Transaction Privacy](#)

[11.0 Token Economics](#)

[11.1 Block Rewards](#)

[11.2 Bad Players](#)

[11.3 Value of Transparency](#)

[11.4 Cash Flow & Liquidity](#)

[11.5 User Benefits](#)

[12.0 THE PLATFORM](#)

[12.1 Platform Overview](#)

[12.2 Platform Benefits](#)

[13.0 INITIAL DEPLOYMENT](#)

[13.1 Payment Gateway](#)

[13.2 Payment Gateway Benefits](#)

[13.3 Audit Tool](#)

[13.4 Off-Chain Transactions](#)

[14.0 ICO](#)

[14.1 Ethereum ERC20 Token](#)

[14.2 Gas](#)

[14.3 Efficiency of Processing](#)

[14.4 Token Value](#)

[14.5 Token Economics and Policies](#)

[14.6 Economic Value](#)

[14.7 Token Swap](#)

[15.0 Potential Use Cases](#)

[15.1 Common Elements](#)

[Transaction Tracking](#)

[KYC, AML for users ~ OCC](#)

[15.2 USE CASES](#)

[16.0 TIMELINE](#)

[17.0 INVITATION TO JOIN](#)

# Definitions and Abbreviations (Glossary)

**API** - Application Programming Interface. Designed to offer open programmability by third party applications or for platform extensions.

**Asset Agnostic Transaction:** A transaction which allows users to trade tokens of different types which have the potential to represent real-world physical objects when constructed as such.

**Asynchronous Byzantine Fault Tolerance (aBFT)<sup>1</sup>** - The dependability of a fault-tolerant computer system, particularly distributed computing systems, where components may fail and there is imperfect information on whether a component has failed. In a "Byzantine failure", a component such as a server can inconsistently appear both failed and functioning to failure-detection systems, presenting different symptoms to different observers.

**Applications or Components** - Applications in the context of this paper are components of a Platform which allow users to access the functionality of the SEZChain. SEZChain can be accessed via a series of APIs which provide an easy interface for users to perform functions such as auditing their transaction history.

**Business User** - A public user or group of users registered in a Special Economic Zone as a business.

**Consensus** - An agreement that is reached by a group of nodes about the validity of a block. When a group of block producers reach a consensus, a block producer can write a block to the chain.

**Consortium Members** - The SEZCo Members who become signatories to this Agreement after the Effective Date and in the specific SEZChain Agreement between the Consortium Members and the sponsoring agency.

**Constitution** - The policies of the SEZChain ecosystem defined in the constitution are voted on by all members of the community according to their stake in the ecosystem as defined by the amount of SEZC they possess. The constitution functions as the DAO for the ecosystem. In addition to the written policies of the SEZChain, the constitution will also allow users to vote for changes to the SEZChain on aspects such as minting SEZC.

**DAO:** Decentralized Autonomous Organization. A governing body of a decentralized system which defines the policies of the system. In the case of the SEZChain, the Constitution functions as the DAO.

**Platform or SEZChain Platform** - The platform that accompanies the SEZChain and is made of apps that are tailored to the needs of the SEZCo members. The primary function of the SEZChain Platform is to allow for easy access to the functionality of the SEZChain via a series of applications.

**Public User** - A user of the SEZChain or platform that does not have membership or membership rights that is a private individual, not a business.

**SEZ** - Special Economic Zone.

**SEZChain** - The blockchain system supporting all of the functionality outlined in this paper.

**SEZ Consortium (SEZCo)** - The Special Economic Zone Consortium (SEZCo) which is comprised of industry, government, and non-profit organizations who subscribe to the platform and its constitution.

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<sup>1</sup> [https://en.wikipedia.org/wiki/Byzantine\\_fault\\_tolerance](https://en.wikipedia.org/wiki/Byzantine_fault_tolerance)

**SEZChain Token (SEZC)** - The token that represents a user's stake in the SEZChain ecosystem and therefore the weight of their vote for the constitution, as well as selecting block producers. In addition, it is also the token that users bid as transaction fees to pay for use of the blockchain.

**SEZChain Asset Token** - Tokens minted by users and linked to real world assets. Any user can mint these tokens. In order to ensure the validity of an on-chain asset, it is recommended they include any relevant legal prose.

**SEZT** - Ethereum ERC20 based (Special Economic Zone) token used in Phase I of the SEZChain. This is the token supporting temporary functionality that will be released on the Ethereum blockchain according to ERC20 standards. The ERC20 token will also enable early investment in the SEZChain ecosystem.

**Stakeholder:** A user that holds SEZChain tokens and will be able to vote on the changes to the constitution as well as receive block rewards.

# Abstract

Special Economic Zones or SEZs are designed to be enclaves that provide a preferential business environment and economic growth for their host country. Many SEZs attract import/export processing, manufacturing, and related industries. Industries located in these zones typically harness low startup costs, tax incentives, and the available low to medium skilled labor market to competitively manufacture and export goods to other countries.

The Special Economic Zone Chain (SEZChain) is a comprehensive digital decentralized economic operating system, the purpose of which is to strengthen infrastructure and stimulate economic activity for Special Economic Zones (SEZs) around the world.

SEZChain addresses common problems that SEZs collectively face while promoting healthy economic growth. This is accomplished through a member-managed Special Economic Zone Consortium (SEZCo) which operates within the bounds of the SEZChain ecosystem. The SEZChain uses SEZChain tokens as the measure of account designed for Special Economic Zones and their participants.

SEZCo members, the governing bodies of SEZs, and members of SEZs all benefit from participating in the SEZChain. Private citizens will find it less expensive to do business, assets can be bought and sold with a legal audit trail, and governing bodies can more efficiently regulate their zones.

# 1.0 Executive Summary

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Stepwyze has architected a comprehensive digital decentralized economic operating system, the purpose of which is to strengthen infrastructure and stimulate economic activity for Special Economic Zones (SEZs) around the world. This blockchain system is called the Special Economic Zone Chain (SEZChain).

Special Economic Zones or SEZs are geopolitical enclaves that provide a preferential business environment and economic growth for their host country. Many SEZs attract import/export processing, manufacturing, and related industries. Industries located in these zones typically harness low startup costs, tax incentives, and the availability of low to medium skilled labor to competitively manufacture and export goods to other countries.

The most successful SEZ's have the following factors in common:

- Government policy-based, business friendly, low-bureaucracy administrative environments.
- Efficient customs processes.
- Streamlined, consistently enforced regulations and procedures.

Conversely, many Special Economic Zones struggle due to some of the following factors:

- Inadequate infrastructure and public services.
- Compliance and enforcement inconsistency.
- High barriers to market entry make it difficult for private enterprises to conduct business.

SEZChain addresses the problems that restrict the growth of SEZs via a member-run Special Economic Zone Consortium (SEZCo) which operates within the bounds of the SEZChain ecosystem.

The SEZChain ecosystem enables members of SEZCo to:

- Establish a consortium with a vested interest in a shared blockchain platform designed to enable sustainable and scalable success for SEZs worldwide.
- Streamline regulations within the ecosystem.
- Trigger financial events and administer legal rules programmatically.
- Incentivize consortium members to develop and maintain strong economic infrastructures that meet or exceed global standards.
- Reduce the cost of doing business when compared to the use of traditional methods and systems.
- Aggregate transactional data allowing consortium members to make data-driven economic decisions.
- Audit economic activity and promote legal business practices.

By harnessing blockchain technology, the SEZChain and its accompanying platform allow members to transact with one another using one unit of exchange. The SEZChain ecosystem enables Consortium members to reliably and rapidly access and track all pertinent economic activity, access the balance of all trade settlement activity, and establish rules that define automated triggers for legal actions, audits, fee collection, passage of investment milestones, and other related activities.

SEZs are able to create an enormous economic advantage when they form partnerships with one another and with various industries under one efficient and innovative economic operating system. The Platform acts as the operating system and the SEZChain token is the primary measure of account within the

ecosystem.

## 2.0 SPECIAL ECONOMIC ZONES

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### 2.1 Economic Zone Overview

Special Economic Zones (SEZs) are demarcated geographic areas contained within a country's national boundaries where the rules of business are different from those that prevail in the national territory. These differential rules principally deal with investment conditions, international trade and customs, taxation, and the regulatory environment. SEZs typically maintain a business environment that is intended to be more liberal from a policy perspective and more effective from an administrative perspective than that of the national territory.<sup>2</sup>

These designated areas are intended to attract foreign direct investment (FDI). The term SEZ covers a broad range of zones including free trade zones, export-processing zones, industrial parks, economic and technology development zones, high-tech zones, science and innovation parks, free ports, enterprise zones, and others.

**\$200 BILLION**  
in global exports

Currently, there are approximately 3,000 SEZs in 135 countries with 40 million workers, producing \$200 Billion in global exports.<sup>3</sup>

Many countries have multiple operating SEZs. Below is a list of countries, the first ten of which are ordered by economic value generated within their SEZs.

1 China	11 Cambodia	21 Myanmar
2 Republic of Korea (South Korea)	12 Greece	22 Nigeria
3 Mexico	13 Egypt	23 Pakistan
4 Indonesia	14 Ethiopia	24 Panama
5 Thailand	15 India	25 Poland
6 Philippines	16 Iran	26 Russia
7 Vietnam	17 Jamaica	27 Thailand
8 Bangladesh	18 Malaysia	28 Ukraine
9 Belarus	19 Mauritius	29 Uzbekistan
10 Cayman Islands	20 Mexico	30 Vietnam
		31 Zambia

The success of Special Economic Zones (SEZ) is reliant upon many factors. They must establish a minimally bureaucratic administrative structure, provide an efficient customs process, and administer consistent economic regulations and procedures, while creating an attractive environment for business investment.

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<sup>2</sup> Farole, Thomas, and Gokhan Akinci, eds. 2011. *Special Economic Zones: Progress, Emerging Challenges, and Future Directions*. Washington, DC: World Bank.

<sup>3</sup> World Bank Group - Poverty Reduction and Economic Network - International Trade Department, [siteresources.worldbank.org/trade/resources/tradeissuebrief\\_specialeconomiczones.pdf](http://siteresources.worldbank.org/trade/resources/tradeissuebrief_specialeconomiczones.pdf)

## 2.2 Common Problems in Economic Zones

Many Special Economic Zones struggle to fulfill their charters and foster accelerated economic growth due to inadequate infrastructure, public services, and inconsistent application of government policies related to immigration, customs, taxes and fees, and other regulatory issues.

There are many ways to improve SEZs globally. Two specific factors related to economic isolation and the collection of taxes and fees are explained below.

1. **Isolated:** SEZs typically operate within predefined geographic areas and often have a limited infrastructure and resources. When seeking to attract FDI from regions outside the SEZ's geographic sphere of influence, many SEZs face the challenge of building trust that their zone and host country can provide political and economic stability in order to garner investment.
2. **Transactions and Collections:** It is difficult for SEZs to collect taxes and fees from businesses operating within their zone. Agreements for such fees and taxes may be vaguely defined or structured as a promise to pay and the processes to collect such fees and taxes are antiquated and costly.

## 2.3 The Solution: SEZCo

**Establish Trust and Reduce Bureaucracy.** The key to promoting economic growth and providing a permanent solution to the challenges that SEZs face is a blockchain-based platform. The SEZ Consortium, or SEZCo, using the SEZChain token as a measure of account, provides a powerful solution to establish trust, transparency, and reduce bureaucracy as follows:

1. **High Level:** As a comprehensive economic blockchain-based platform, with various Applications or Components to streamline SEZ administration, the SEZChain token serves as a universal measure of account within and between SEZs.
2. **Connected:** Through the SEZ Consortium (SEZCo), SEZs can organize as a unified association with common goals, rather than existing as isolated economic enclaves.
3. **Stability:** With SEZs able to act as a unified body, the consortium members will enjoy more economic stability and will attract more investment than if they remained isolated entities.
4. **Transparency:** The transparency of the SEZChain for SEZCo members allows them to audit economic activity, enabling them to enforce collections within their zone.
5. **Deploy Two Applications Initially:** Build and deploy two specific applications that benefit the Consortium Members (I) the Payment Gateway and (II) the Audit Tool.
6. **Continue to Build:** Continue to build and deploy other applications per the needs of the Consortium Members.
7. **Liquidity:** The motivation for SEZCo members to incentivize adoption of the SEZChain within their SEZs, as well as the fees that are paid by users when performing transactions creates an ecosystem in which SEZChain token is consistently circulated resulting in a larger pool of liquidity for all participants in the SEZChain ecosystem (§11.4).

## VALUE PROPOSITION.

The core value of SEZCo comes from a few different aspects of the SEZC ecosystem.

1. **Rewards:** When SEZCo members are hosting nodes they are rewarded SEZChain tokens simply for being a member. Their membership status allows them to make significantly more off of hosting a node than what an average stakeholder would be able to make (§11.1). In addition to the extra SEZChain tokens that are made by hosting a SEZCo Node, those that are selected to be block producers based on a variety of factors receive more than just regular SEZCo Nodes.
2. **Transparency:** The transaction receipt system (§7.3) ensures that there is full transparency on the blockchain for all pertinent transactions. What this means is that SEZCo members that incentivize widespread adoption in their respective economic zones have a greater level of transparency for the economic activity occurring between businesses and consumers in their zone which allows them to enforce laws governing economic activity with greater ease.
3. **Auditability:** The audit tool (§13.3) allows SEZCo members to audit the economic activity on their zone and analyze the data however they see fit. Insight into the economic activity for a given SEZ will allow the governing bodies to make better economic decisions based on data.
4. **Liquidity:** In addition to these factors the liquidity pool that is created by the circulation of funds throughout the SEZChain ecosystem creates an environment in which economic activity is stimulated in all economic zones (§11.4). The more SEZCo members that join the consortium and promote widespread adoption of the SEZChain in their SEZs, the greater the liquidity pool will be for all SEZCo members.

## THE LONG-TERM GOAL.

The long term objectives of SEZChain are:

- Build the SEZCo to be recognized as an international, hyper-connected business community
- Build a platform accompanying the SEZChain which allows for a more efficient and reliable infrastructure for SEZs and corporations. The increase in efficiency will foster greater productivity and economic growth within SEZs.
- Utilize the SEZChain token as an internally stable measure of account representing usage and stake in the ecosystem.
- Utilize SEZChain Asset tokens to allow users to trade assets with minimal overhead cost while providing governing bodies with greater transparency and auditability.

# 3.0 BENEFITS OF BLOCKCHAIN

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Blockchain technology offers SEZs and participating businesses numerous tangible benefits as listed below.

**Transparency:** Blockchain technology provides a permanent, accurate audit trail for all transactions. Economic Zones are often forced to rely on self reporting. This accounting method is prone to error, mis-reporting, and fraud. By utilizing the SEZChain, all business transactions within a SEZ are transparent to the governing body of that SEZ, enabling the economic zone authority and businesses to monitor and audit all transactions relevant to them.

**Fee Collection:** By using the SEZChain and its accompanying platform, fees can be collected automatically and instantly as part of transaction processing. For example, an interactive gaming site could automatically levy fees on a transaction-by-transaction basis in real time or near-real time utilizing the platform's accompanying off-chain channel API (§13.4). Transparency of the chain within a given SEZ allows the authority that governs it to ensure that all parties involved in a business transaction pay the proper fees or taxes.

**Pay as you go:** The off-chain channel API (§13.3) allows businesses operating within SEZs to pay fees in a pay-as-you-go fashion. Additionally the off-chain channel framework ensures that all payments are accurate and the payer is unable to fall behind on payments.

**Scalability:** The consensus algorithm utilized by the SEZChain blockchain (DPoS) (§9.0) enables maximum throughput of transactions. In addition to this, the Unspent Transaction Output model (UTXO) being utilized allows for maximum parallelism when processing transactions of both SEZChain tokens and SEZChain Asset tokens.

## 4.0 THE CONSORTIUM (SEZCo)

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### 4.1 SEZCo Overview

The goal of the consortium (SEZCo) is to build a hyper-connected business community which drives a cooperative effort to modernize the economic infrastructure of its members. The SEZCo, acting as an economic ambassador, can foster strong and mutually-beneficial trading arrangements that encourage investment in special economic zones, and subsequently, investment in the host nation. This concept has some parallels to BRICS<sup>4</sup>, the economic association comprised of Brazil, Russia, India, China, and South Africa.

**Purpose:** SEZs and Corporations express a desire to be engaged in a unified financial infrastructure in order to promote a more efficient, highly-connected economy. The SEZChain ecosystem unites SEZCo members and promotes healthy economic growth for all members.

**Consortium Members:** The SEZCo will consist of members from industry, government, and non-profit organizations. The Parties adopt a non-exclusive, open membership policy. The policies determining the criteria for consortium membership are voted on in the constitution. The SEZCo will notify the Sponsor(s) of the addition or deletion of Consortium Members. All SEZCo members, regardless of when they become a signatory to this Agreement, have the same rights and obligations.

**Reserves:** Membership in the SEZCo is dependent upon each Member reserving a specified number of SEZChain tokens at all times. If a Consortium Member fails to reserve enough SEZChain tokens, Members will automatically lose membership privileges which includes special voting rights and be unable to participate in the SEZCo.

**Voting:** Voting on changes in the constitution is done by all members of the community who have some reserve of SEZChain tokens. Votes are weighted according to the number of SEZChain tokens a user has. The number of tokens that SEZCo members are required to have in reserve ensures that they will have significantly higher voting weight than most users of the platform. In addition to this there may be special sections of the constitution that only SEZCo members may vote on, most specifically parts of the constitution governing the SEZChain's accompanying platform. Voting is also done to determine block

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<sup>4</sup> <http://infobrics.org/>

producers. Nodes run by SEZCo members are likely to be selected as block producers if they perform well and block producers make greater rewards due to their stake.

## 5.0 Governance

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### 5.1 Constitution

**Constitution:** The policies of the SEZChain laid out in the consortium constitution are voted on by all members of the community according to their stake in the ecosystem which is defined by the amount of SEZChain tokens they have. The constitution functions as the DAO for the ecosystem. In addition to the written policies of the SEZChain, the constitution will also allow users to vote for changes to the SEZChain. The reason that a constitution is important to the network is it not only governs the policies of the blockchain, it also makes clear what the intent of those policies are. This aids in avoiding speculation on policies and ensure that all stakeholders are informed about the intent of the SEZChain in addition to the rules by which it functions.

**Sub-Constitutions:** Different SEZs may also have their own sub-constitutions which govern the policies of the SEZChain in their own zone. Voting on sub-constitutions may happen between stakeholders, or the governing authority of the zone may decide what the policies will be in their zone.

### 5.2 Voting Examples

Some examples of elements of the constitution that stakeholders may vote on are as follows. This is not a comprehensive list, it is a set of examples.

**Quorum Membership:** The quorum is the group of SEZCo Nodes that produce blocks during consensus. Quorum members receive more block rewards than SEZCo Nodes that are not acting as block producers because they are contributing more to the system as a whole. Voting on quorum members highly incentivizes good performance of SEZCo Nodes because members with a good history of performance are more likely to be voted in as block producers.

**Quorum Size:** The maximum and minimum number of block producers may be voted on by the community. There is a maximum and minimum number of quorum members that can be voted in. The current maximum is 101 and the current minimum is 1. The reason that stakeholders are able to vote on this is the size of the quorum may affect the number of transactions per second that can be validated and written to the blockchain. For instance if the community feels that the maximum number of quorum members should be 21 a vote will take place and if the vote passes, the maximum number of quorum members will then be 21. This gives users with a large amount of stake greater control of the network.

**SEZCo Reserve Minimums:** The minimum number of tokens that must be held by a user in order to run a SEZCo Node may be voted on by stakeholders. This is decided by vote and not a formula because members holding close to the minimum amount of reserve tokens may be taken by surprise and suddenly not have enough reserves to be consortium members otherwise. This also gives the SEZCo community greater control over the conditions that must be met in order to be a SEZCo member which allows greater self regulation of the consortium.

**SEZCo Membership Conditions:** If SEZCo members want to change the conditions required to be a member of the consortium, this can be put to a vote. For instance, if SEZCo members would like to enforce a limit on the amount of downtime a node can experience this may be voted on.

**“Bad Player” Penalties:** If a node is acting as a “bad player” or engaging in activity that is harmful to the network, stakeholders may vote on how they are penalized. An example of this would be if a node was intentionally presenting fraudulent transactions, the policy concerning how many rounds of consensus they would miss out on would be determined by the constitution.

**Block Reward Minimums:** The minimum percentage of block rewards that users in a given tier of membership receive may be voted on by stakeholders. For instance, the initial minimum amount of the total block rewards awarded during consensus to block producers is initially 15%. If that number should change based on the size of the network or network conditions, stakeholders may put that to a vote within predefined limits.

## 5.3 Protocol

The protocol for updating the SEZChain and enforcing policy changes is based on the constitution and protocol utilized by [EOS](#), the blockchain developed by [Block One](#).

When the community wishes to vote on a change to the blockchain the quorum must maintain a  $(2/3)+1$  “yes” vote on the change for 30 days. After a vote has passed, the developers of the SEZChain will implement the changes. After the changes have been written, Block producers will vote again on the changes to the code and it must again maintain a  $(2/3)+1$  “yes” vote for 30 days consecutively. After the change has been ratified by the block producers, nodes that are running will have a 30 day window to implement the change. If nodes do not upgrade to adopt the changes they will not be able to participate in the network. Nodes are highly incentivized to adopt the changes because they will not receive block rewards if their nodes do not stay current within 30 day window.

If an emergency occurs in the form of a major bug or security exploit, quorum members may expedite the process so that a fix can be implemented in a timely fashion.

# 6.0 SEZChain Token (SEZC)

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Within the SEZChain ecosystem there are two types of tokens with two main functions.

## 6.1 SEZChain Token

**Stake:** The first type of token is referred to as a SEZChain token (§7.5). The purpose of this token is twofold. The first use case for a SEZChain token is to represent a user’s stake in the SEZChain ecosystem. When voting on changes to the constitution of the SEZChain, a user’s stake represents the weight of their vote. A minimum amount of 25 million SEZChain tokens is initially required to retain membership. Members will naturally have larger weight to their votes on changes to the constitution because of the large amount of tokens that are required to be a member of the SEZCo. A user’s stake also is a major determining factor during consensus when users with stake are given block rewards. The more stake or SEZChain tokens a user has, the more block rewards they will receive (§11.1).

**Chain Usage:** The second purpose of the SEZChain token is as a “utility token” created to pay for usage of the network. When users create transactions they must bid a certain amount of SEZChain tokens as a fee for the computational resources required to validate that transaction and write it to a block. When a block producer writes a block, rewards are given to staked members from the total of fees that are bid for the the transactions that are written to that block (§11.1).

## 6.2 SEZChain Asset Token

The second type of token is the SEZChain Asset token or Asset token (§7.5). The purpose of the SEZChain Asset token is to allow users to mint their own tokens and tie them back to real world assets so they can be traded on-chain. Asset tokens can be minted individually or in groups and cost SEZChain tokens to mint. When a group of asset tokens are minted, an origin will be generated and stored as a hash in every state that allows access to other users wanting to buy or sell this asset to view the relevant documents needed to legally purchase it. Only assets with the same origin hash may be “stacked.” There can be multiple inputs to a single output of this asset. Many individuals would not purchase assets if there is no accompanying legal prose. In this system, users can trade assets on-chain for other types of assets or SEZChain tokens. Current owners of a SEZChain Asset token may burn these tokens if the asset has been used or spent according to the legal prose of the asset. In order to ensure correct storage of legal prose it is recommended that users mint SEZChain Asset tokens on the platform (§12.1). The smallest denomination of an SEZChain Asset token is 1.

## 7.0 Transaction Model

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The transaction model utilized by the SEZChain is called an **unspent transaction output** (UTXO) and is similar to the one used by R3 in their product [Corda](#).

### 7.1 UTXO Overview

In the traditional UTXO model, every transaction has one or more inputs and one or more outputs. Inputs are the amount of coin that a transaction begins with, and therefore the amount that will be sent to another address.

An example of a simple exchange in the UTXO model is as follows.

*Adam has a wallet with 150 tokens in it. The balance in the wallet actually consists of the sum of all the outputs of the transactions unspent by Adam. He may have three outputs with 50 tokens, 80 tokens, and 20 tokens. Because these outputs reside in Adam’s wallet, they are considered to be unspent or unconsumed, hence the name Unspent Transaction Outputs. They are transaction outputs that as of yet, have not been sent to another wallet or spent.*

*When an output is consumed, the entire amount is consumed. Adam sends 30 tokens to Bob. The unconsumed output(s) totaling 50 tokens is/are selected. When consumed, two outputs become inputs for two new transactions. The first new input goes to Bob and is worth 30 tokens, the second input worth 20 tokens is sent back to Adam at a new address that is created by his wallet. The 20 tokens sent back to Adam are a UTXO from the transaction that just occurred.*

Throughout this paper, inputs and outputs in the SEZChain are referred to as “states.” These states contain more data than those in Bitcoin, and only exist in the context of a transaction either as an input or an output.

### 7.2 Transaction Fees

When a user creates a transaction, they also bid a number of SEZChain tokens for that transaction to be written to a block. This is referred to as a transaction fee. When blocks are produced, the block producers will choose the transactions that they wish to write to a block, usually based on the amount that is bid as

the transaction fee. When block producers write blocks, block rewards will be distributed to stakeholders based on their stake (§11.1).

## 7.3 Transaction Receipt Keys

When a transaction is signed by the required number of users, validated by a SEZCo Node, and written to a block, all parties relevant to the transaction receive a receipt key that is generated by hashing all of the data from the transaction. The odds of two hashes having the same result are negligible.

When a transaction takes place between parties having different validating SEZCo Nodes, the SEZCo Nodes for each SEZ involved must validate the transaction. One of them is selected to present the transaction during consensus. Keys to view transactions are always unique because part of the data being hashed is comprised of the inputs and outputs of the transaction. These receipts are required to view the contents of both the transaction and the output states that are relevant to that user (§10.3). Without the receipt key to the transaction and output state, a user cannot see any of the information associated with that transaction.

## 7.4 Transaction Data

Transactions in the SEZChain consist of inputs, outputs, and signatures. There must always be one or more of each for a valid transaction. All the elements contained in a transaction are as follows.

**Inputs:** All of the input states that are being consumed by a transaction.

**Outputs:** The unspent transaction outputs resulting from a transaction if or when the transaction is spent.

**File Zip Hash:** The hashed zip file reference for any legal prose which accompanies a transaction.

**Timestamp:** The time at which a transaction was written to the blockchain.

**Origin:** A reference to the origin state. Most relevant for SEZChain Asset tokens as it allows users to view the original legal prose that was uploaded when minting asset tokens. Origins for SEZChain tokens are all the same whereas those for SEZC Asset tokens are unique to the group in which the tokens were minted.

**Signatures:** Signatures are confirmations from the users involved in a transaction to validate the transaction. Transactions can only be executed once they are signed with the public keys of the users involved.

## 7.5 State Data

The output states that are created by a transaction contain the following information:

**Type:** There are two main types of tokens that can be traded on the chain. The first of these is the SEZChain token (§6.1). The purpose of this token is to pay for the usage of the blockchain system as well as representing a user's stake in the chain for actions such as voting. The second is a SEZChain asset. These are user-defined assets that they wish to trade on the chain (§6.2).

**File Zip Hash (Origin):** These are any relevant documents that are involved with the minting of an SEZChain Asset token such as a title for a vehicle. These can be any types of documents. Some common examples include statements of intent of the transaction resulting in this output, legal contracts governing the sale of an asset, and bills of sale of assets. These files are stored with the origin which can

be referenced from the current UTXO which full nodes store. These are stored with the origin or the first output of a SEZC Asset token.

**Metadata:** Extra data about the transaction such as the users involved in the transactions or a timestamp of the creation of the output.

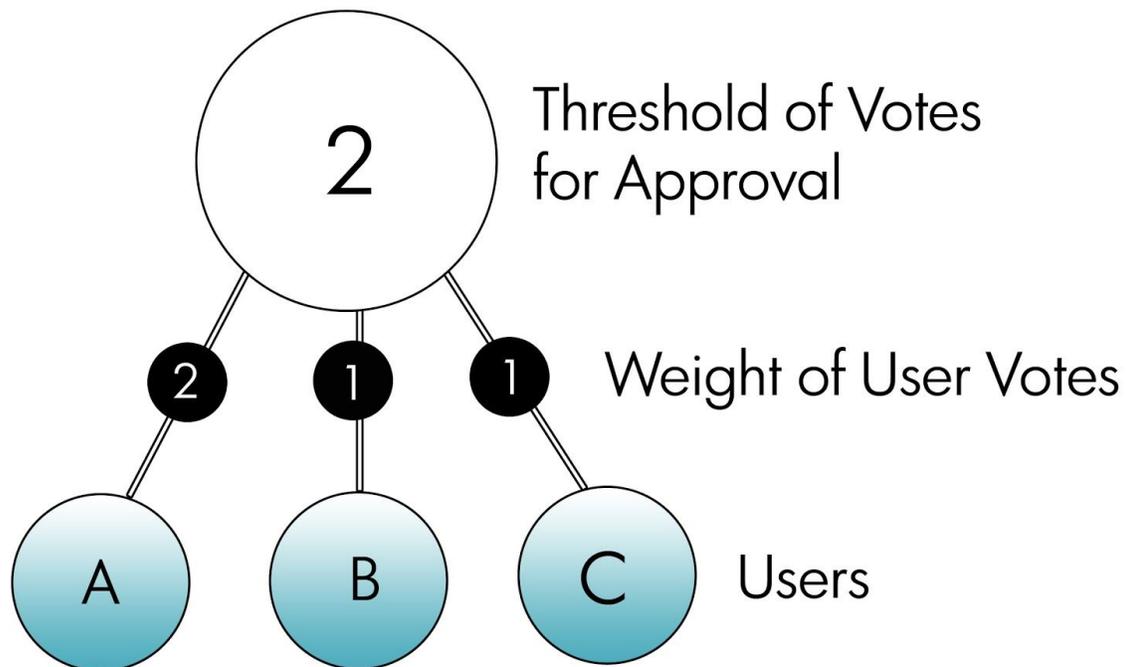
**Origin:** This is a hash of the data that is generated when a user mints a SEZChain Asset token. It is the origin of the minting of the asset to ensure that assets are not duplicated. While the origins of a type of asset token are unique, the origin of all SEZChain Tokens is the same. When a user mints an asset token, a new contract may be uploaded and is a singular set of legal prose accompanying the asset. The purpose of the origins store in the state is so that it can be easily referenced to determine if two outputs may be inputs to the same transaction.

**Output:** For transactions that are spent, the new outputs that are a result of a transaction are stored.

## 7.6 Multi-Signature Transactions

**Multi-Signature Transactions:** Users may also create transactions that require a number of signatures for validation. When a user creates a multi-signature transaction, they define whose signatures can be used to sign the transaction, the weight of each of those users' signatures, and the threshold of votes needed to be met for the transaction to be considered valid.

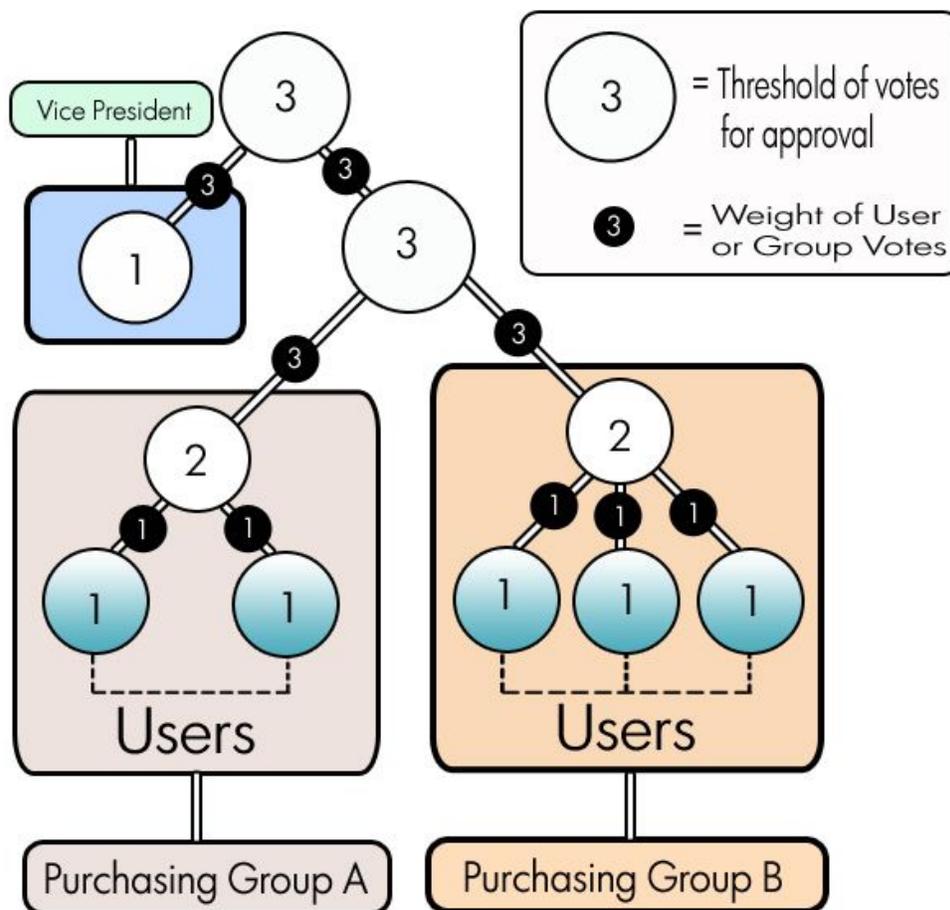
In the diagram below user A has created a multi-signature transaction that requires a weight of two to be valid. User A would like to be able to validate this transaction themselves, or have two of their co-workers (B and C) combined validate it. When user A creates the transaction they set the vote of their vote to two and the weights of B and C to one. In this way, having either user A's signature or the signatures of users B and C combined will be able to validate the transaction.



**Transaction Groups:** In some scenarios, weights alone are inadequate to meet more complicated requirements. In these scenarios, transaction signature groups can be used. Signature groups work as a

cluster of individuals representing a single approval for validation and can have their own sub-weighted transactions. In these cases, groups can work and function as a single individual. In other cases, certain groups require validation before a transaction can complete. This allows for unbalanced validation processes where a certain amount of weighted validations are allowed, coupled with certain required signatures from specific individuals. (example: a requirement that needs a weight of 'two' from a legal department and weight of 'three' from a financial department.

In the example diagram below, a Vice president of a company would like to create a transaction for the company to purchase a number of SEZChain Asset tokens. In this company there are also two different purchasing groups that may acquire these tokens. Group A is comprised of two people and Group B is comprised of three. For Group A, the Vice President would like to require both users to approve a purchase. In the group of three, only two votes are needed to purchase the tokens. The Vice President would also like to be able to approve the purchase by himself. He would set the weight of his vote to 'three' and create two groups, one for each purchasing group. The weight of each group's vote also being 'three.' In this way the Vice President, or either group, could approve the transaction.



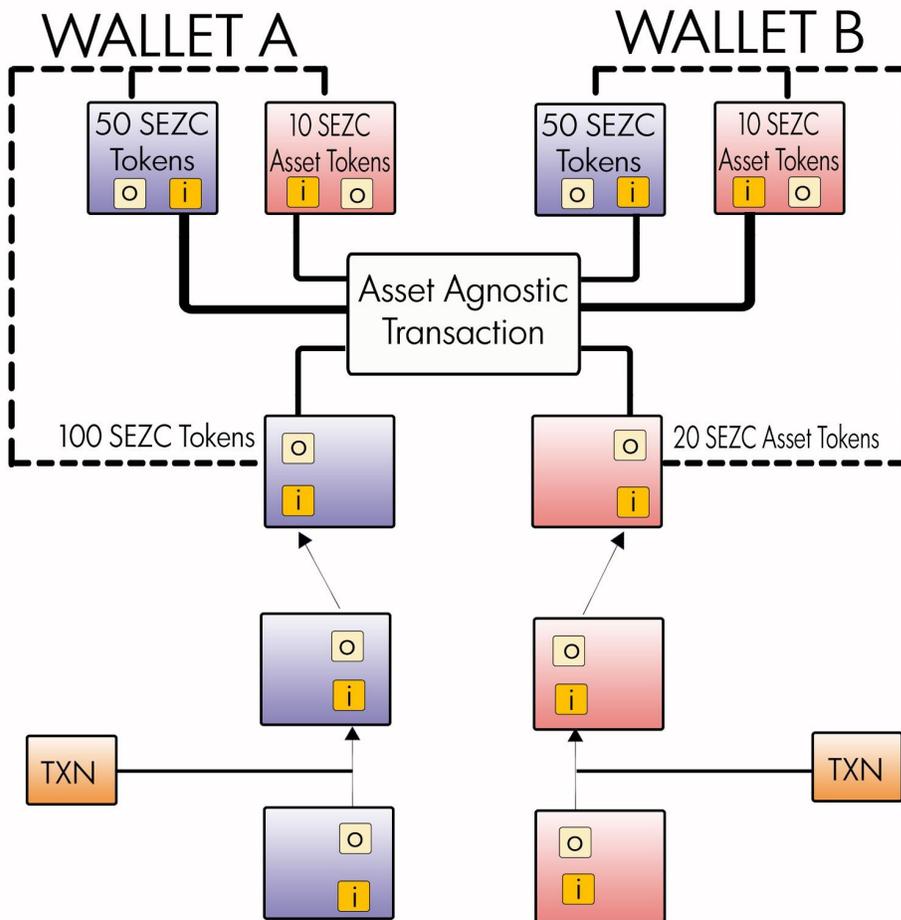
## 7.7 Asset Agnostic Transactions

When trading any assets on the chain that do not have the same origin hash, a user would create a special type of transaction referred to as an **asset agnostic transaction**. For this type of transaction, both users involved would create one half of an asset agnostic transaction. Each user creates a pre-signed, multi-signature asset agnostic transaction requiring two signatures. Only one of these is

signed. These transactions are then merged into a single transaction with the required number of signatures.

Within each of the pre-signed asset agnostic transactions is contained two pre-signed regular transactions, one for each type of asset being traded. When both users sign the asset agnostic transactions, the pre-signed transactions wrapped within are checked for validity and can then be written to a block. An asset agnostic transaction is always treated as a single transaction by a block producer, when they choose to write one, they always validate both of the transactions that are wrapped within. In this way, different types of assets defined by users on the chain can be traded atomically.

In the diagram below, Adam is the owner of wallet A and Bob is the owner of wallet B. Adam owns 50 SEZChain tokens which can be seen in blue in his wallet and Bob has 20 SEZC Asset tokens he minted representing widgets he would like to sell represented in orange. Adam would like to buy 10 of Bob's widgets. Once they have each created a partially signed transaction, their transactions are combined to form an atomic Asset Agnostic Transaction. Adam's input from his wallet will generate two outputs during this transaction, one will go to Bob leaving Bob with 50 SEZChain tokens in his wallet and Adam's change totaling 50 SEZC will be sent to his wallet. Bob's input from his wallet will generate two outputs during the transaction, one will go to Adam for 10 SEZC Asset tokens representing widgets and Bob's change totaling 10 SEZC Asset tokens representing one widget each will be sent back to his wallet. In this graphic "i" represents an input and "o" represents an output.



# 8.0 Node Network

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## 8.1 Node Network Overview

In the SEZChain ecosystem, there are three types of nodes that users can run, they are as follows.

**SEZ - SEZCo Validating Node:** Each member of the consortium who is the governing body of a SEZ runs a special type of node or cluster of nodes called a SEZCo Node. Every entity that does business within the bounds of a SEZ is linked to the SEZCo node operated by that SEZ to which they belong. It is the responsibility of these special nodes to validate transactions from their own economic zones and present them to the quorum during consensus.

SEZCo Nodes receive all transaction receipts of their constituents that are generated when blocks are produced except for those between two private individuals.(§ 7.3, 10.2) The large amount of stake that is required to run one of these nodes, as well as the incentives of SEZCo Node owners to properly validate transactions from their zone incentivizes minimum downtime for SEZCo Nodes. In the case of a SEZCo Node run by a governing body, downtime will result in a loss of all block rewards generated during that time and the transactions may be presented during consensus by a Non-SEZ SEZCo Node (§9.3).

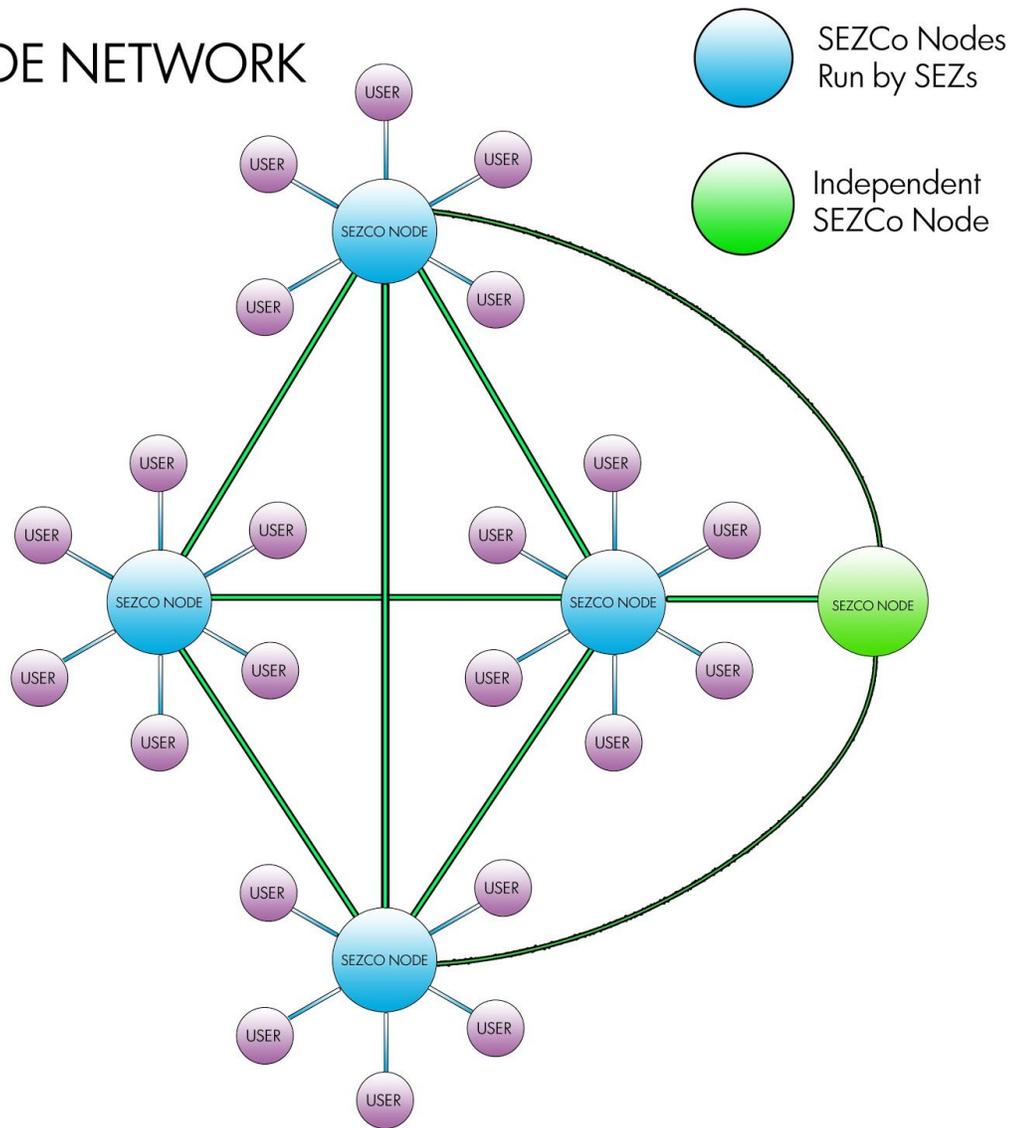
**Independent - SEZCo Validating Node:** Each member of the consortium who does not represent the governing body of a SEZ runs a SEZCo Validating node referred to as an Independent Sezco Node. Independent SEZCo Nodes do not receive the receipt keys for the transactions they process and present during consensus. The main purpose of these nodes is to provide extra network bandwidth and allow private groups and businesses the potential to become block producers to receive block rewards. These nodes function as a form of backup when a SEZCo Node run by a SEZ governing body experiences downtime, is unable to validate all of the transactions occurring within their subnetwork, or is acting as a bad player in the network. When Independent SEZCo Nodes validate transactions, the transaction receipts that are generated during consensus will still be sent to the SEZCo Node that is run by the governing body of that zone. In the case of a SEZCo node run by a governing body or a private entity, downtime will result in a loss of all block rewards generated during that time.

**Full Node:** Each full node that is running downloads a full copy of the SEZChain. These nodes are also able to plug into the SEZChain and make any required API calls that applications running on the platform may require such as creating a transaction, interacting with a wallet, and more. Any functionality that requires querying data from the blockchain will require a full node. For many of the applications that run on the SEZChain's accompanying platform, users or application hosts will be required to run a full node.

**Lite Client:** Lite clients do not download full copies of the blockchain and are limited in the API calls that they can make. They are essentially able to make remote requests to the chain with only pre-signed transactions. A lite client is unable to directly query data from the blockchain. The primary purpose of the lite client is to allow users, that are only using apps from the SEZChain's accompanying platform, access to the functions of the blockchain such as a mobile wallet.

Within the SEZChain it is important to understand that each SEZCo member who represents a SEZ is essentially the master and governing body of what can be thought of as their own private node network. Every transaction that is performed by an entity within a SEZ must be validated by the SEZCo Node that governs that zone or their backup node(s). In addition to this, as is described in the identity section (§10.1), each SEZCo member acts as the certificate authority for their zone and is responsible for validating each entity that would like to make an account associated within their subnetwork.

## NODE NETWORK



## 9.0 Consensus

### 9.1 Consensus Overview

Once a SEZCo node has validated a transaction (§7.1-7.8), that transaction is stored in the transaction pool belonging to which it belongs.. Consensus happens in a series of rounds. In each round, a number of SEZCo nodes are voted on to join a quorum. The weight of each users vote is determined by the number of SEZChain tokens a user has. Once a SEZCo node has been voted into the quorum it will be a block producer for that round.

In every round of consensus, the SEZCo Nodes present the transactions in their transaction pool along with the fees that are bid by the creators of the transactions. Once a SEZCo node has validated a transaction, it will keep presenting it to the quorum until it has either been written (§7.4). For a quorum size  $n$ , the  $n$  number of SEZCo Nodes with the most votes will become quorum members.

Each round of consensus begins by all members of the network checking in and validating their stake. The members of the quorum are selected from the group of SEZCo nodes according to the number of votes they have received. The formula for the number of nodes that participate in the quorum is represented by the function  $f(x) = \lfloor \sqrt{n-1} \rfloor + 1$  odd where 'n' is the number of SEZCo nodes on the network. The nodes with the most votes are selected up to a maximum number of quorum members as determined by the constitution. The following chart illustrates how many members would participate in a quorum given a number of active SEZCo Nodes.

Number of SEZCo Nodes	Quorum Size
1	1
5	3
10	5
20	7
50	9
100	11
200	17
400	21
10,001	101

Each node in the quorum is chosen in a random order to select which transactions presented by all the SEZCo nodes will be written to the blockchain. When a particular nodes writes a block, the members of the quorum will vote on the validity of the presented block via asynchronous Byzantine Fault Tolerance (aBFT). A block presented must receive  $(2/3)*n+1$  votes to be written where  $n$  represents the size of the quorum. When a block has received enough votes from the quorum, the current block producer will then write that block and all of the transactions written to that block will be considered final. Once a block has been written, the SEZCo Node that has written that block as well as all stakeholders will be rewarded with the appropriate amount of block rewards (§11.1).

## 9.2 Benefits

**Finality:** One major problem in many blockchain systems such as Bitcoin or Ethereum is that the blocks produced are not considered final until a number of subsequent blocks have been written. The finality of [Delegated Proof of Stake](#)<sup>5</sup>, or DPoS, means that once a transaction has been written to a block, that transaction is considered to be permanent. This means that once a transaction has been written to a block, users do not have to wait for subsequent blocks to be written to be sure their transaction is permanent.

**Throughput:** In addition to the benefit of finality, consensus via DPoS is also extremely fast because the block producers are working together to create blocks rather than competing with one another. Another reason DPoS has a very high throughput of transactions is consensus is happening between a much smaller group of nodes meaning not every node on the network must agree, just the required number of

<sup>5</sup> <https://steemit.com/dpos/@dantheman/dpos-consensus-algorithm-this-missing-white-paper>

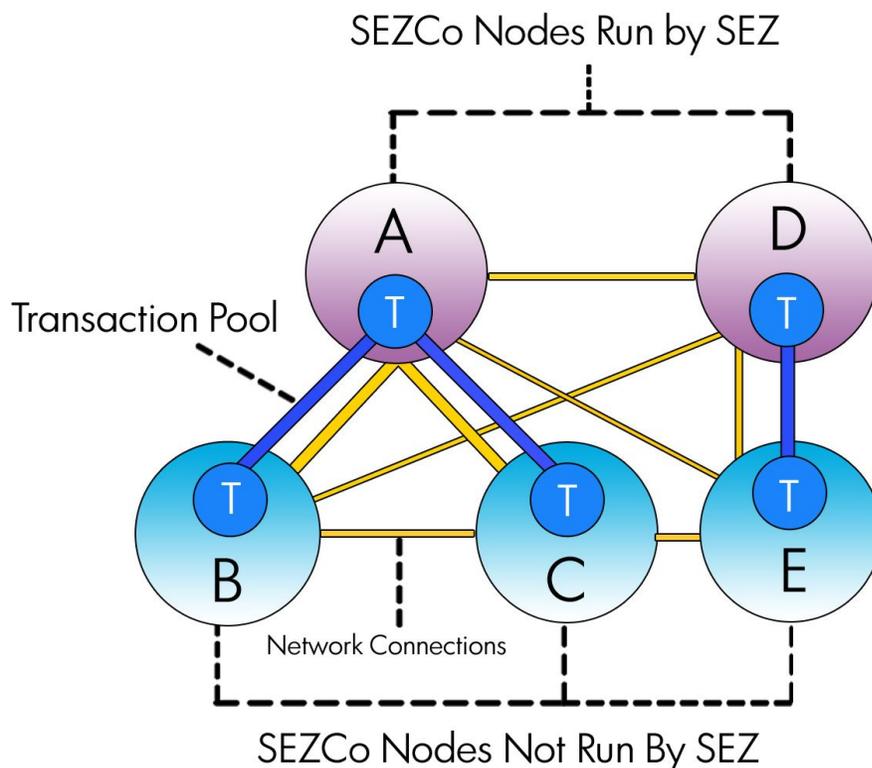
quorum members. There is no [difficulty set for producing blocks](#) such as in systems like Bitcoin. This minimizes the amount of computational power required by the network because there are no miners doing proof of work.

## 9.3 Backups

One potential problem with having SEZCo Nodes run by SEZs presenting all of the transactions for their respective zones during consensus is the possibility of downtime. If a SEZCo Node run by a SEZ member goes down, there needs to be another node that will be able to present the transactions for that economic zone during consensus. To mitigate this, Independent SEZCo Nodes may be contracted by SEZs to act as a backup in case of outages. In this instance the Independent SEZCo Node would share a transaction pool with the SEZCo Node run by the SEZ member. If a SEZCo Node run by a SEZ goes down during the phase of consensus at which nodes are checked to determine who receives block rewards, the node that is sharing the transaction pool with them would present the transactions for them.

SEZCo Nodes experiencing downtime will not receive any block rewards during the time which they are down. The node that presents transactions for a SEZCo Node would presumably be paid by the SEZ for backing them up in the case that they experience downtime. Mitigating downtime of validating nodes increases the circulation of funds throughout the ecosystem and preserves the integrity of the network.

In the example below there are depicted two SEZCo Nodes that are run by SEZs labeled “A” and “D”. In order to ensure the integrity of their subnetworks, these two nodes have contracted Independent SEZCo Nodes as backups. Node A has contracted two Independent SEZCo Nodes “B” and “C” to share a transaction pool. If node A goes down, either Independent Node A or Independent Node B will present their transactions during consensus. SEZCo Node D has contracted Independent SEZCo node E to share a transaction pool. If node D experiences downtime, the transactions in it’s pool will be presented by Independent Node E..



# 10.0 Identity & Privacy

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## 10.1 Identity Overview

It is important to note that due to the way consensus works, the SEZChain network is essentially a cluster of semi-private subnetworks, each of which are managed by a SEZ and its SEZCo Node. SEZs function as Certificate Authorities (CAs) for members of their respective economic zones. Any user that wants to create an account must have permission from the CA (SEZ) before they can do so. SEZ governing bodies may set their own criteria for having an account operating in their zone. The SEZChain is designed to act as a financial system and backbone for transfer of value and assets across SEZs. Like many financial systems, the SEZChain must have a form of Know Your Customer (KYC) in order for the SEZs to properly audit their business transactions to ensure fair play within the ecosystem.

Once a user has permission from the governing body of their economic zone they may make an account. The identity of each user is linked to a unique username. A private key is also generated for each user and is used to generate public keys which are used to sign transactions. The governing body is then able to use this identity in conjunction with the transaction receipt keys to audit the chain via the audit tool (§13.3) running on the SEZChain platform.

## 10.2 User Types

There are four different types of users on the SEZChain.

**Sovereign Authority:** The sovereign authority of an economic zone is the nation to which a SEZ belongs. The purpose of the SEZChain is to function as a financial system for SEZs, therefore Sovereign Authority has the ability to audit any economic zones belonging to them via transaction receipt keys.

**Consortium Member:** SEZs that have joined the SEZCo are referred to as consortium members. They manage the users who do business within their economic zone and are able to audit their business transactions. In addition to this, they also run SEZCo nodes which are responsible for validating the transactions of their members and presenting them during consensus. Every user on the chain is linked to a consortium member and consortium members are sent the receipts of every transaction happening in their zone except for those between two private individuals.

Consortium members may be the governing bodies of a SEZ. They may also be private business that seek to make a profit in SEZChain tokens by stake/becoming block producers. They also may opt to make a profit by acting as backup nodes for SEZCo Nodes that are run by SEZs. The later run nodes called Independent SEZCo Nodes.

**SEZ Business:** Companies that use the SEZChain to do business or pay fees such as port tariffs are registered as SEZ businesses. Businesses function very similarly to private users; the major difference between them being the location(s) to which their transaction receipts are sent.

**Private Individual:** These accounts are for individuals who are not business or government entities that are participating in the network or using the SEZChain.

## 10.3 Transaction Privacy

**Identity:** The following is a table outlining which entities on the blockchain are allowed to know the identity of different types of users. For instance, the sovereign entity governing a region will know the identity of each consortium member that falls under their jurisdiction. This table does not outline the recipients of transaction receipts for transactions that are performed on the SEZChain.

	Sovereign Authority (Government)	Consortium Members	SEZ Business	General Public
Sovereign Authority (Government)	Yes	Yes	Yes	Yes
Consortium Members	Yes	Yes	Yes	No
SEZ Business	Yes	Yes	Yes	No
General Public	Yes	Yes	Yes	No

**Transaction Receipts:** When transactions involving businesses are performed on the chain, the resulting receipts are sent out to multiple parties to ensure that the governing bodies of a nation or special economic zone are able to audit the blockchain ensuring that individuals or companies are paying the correct amount of tax. The transparency that this provides for an economic zone and governing body provides an enormous amount of value because within their ecosystem, they are able to audit all business transactions ensuring that entities doing business within their zone are doing so legally.

The following is a table outlining which users are sent the receipts from a given transaction. The two parties involved in a transaction will always get a receipt key.

	Sovereign Authority (Government)	Consortium Members	SEZ Business	General Public
Sovereign Authority (Government)	No	Yes	Yes	No*
Consortium Members	No	No	Yes	No
SEZ Business	No	No	No	No
General Public	No	No	No	No

It is important to note that governing bodies and consortium members do not receive the receipt keys from transactions between two private individuals. In addition to this, consortium members do not have access to the identities of individuals outside their special economic zone and do not receive receipt keys for transactions of users outside their jurisdiction. The only exception to this rule is if there is a business transaction between users with different CAs. The identity system helps prevent criminal acts such as money laundering. If a business were attempting to launder money through private accounts, the governing body would be able to use traditional data mining techniques to locate perpetrators based on irregularities in transaction activity.

## 11.0 Token Economics

The SEZChain ecosystem is designed to facilitate ease of trade and cooperation between members of the SEZCo while still maintaining the relative independence of each zone.

## 11.1 Block Rewards

The percentage of block rewards which are given to SEZCo Nodes who are voted in as quorum members during consensus to produce blocks is calculated by a formula that can be voted on in the constitution between predetermined bounds. The percentage of block rewards that are given to SEZCo nodes that are performing as expected is the remainder of the transaction fees that are left over when SEZCo quorum members and non-SEZCo nodes have received their rewards. The amount of block rewards that are given to members of the community that do not belong to the SEZCo determined by the constitution.

When nodes receive block rewards, they are proportional to the stake they have compared to nodes of the same type. For instance, if there are two block producers A and B, where A has twice as much stake in the system, the SEZChain tokens awarded to A will be proportional to the amount of stake they have. The amount of reward that a user can make from running a single node is also capped by the maximum amount of stake a user is allowed to have in the system, ensuring that the amount of SEZCo tokens that flow through the ecosystem are not consolidated amongst a small number of users. This encourages circulation of funds throughout the network as well as increased liquidity for the SEZChain token.

**SEZCo Block Rewards:** The table below depicts the block reward potential for SEZCo Nodes that are block producers and SEZCo Nodes that are not block producers. It is based on the average SEZCo Node run by a SEZ having a transaction throughput of 4000 transactions per day. The bandwidth is based on a conservative estimate of 1,000 transactions per second, a level of performance that DPoS systems such as BitShares and EOS claim to easily surpass. Estimates of the throughput potential of DPoS when implemented properly greatly exceed this estimate. As can be seen, SEZCo members that are selected during consensus as block producers profit in SEZChain tokens both as a block producer and as a SEZCo member. The far right column depicts the average amount of coin each block producer would make assuming equal stake.

SEZCo Nodes	Quorum size	TXN / Day	SEZ C/txn	SEZC throughput	Est. Bandwidth Usage	Quorum %	Quorum Profit	Profit/Quorum Member	Profit/SEZCo Member	Total Profit / Quorum member
1	1	4000	0.1	400	< 0.01%	48.26%	193.07	193.0718	191.3282	384.4000
5	3	20000	0.1	2000	0.02%	46.12%	922.54	307.5134	200.3864	507.8998
10	5	40000	0.1	4000	0.04%	44.52%	1780.91	356.1822	207.1738	563.3560
20	7	80000	0.1	8000	0.09%	42.25%	3380.32	482.9032	216.7727	699.6760
50	9	200000	0.1	20000	0.23%	37.75%	7550.51	838.9456	235.8182	1074.7638
100	11	400000	0.1	40000	0.46%	32.67%	13071.79	1188.3452	257.2820	1445.6272
200	17	800000	0.1	80000	0.92%	25.50%	20404.08	1200.2401	287.6364	1487.8766
400	21	1600000	0.1	160000	1.85%	15.35%	24574.37	1170.2083	330.5641	1500.7724
1200	37	4800000	0.1	480000	5.55%	15%	72000.00	1945.9459	332.0000	2277.9459
1200	37	86400000	0.1	8640000	100.00%	15%	1296000.00	35027.0270	5976.0000	41003.0270

**Stakeholder Block Rewards:** The table below depicts the block rewards that are given out to stakeholders in the community that are not SEZCo members. These rewards are distributed to the entire community of stakeholders and will be distributed among users according to their stake. These numbers depict the average number of SEZChain tokens that a user will receive.

TXN / Day	SEZC/ txn	SEZC/ throughput	Staked public members / businesses	total staked member profit / day	100 members	500 members	1000 members	5000 members	10000 members
4000	0.1	400	3.9000%	15.6000	0.1560	0.0312	0.0156	0.0031	0.0016
20000	0.1	2000	3.7764%	75.5279	0.7553	0.1511	0.0755	0.0151	0.0076
40000	0.1	4000	3.6838%	147.3509	1.4735	0.2947	0.1474	0.0295	0.0147
80000	0.1	8000	3.5528%	284.2229	2.8422	0.5684	0.2842	0.0568	0.0284
200000	0.1	20000	3.2929%	658.5786	6.5858	1.3172	0.6586	0.1317	0.0659
400000	0.1	40000	3.0000%	1200.0000	12.0000	2.4000	1.2000	0.2400	0.1200
800000	0.1	80000	2.5858%	2068.6292	20.6863	4.1373	2.0686	0.4137	0.2069
1600000	0.1	160000	2.0000%	3200.0000	32.0000	6.4000	3.2000	0.6400	0.3200
4800000	0.1	480000	2.0000%	9600.0000	96.0000	19.2000	9.6000	1.9200	0.9600
86400000	0.1	8640000	2.0000%	172800.0000	1728.0000	345.6000	172.8000	34.5600	17.2800

## 11.2 Bad Players

Nodes that are experiencing downtime will not be able to receive block rewards during the rounds for which they are not online. The audit done at the beginning of the round (§9.1) counts the numbers of each user type on the network. For that round, only those that confirm they are active on the network will receive their block rewards. In addition to this, SEZCo Nodes that are flagged as bad players for actions such as validating transactions that are known to be fraudulent or voting no on every block during consensus will be penalized. They will not be able to receive any block rewards for a number of subsequent rounds of consensus for an amount of time voted on in the constitution.

## 11.3 Value of Transparency

While the idea of all business oriented transactions being transparent to a governing body may sound threatening to users at first, consider the substantial overhead that is charged as extra to businesses in the form of fees and taxes to account for entities engaging in business illicitly in a SEZ. When users are conducting business in a system that ensures transparency with funds, the amount of overhead paid to account for illicit businesses is completely unnecessary. In addition to this transactions between two non-business users are still private.

In order to mitigate the cost of fraudulent businesses, governing bodies are encouraged to incentivize members of their SEZs to use the SEZChain by providing discounts. There is incentive for a governing body to provide discounts for use of the SEZChain, in addition to lowering the costs of doing business because the overhead of illicit business no longer needs to be accounted for. This means that although governing bodies are able to collect fees and make money off the chain, it is actually much cheaper for consumers to do business within the SEZChain ecosystem.

All stakeholders are able to make a profit from SEZChain tokens simply by holding stake. This is even more true for those belonging to the SEZCo and those selected as block producers. SEZs benefit because the level of transparency on the SEZChain allows them to properly audit business traffic on the chain,

while still maintaining users privacy for peer-to-peer transactions. This transparency drives prices down for consumers because additional overhead accounting for illicit business is no longer needed. This fosters a mutually beneficial ecosystem in which all parties involved benefit.

## 11.4 Cash Flow & Liquidity

The consensus algorithm utilized by the SEZChain ensures that nodes are highly incentivized to perform well with maximum integrity and with minimum downtime. This is because of the large amount of SEZChain tokens that are rewarded to block producers and SEZCo Nodes. The profitability of SEZCo Nodes and nodes selected to be block producers could result in users holding too much currency and have too much voting power. This is why the amount of stake a user can have for voting is capped in order to avoid monopolies and centralization of funds. A user can hold more than the maximum amount of stake in a wallet. The amount of total stake that a user can have in the system is inversely proportional to the amount of total stake that is held by users on the network. Users can hold more than that amount in a wallet, however, the stake they hold beyond a certain point will not add more weight to their votes on the network or their portion of the block rewards.

The presence of a cap for the amount of stake that a user can have creates an ecosystem in which nodes that hold more than the maximum amount of stake are incentivized to offload their excess SEZChain tokens on an exchange for other assets or fiat money. While the cap encourages the circulation of funds through the network, the system by which SEZCo members actually earn reward based on their stake and the traffic on the network also encourages the circulation of funds. SEZCo members' profits from their stake are directly proportional to the amount of traffic on the chain, therefore SEZCo members and those that are actually members of SEZs in particular will be motivated to provide as much incentive as possible for members of their respective economic zones to use the chain for commerce. In short, the more people SEZs encourage to participate in the ecosystem, the greater return on investment all stakeholders will receive.

## 11.5 User Benefits

The incentive for SEZCo members to offload excess tokens fosters an ecosystem through which tokens consistently flow. SEZs are extremely motivated to ensure that as many members as possible who are operating in their zones utilize the SEZChain to increase traffic on the chain to make more profit. The SEZChain also provides a level of transparency to ensure that members of their zones are doing business in a legitimate fashion. These two factors create an environment in which SEZCo members are consistently offloading funds. Users then buy the SEZChain tokens on an exchange in order to pay for the usage of the SEZChain. It is less expensive for them to trade on the SEZChain which creates a pool of liquidity proportional to the demand.

In this way the SEZCo members, the governing bodies of SEZs, and members of SEZs all benefit from participating in the SEZChain. Private citizens will find it less expensive to do business, assets can be bought and sold with a legal audit trail, and governing bodies can more efficiently regulate their zones.

# 12.0 THE PLATFORM

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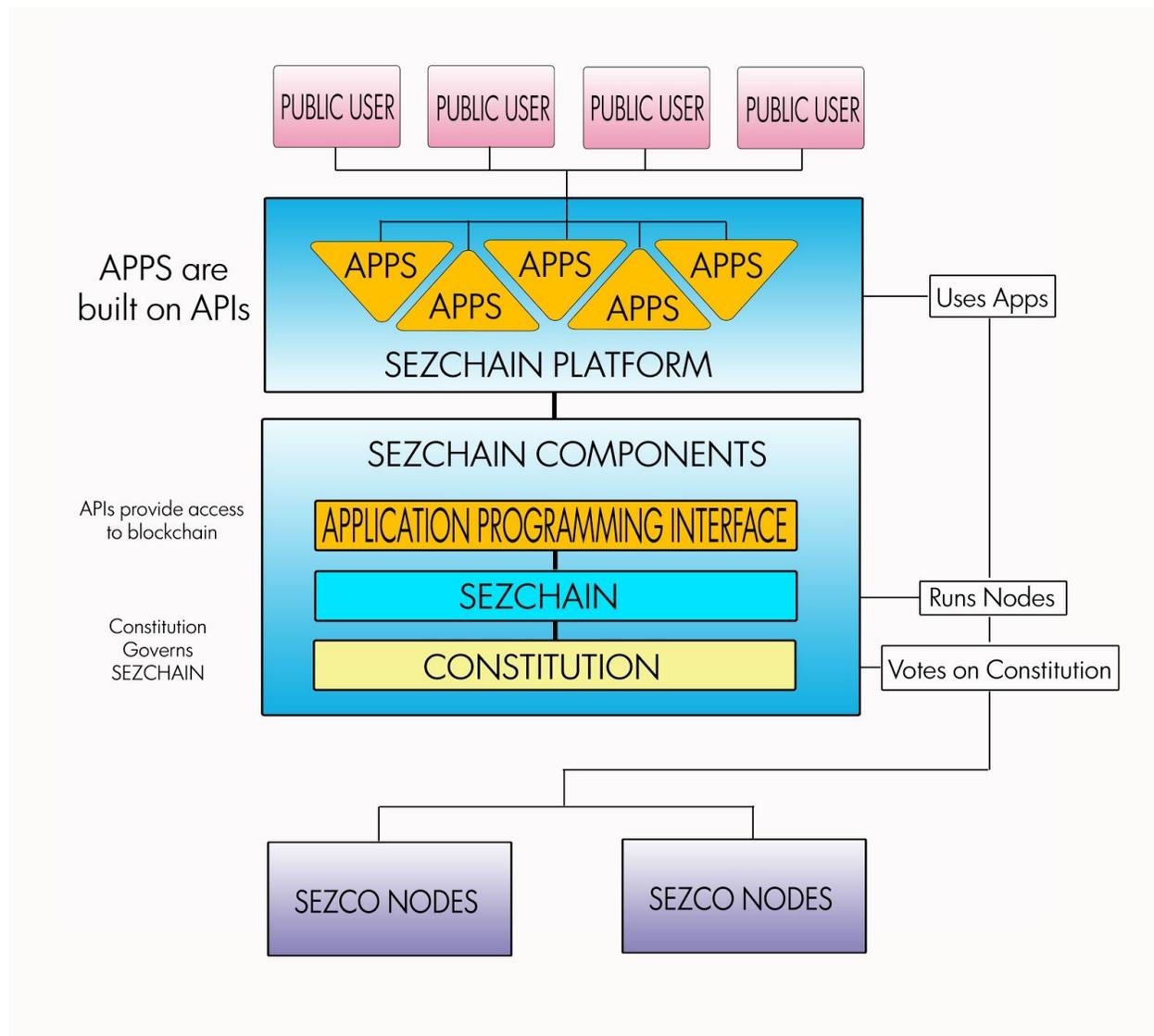
## 12.1 Platform Overview

The platform is a set of applications and tools that allow users to fully utilize the functionality of the SEZChain and is centered around the needs of the members of the SEZCo. The goal for the platform is to allow for a more efficient and reliable infrastructure for SEZs and businesses, allowing for greater productivity and economic growth within SEZs.

**Continuous Integration.** It is important that Consortium Members understand the development of the Platform will begin with a narrow scope of work. More applications will be created according to the needs of the SEZCo members. The SEZChain team and affiliated application developers will work closely with SEZCo members to create applications that best suit their needs.

**Adoption.** The platform is designed to attract SEZs and businesses from around the world. The system will be built to adapt to the unique needs of each SEZ and business in the ecosystem. In addition, the transparent design of the SEZChain allows SEZCo members to ensure regional rules and regulations are obeyed by parties using the SEZChain and its accompanying platform.

**Design.** The platform that accompanies the SEZChain is run primarily by and for consortium members as illustrated in Figure 1.1. However, public users are allowed to use the system. The overall rules of the platform are decided by special rules in the constitution that may only be voted on by SEZCo members because the platform is designed for the benefit of consortium members. The Platform is built on the SEZChain’s APIs with various applications or components that perform specific functions for the Consortium Members and Public Users. The platform allows for access to the API’s for both SEZChain token and SEZC Asset tokens.

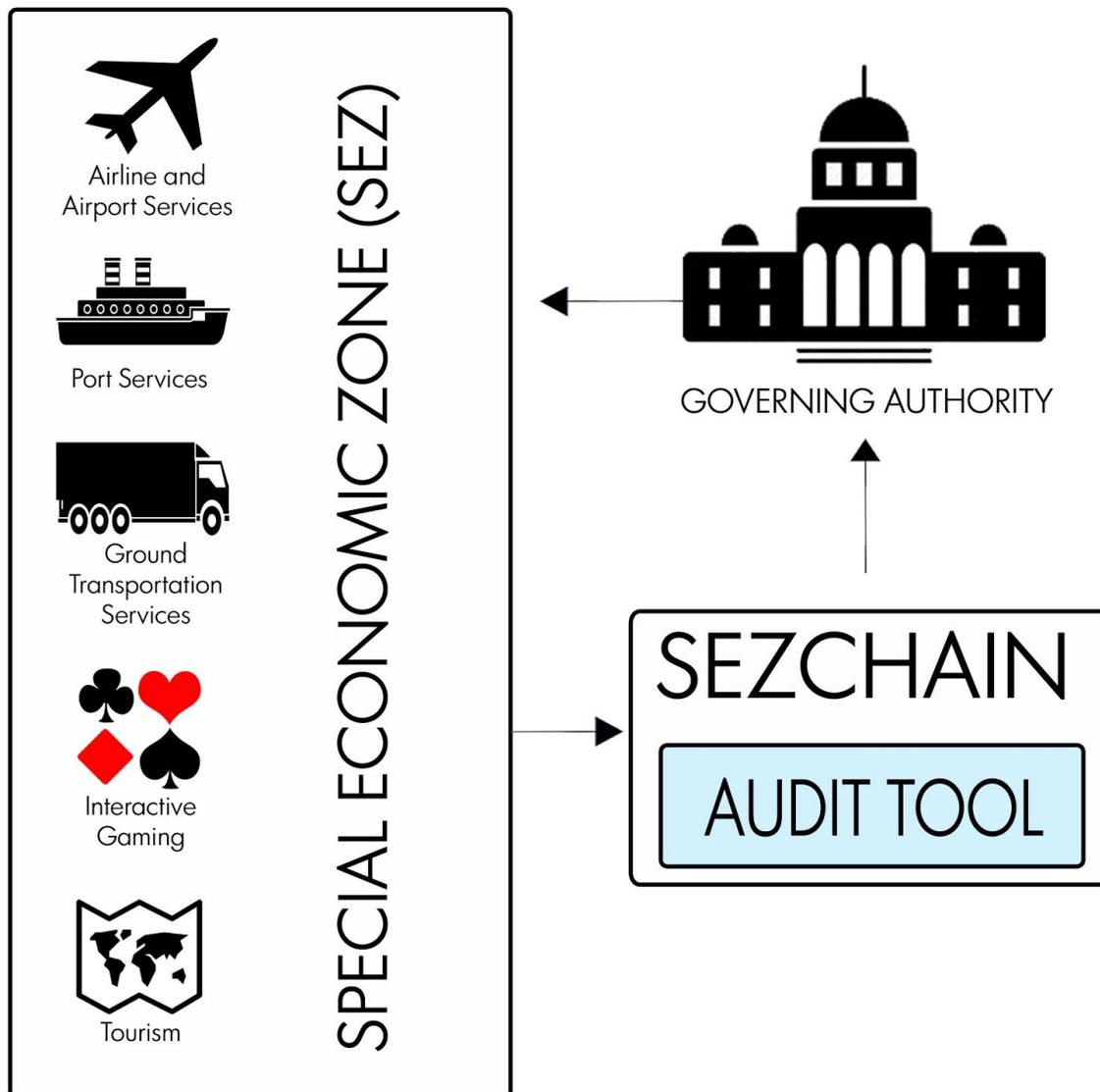


## 12.2 Platform Benefits

**Multiple Valuable Applications.** The Platform creates membership “stickiness” because of the compelling array of applications used by the Consortium Members. The Members are encouraged to present ideas for applications to integrate into the Platform.

**Discounts.** The economies of scale fostered by the Consortium allow for discounts between Members as it becomes easier to do business within the system. This is enhanced by the unity and common goals of the SEZCo members.

**Streamlined Member Interaction.** The diagram below illustrates the type of Members that will interact on the platform and how the Members can work in a streamlined manner, interacting with each other and the Platform.



# 13.0 INITIAL DEPLOYMENT

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## 13.1 Payment Gateway

The payment gateway is a fundamental component of the ecosystem of the SEZChain. Its primary function is to allow users to trade different types of tokens interchangeably. This also contributes to the liquidity pool by giving users a place to buy SEZChain tokens and thereby creates a hub for funds and assets to circulate through.

When users wish to trade assets on the chain it is highly recommended that they mint these assets on the payment hub. This is because the legal prose for the assets can then be stored in the platform's database. This ensures that all parties involved with a transaction of assets have access to the accompanying legal prose of that asset. One other benefit of the payment gateway is that it allows users to back their assets with as many SEZChain tokens as they choose as collateral for the transaction.

*When SEZChain tokens are used as collateral for trading of assets, it adds a great deal of legitimacy to the asset. For example, consider two users that each mint asset tokens on the platform to represent their cars. User A backs his car's SEZC Asset token with \$10,000.00 USD worth of SEZChain tokens and user B does not back his car's SEZChain Asset token with any SEZChain tokens. Even if both of them upload contracts, bills of sale, and any other accompanying legal prose, User A's car would be more desirable to most users looking to buy. Users that wish to purchase User A's car have collateral for the sale. It is recommended that users trading assets on the platform always upload any necessary legal prose that would normally accompany an asset of that type. In this way, users around the world can trade assets on the platform in a manner that is legal in the area in which they live. When users add collateral for assets being traded on-chain, the collateral will be returned to them when both users agree, presumably when conditions on an accompanying contract are fulfilled by both parties.*

**Steps.** The first step in establishing the Payment Gateway is creating Membership Profiles as new Members join the Consortium. The second step is to allow Members to transact between one another using SEZChain tokens and SEZC Asset tokens.

1. Establish Membership Profiles
  - a. Name
  - b. Address - Business users only
  - c. Officers and Wallet Signatures
  - d. Rules or Member Regulatory Configuration
    - i. Specific rules regarding taxes, customs, tariffs, fees, regulations

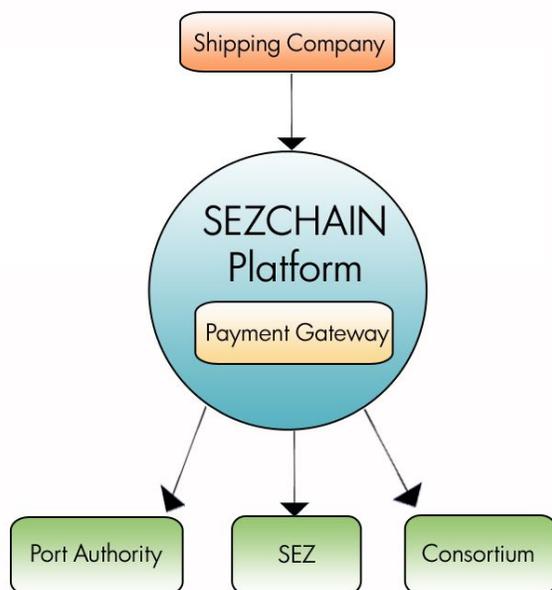
## 13.2 Payment Gateway Benefits

There are numerous advantages to using the Platform as a common transactional engine. Several examples are listed below.

**Performance.** The platform is designed to take advantage of the architecture of the chain and allow for users to create and perform transactions as quickly as possible. Transactions that occur within the Platform are extremely low latency. Transactions do not need to traverse multiple systems to accomplish their purpose. This comes from a combination of the low latency and finality provided by DPoS consensus as well as the high level of parallelism that can be achieved with UTXO based systems.

**KYC/AML.** Each registered Member or Public User operating on the Platform will comply to Know Your Customer (KYC) and Anti-Money Laundering (AML) regulations. KYC regulations require that each Member will submit all identifying information to ensure the SEZCo Member is qualified to transact on the Platform. AML regulations prevent income from illegal and illicit transactions. The identity system aids in ensuring fair play by all parties involved because each SEZCo member is able to manage the identities because they are the Certificate Authority (CA) for all entities that are linked to their SEZ. The audit tool (§13.3) in conjunction with the identity system (§10.1) ensures that all of the relevant parties have the information they need for proper KYC. In addition to the benefits of the identity system, the audit tool ensures that governing bodies are able to analyze business transactions within their respective SEZs to ensure that all parties doing business within that zone are doing so legally.

**Secure Transactions.** The transaction system outlined in (§7.3) ensures that all transactions are executed securely. Only the users involved in a transaction as well as the governing body are able to see the contents of a business transaction and its resulting output(s).



**Automation.** Fees can be collected automatically as part of the platform according to the rules and regulations of a given SEZ when utilizing the off-chain channels API (§14.2).

For example, as seen in Figure 1.2, when a commercial cargo vessel comes to port and pays the Port Authority, the transaction travels through a set of predefined rules that allow the transaction to be dispersed to the Port Authority, to the SEZ for taxes and fees, and to the Consortium for fees related to ongoing administration and development, as well as the transaction fee.

**Taxes/Fees.** The transaction receipts that the SEZCo members receive allow them to easily audit the history of transactions in their zone. This ensures that all businesses and individuals are complying with the rules and regulations of their respective SEZ.

**A Unified Data Model.** A rich unified reporting capability will be constructed to ease transaction audits and other forensic activities for SEZCo members based on the transaction receipt keys that are sent out. This is accomplished by utilizing the audit tool on the platform (§13.3).

**Rich Unified Reporting and Meta-Data.** The transaction receipt keys allow SEZCo members to analyze economic data in their SEZs and allow them to gain more insight about different industries and economic trends. Authorized reporting via transaction key receipts for the purposes of accounting and regulation is far simpler than gathering data across multiple systems.

## 13.3 Audit Tool

The audit tool that will be included in the initial version of the platform will allow users to audit all of the transactions for which they possess the transaction receipts. The primary function of this is to allow governing bodies to perform audits of the users who fall under their jurisdiction and ensure that they have been doing business legally. This means the ability to audit taxes and fees that may have been required for certain transactions as well as the ability to go over any legal prose that was included in these transactions. This will allow parties on the chain to run reports over their transaction receipts and analyze any metadata that may be associated with them. One reason that it is recommended that trading of SEZC Asset tokens is done on the platform is that users will then have the ability to look over any legal prose associated with any of the transactions that they have access to. The reports may be customized for different entities which will allow them to analyze their own transaction data in any way that they choose.

## 13.4 Off-Chain Transactions

A series of APIs will be created to increase the value of the SEZChain and its accompanying platform for members of the SEZCo. This will begin with off-chain transaction channels. When a channel is opened, two wallets are linked and funds that will be transferred are escrowed. They can trade as much SEZChain token or SEZChain Asset token of any asset they have between one another. When they are finished, one transaction fee is paid and only the net difference between the two users is paid out, and so the transaction is settled and fewer transactions must be written to the blockchain.

The channels API only charges users transaction fees when they interact with the actual blockchain. This happens at three major points.

**Creation:** When a channel is opened, the user that opens it escrows a certain amount of tokens, This works much like an escrow account. A user can only pay tokens over the channel that have already been escrowed.

**Re-Up:** When a user would like to place more tokens in a channel because they are running low, they re-up or retrieve more tokens to escrow. This action can be done any arbitrary number of times.

**Close Out:** When either user would like to close out, the channel pays out the net amount of tokens that are owed to whichever user they are owed.

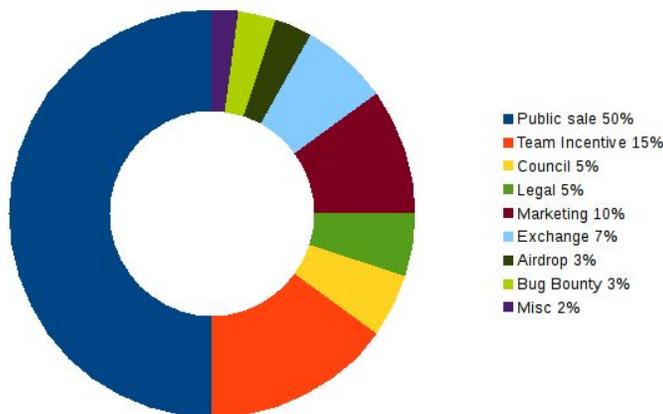
It is important to note that channels are two-way. This means that both users can escrow tokens and pay them back and forth. At the onset of the channels API users will only be able to have one token type per channel.

One limitation of all blockchains is that they incur overhead for each transaction. In the case of the SEZChain, that payment is made in the form of a SEZChain token. As the number of transactions increase, the overhead costs in time and money increase proportionally. One way of reducing overhead costs on a network is by the application of these off-chain transaction channels. They allow users to more easily perform microtransactions, which fosters an environment for a “pay-as-you-go” ecosystem.

For example, consider an online gaming system. Instead of executing a transaction for each game, a player could buy in with a certain number of tokens (creation), and have his winnings and losses recorded. If the user would like to purchase more tokens while playing they can (re-up). When the user is cashing out at the end of the night they settle up the difference between what the house is owed and what they are owed (close out). This is similar how a casino works, with a customer buying chips when they get in the door, potentially buying chips at intervals throughout the night, and cashing out at the end of their visit.

## 14.0 ICO

The goal of the token is for SEZT to be an internally stable currency and store of value. It allows users to buy stake in the SEZChain at a discount while the chain is in development.



### SEZ Tokens Available in each phase

- Private            3 Billion SEZT
- Whitelist        1 Billion SEZT
- Public            1 Billion SEZT

## 14.1 Ethereum ERC20 Token

The SEZT will be implemented as an Ethereum ERC20. The Ethereum Network and ERC20 provides several important benefits from both a business and technical perspective.

Ethereum has a robust existing network. This provides an immediate global infrastructure of nodes with no ramp up time and no upfront infrastructure cost.

Ethereum is a highly respected blockchain implementation / network with an active developer base. Basing a token on ERC20 minimizes the risk that a particular code base will stop being supported.

## 14.2 Gas

Every Ethereum transaction costs a small transaction fee known as “gas”. Gas is paid to the nodes for processing the transactions. Any and all systems must pay for infrastructure in some way, either by building out a privately owned computer network, demanding membership fees, or otherwise building and maintaining a network of nodes. Gas is the way Ethereum pays for its infrastructure.

Ethereum is large and well adopted so economies of scale make the cost of gas for Ethereum transactions lower than other alternatives. In addition, because gas is only paid when performing a transaction, it automatically scales, thus eliminating the capital outlay of other alternatives when new infrastructure must be built.

**Gas Costs.** Gas costs associated with a transaction are not based on the monetary “value” of a token. Instead, gas is based on the computational requirements of processing the transaction (executing the contract). Gas prices fluctuates at any given time based on transactional volume within Ethereum. Table 2.1 below shows an example of Eth prices as of July 19, 2018.

Table 2.1 Ethereum Gas Prices (As of July, 19, 2018)<sup>6</sup>

Category	Value
Cheapest Gas Price (gwei)	0*
Highest Gas Price (gwei)	<u>2488</u>
Median Gas Price (gwei)	5
Cheapest Transfer Fee	<u>\$0.01</u>
Highest Transfer Fee	<u>\$24.77</u>
Total Transactions	176565
% Empty Blocks	0*
% Full Blocks	88

\*It is important to note with this table that a value of 0 gwei does not mean that a transaction is free, it means that it costs less than 1 gwei. Gwei is not the smallest unit of currency on the ethereum blockchain.

<sup>6</sup> Eth Gas Station. <https://ethgasstation.info/>

## 14.3 Efficiency of Processing

It is intended, as the system matures, that an “off-chain” microtransaction layer be created. By utilizing existing software such as [Raiden](#)<sup>7</sup> an off-chain architecture can be made quickly to minimize transaction fees.

**Scalability.** The Ethereum network is a global, distributed infrastructure which can support any number of Economic Zones, either individually or as groups such as multiple cooperative economic zones in a given country.

## 14.4 Token Value

ERC20 tokens are essentially “special” ETH via smart contracts. The smallest unit in ETH is a “wei”. For reference, ‘wei’ are the “pennies” of ETH. There are a quintillion wei in a single ETH token.<sup>8</sup>

The token’s value and power are derived from the following.

- The ability to programmatically create scarcity (aka “Monetary Policy.”)
- The ability to define the rules by which a given token is used in the system.
- The ability to transfer economic value without using a traditional trusted third party.

The disadvantages of using a trusted third party are as follows.

- Slow transactions
- Incurs intermediary cost
- Can potentially become entangled in counter productive cross-entity agendas

SEZT is designed to be used in special economic zones. As such, a broad spectrum of uses for the transfer of economic value can occur. These transactions range from “microtransactions” for very small services and fees to large transactions, potentially many millions of dollars.

Therefore, a dynamic range of payment sizes will be enabled to allow for a number of tokens in the billions.

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<sup>7</sup> “Raiden Specification.” <https://raiden-network.readthedocs.io/en/v0.6.0/spec.html>. Accessed 30 Aug. 2018.

<sup>8</sup> “Ether — Ethereum Homestead 0.1 documentation.” <http://ethdocs.org/en/latest/ether.html>. Accessed 11 May. 2018.

## 14.5 Token Economics and Policies

**SEZT Token Population.** The token size for SEZT is 10 Billion. The volume is targeted for a global market represented in an easily divisible and comprehensive form. A divisible number of tokens is necessary to create “familiar” and logical figures in terms of scale and entry thresholds for special economic zones world-wide.

**Reserves.** Membership in the SEZCo is dependent upon each Member reserving 25,000,000<sup>9</sup> SEZT at all times prior to the token swap. During the period of the token swap there will be a grace period (nine months) for members to exchange their SEZT for SEZChain tokens. If a Consortium Member fails to reserve 25,000,000 SEZT prior to the swap, Members will automatically lose membership privileges and be unable to participate in the SEZCo until their reserves are above the 25,000,000 SEZT threshold.

**Initial Release.** The total amount of tokens created through the smart contract system and offered for sale during the Sale Period is between 500,000,000 and 5,000,000,000 SEZT. All tokens are of equal value and functionality. Tokens distributed during the Sale Period will constitute 50% of the total number of tokens generated. Tokens that are not sold during the token sale period, will be not burned.

## 14.6 Economic Value

Unlike traditional currencies, SEZT cannot be overprinted, inflated, duplicated, manipulated, or counterfeited because only a limited amount of SEZT will be created and each transaction will be verified across a decentralized and immutable Ledger.

The SEZT Token holds economic value in the form of developed digital tokens. Developed tokens will not be burned. Instead, tokens will be held in reserve for future members distributed at predictable levels as a percent distribution per a specified time period. As a result, the token will be more resistant to radical value fluctuations, and avoid speculation-driven price changes.

The SEZT Token is initially valued at \$0.01 USD in Cryptocurrency. The token is not backed by USD. Instead, the token derives value from its numerous uses and utility functions on the SEZChain platform. As the system is used more by special economic zones and its participants, the value of the SEZT token increases.

## 14.7 Token Swap

Starting with an ERC20-based token allows for the immediate investment in the SEZChain ecosystem and with less expensive infrastructure. In addition, the ERC20-based token services allow for the necessary R&D to develop the full SEZChain system.

As such, Stepwyze will develop the SEZChain and perform a token swap. In a swap, the existing ERC20 based tokens would be swapped one-to-one for SEZChain token. The number of tokens in this case must be equal to the number of SEZT, and must not be “mineable” (i.e. there must be an equal, finite number of tokens)

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<sup>9</sup> This will be voted on by qualified consortium members with a Max of 25,000,000 and possible future value voted on at defined intervals.

# 15.0 Potential Use Cases

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## 15.1 Common Elements

Most use cases share the following common elements.

### Transaction Tracking

Transaction tracking ensures that all of the fees owed to the authorizing body are paid in a fair and automated method reducing the need for manual oversight.

### KYC, AML for users ~ OCC

Some of the oft cited concerns of authorizing bodies and law enforcement are regarding Anti-Money Laundering (AML) activities as balanced with the concerns for the privacy of everyday citizens. Using OCC, these functions can be made as private as possible while still providing the minimum information required for security and law enforcement.

## 15.2 USE CASES

The following list of use cases is intended to create context and expansion on the possible ways SEZChain can be expanded but is not by any means an exhaustive accounting of the various vertical industries and special uses to which it can be applied.

### **Interactive Gaming**

- Game Fairness Audits
- Fees on Winnings Due

### **Exchanges**

- Fees on Asset Gains Audits
- Fees Reporting on Exchange Profits

### **Commodities Exchanges**

- Fees on Asset Gains Audits
- Fees Reporting on Exchange Profits
- Commodity Volume Tracking (Agricultural reporting, etc.)
- Commodity Movement and Storage Tracking
- Commodity Infestation and Health Tracking

### **Shipping & Logistics**

- Shipping Manifest Tracking
- Real Time Geolocation Tracking (See FOAM Protocol)
- Fees on Port Services
- Customs Process and Paperwork Tracking
- Commodity Volume Tracking for Agricultural Reporting, ETC
- Commodity Movement and Storage Tracking
- Commodity Infestation and Health Tracking

### **Asset Tracking**

- Equipment Tracking
- Building Materials Tracking
- Antiquities, and Collectable Storage and Movement Tracking
- Chain of Custody and Responsible Party Recording

**Titles and Title Records**

- Real Estate Title Recording
- Vehicle Title Recording
- Transfer of Title & Chain of Ownership Recording
- Title Registration Fee Collection

**Workflow**

- Time stamp each stage of the process of workflow to ensure all requirements are met.
- Recordation in real time for accurate reporting and monitoring
- Allows for greater visibility along subsequent checkpoints along supply chain

**Rapid Customs Clearance**

- Chain of Custody and blockchain time stamps are recorded on the Platform.
- Custom clearance is fast tracked.

**Other Potential Use Cases**

- |                         |                     |
|-------------------------|---------------------|
| • Professional Services | • Education         |
| • Transportation        | • Certification     |
| • Lending               | • Community Service |
| • Licensure             | • Court Judgment    |
| • Medical Records       |                     |

## 16.0 TIMELINE

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**SEZChain will take place in two major phases:**

**SEZChain Phase I**

Phase I will use ERC20 tokens to represent the stake that a particular entity will have in the SEZChain ecosystem has in the system.

**SEZChain Phase II**

Phase II will mark the milestone when the proprietary SEZChain node network blockchain node network will come online. At this point there will be a period where ERC20 tokens will be exchanged for native SEZChain tokens.

### 2018

Q1-Q2: Concept development, team formation. Early prototyping and development.

Q3: Development of token Agreement, and Consortium Member Contracts, White Paper Completion. Presale begins.

Q4: Marketing Campaign, accept Consortium Members, Token Listing, Develop Platform and API

### 2019

Q1-Q3: Development of Payment Gateway and Exchange

Q2: Public Sale begins

Q3: Initial Deployment of Payment Gateway and Exchange

Q4 Forward: Future Deployments

2020

Q1-Q4 - The Platform and SEZC as the unit of exchange proves to be an efficient and scalable system. Consortium has a solid Membership, the platform is being utilized by Members, and the token is the unit and a store of value for SEZs and businesses that operate on the Platform.

## 17.0 INVITATION TO JOIN

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The SEZChain team is actively seeking Consortium Members throughout the world. According to the World Bank South Asia Economic Focus, Spring 2018, South Asia is the fastest growing region in the world and growth should further strengthen to 7.1 percent on average in 2019-2020.