Setheum & Khalifa Economic Model

Tokenomics White Paper

MAY 2023

By

Muhammad-Jibril B.A. (Khalifa MBA)

Founder, Chief Architect, Grand Imam

Slixon Technologies | Setheum Labs| Open Web3 Foundation

Abstract

This paper assumes you have read at least some of the Whitepapers or the Lightpaper. For more in-depth understanding of the Setheum Network, Khalifa Network and this paper, please read the Setheum WhitePaper and the Khalifa WhitePaper, the Lightpaper summarises the whitepapers - highlighting some important details while ignoring other more described details for the WhitePaper.

Introduction

Setheum achieves a decently high level of equilibrium in the trilemma by leveraging a Directed Acyclic Graph(DAG) to build the blockchain consensus, achieve instance finality, high throughput and subsecond blocktime while preserving network security and having a fairly decentralised network, Setheum's consensus system leans towards achieving high scalability and high security with an ethical, decent and equitably high level of decentralisation.

Setheum is EVM(Ethereum Virtual Machine) compatible for smart contracts to thrive on its super fast blockchain, the entire chain is upgradable and forkless enabling forkless upgrades as Setheum is built with the Substrate framework using the Rust programming language. Khalifa Suite powers the DeFi revolution on Setheum, being on the fastest public blockchain network in the world and leveraging all the benefits that come with being on Setheum, making it a DeFi optimised blockchain especially exceptional for DeFi applications and solutions.

Khalifa Subchain's DeFi Suite is also the DeFi powerhouse of the Setheum Network, providing all kinds of top notch DeFi protocols including an AMM DEX, payment gateway rail based on setheum's built-in payments modules, DEX aggregator, Decentralised Liquid Staking for for both Setheum SEE and Khalifa KHL and ethical zero-interest halal stablecoins that gives us the properties of both Fiat and Crypto with SlickUSD (USSD) and the Setter (SETR) using an Ethical Collateralized Debt Position (ECDP) mechanism that is over-collateralized and multi-collateralized and stable without compromising decentralisation or economic stability, offering zero-interest loans of stable cryptocurrencies that has scalable value and trust, setheum provides just that, backed by crypto assets with efficient zero-interest loans.

Table of Contents

Abstract **1**
Introduction **1**
Table of Contents **2**
Currencies & Token Utility **3**
Token Generation **3**
Currencies 3
Token Utility 4
FlexiFee: Network Gas Fee Mechanism **4**
Staking 5
Setheum Staking Rewards & Token Issuance 5
Khalifa Staking Rewards & Token Issuance 5
Penalty and Slashing Mechanism in Setheum 6
Standard & Liquid Staking Mechanisms 6
Setheum Standard Staking 6
Khalifa Standard Staking 7
Liquid Staking 7
Token Allocations **8**
Vesting **10**
Token Vesting Schedules 11
Airdrop & Lockdrop **11**
Token Metrics **12**
Setheum Cloud S2 Storage Order 13
Setheum Cloud C2 Compute Order 13
ECDP: Ethical Collateralized Debt Position 14
The Ethics of ECDP, Stablecoins in Khalifa Suite 15
Types of ECDPs - Pegged and Unpegged 16
Comparison between Khalifa Stablecoins - Pegged/Unpegged 17
The ECDP Process 17
Comparison between Khalifa Stablecoins and Others 18
Risk Management in the ECDP 19
ECDP Liquidations 19
Liquidation Pools 20
Liquidation Swaps 20
Unpaid Debt 20
ECDP Risk Management Parameters 21
Pegged-ECDP Risk Management Parameters 21
Pegged ECDP Price Stability Mechanisms 22
Unpegged-ECDP Risk Management Parameters 22
Unpegged ECDP Price Stability Mechanisms 23
Conclusion **25**
References and Further Reading **25**

Currencies & Token Utility

The token utility is how the token is needed and used in the network, how it all fits into the token economics of the system. You don't just want a token for the sake of it, but for the utility it provides, for the value it has and adds, for the role it plays both technically and economically. Below is the list of tokens and the functions that these currencies in the Khalifa Subchain and Setheum Network serve;

Token Generation

Tokens will be issued and accordingly distributed natively on Mainnet `Genesis`. As for Launchpool Offering, it will be offered on Binance Launchpool for both `SEE` and `KHL` as `BEP20` tokens on BNB Chain that are bridged from Setheum to BNB Chain and can be bridged back to the Setheum network via the Setheum `SialBridge`. The `KHL` tokens for the Khalifa Subchain will be endowed to accounts associated with the initial `SEE` allocations below in the Token Allocations table, that includes participants of private and strategic rounds, as well as participants of the public sale event. Token Sale allocations will be made on BNB Chain in the form of unminted allocations that can be claimed and issued natively on Mainnet `Genesis` at TGE (Token Generation Event).

Currencies

There are currently **7 Native Assets** in the **Setheum** and **Khalifa Network**:

- **SEE(Setheum)** is the `PrimaryCurrency` or **`NativeCurrency`** of the Setheum Network.
- **KHL(Khalifa)** is the `PrimaryCurrency` or **`NativeCurrency`** of the Khalifa Subchain.
- **LSEE(Liquid SEE)** is the **`LiquidStakingAsset`** of `SEE` for the Setheum Mainchain staking in the Khalifa Suite of protocols. It allows staking while enabling liquidity in the market.
- **LKHL(Liquid KHL)** is the **`LiquidStakingAsset`** of `KHL` for the Khalifa Subchain staking in the Khalifa Suite of protocols. It allows staking while enabling liquidity in the market.
- **LSETR(Liquid SETR)** is the **`LiquidStakingAsset`** of `SETR` for the Khalifa Subchain staking in the Khalifa Suite of protocols. It allows staking while enabling liquidity in the market.
- **SETR(Setter) is** a multi-collateralized over-collateralized **`unpegged_stablecoin`** built in the Khalifa ECDP Protocol with an BVSI(Blunt Volatility Scale Index) of `SEE` as collateral. Not pegged to any fiat currency, and relatively stable-ish.The protocol is inspired by RAI which was inspired by MakerDAO's Yellow Paper.
- **USSD(Slick USD)** is a multi-collateralized over-collateralized **`pegged_stablecoin`** built in Khalifa ECDP Protocol pegged `1:1` to the `USD`. Pegged to the USD, and relatively stable.

Token Utility

Below is a list of utilities that the main tokens in the Setheum Network and Khalifa subchain provide:

✔️**Criteria**	**SEE** (Mainchain)	**SETR** (Stablecoin)	**KHL** (Subchain)
✔️ `PrimaryCurrency` for settling `TransactionPayment`	✅	❌	✅
✔️ `PrimaryCurrency` for Staking	✅	❌	✅
✔️ Validator Staking	✅	✅	✅
✔️ Nominator Staking	✅	✅	✅
✔️ Account for Increasing `SeeStakingQuota`	❌	✅	❌
✔️ Cloud Provider Staking	✅	✅	❌
✔️ Cloud `StorageOrder` Payment	❌	✅	❌
✔️ Cloud `ComputeOrder` Payment	❌	✅	❌
✔️ On-Chain Governance - Referendum Chamber	✅	❌	✅
✔️ ECDP Collateral (for SETR)	✅	❌	❌
✔️ ECDP Collateral (for USSD)	✅	✅	✅

Fig-1: Setheum SEE, Setter SETR, and Khalifa KHL Token Utility Table

FlexiFee: Network Gas Fee Mechanism

On-Chain transactions in Setheum can be paid in any token, not just in the PrimaryCurrency, any token can be enabled to pay for gas fees on the Setheum Network - both Mainchain and Subchains, this is called FlexiFee. The FlexiFee mechanism is facilitated by the Khalifa DEX, the token used to pay for gas is automatically swapped on the Khalifa DEX for the PrimaryCurrency used to settle the network fees payment. The fee is dissected into two (2), 1:2 to the Treasury then 1:2 is burned, this burn mechanism introduces a deflationary effect into the PrimaryCurrency which is the SEE.

Staking

Setheum Staking Rewards & Token Issuance

A definite amount of rewards are paid out per payout period, validators, nominators and the treasury are rewarded from that reward pool of 1 Billion SEE, 10%(100 Million SEE) to the treasury, 90%(900 Million SEE) to the Validators and Nominators. There is a minimum stake amount of 1,000 SEE for nominators, and Providers have a hardware requirement and a minimum stake of 250,000 SEE. A payout period is made up of 24 hour long eras made up of 96 sessions of 15 minutes each, nominators/Providers need to wait for the next era to initiate. The protocol allows any Setheum Provider to take part and allows nominators to choose which Providers they want to elect and stake with them. Setheum's ***Cloud Proof of Stake (CPoS)*** does not distribute block rewards to the so-called winning blocks or elite Providers that have the highest self-stake, it rather takes a lot of factors like nomination, CPoW, provider reliability, etc. into consideration to quantify a provider's score and `stake-limit`. It is halal from my opinion and understanding and we say that it is Halal unless there is an evidence that it is haram from the Qur'an, Sunnah, Ijma' of the Sahaba or the Tabi'een, or the Atba' tabi'een, or ijma' of the Salaf AsSaliheen, or ijma' of the Ulama, or from the logical deduction according to the principles of the purposes of Shari'ah, and Allah knows best. The Ethical approach just happens to be the best option out there for best long-term economic sustainability and reliability with equanimity and equality of opportunities. Setheum just happens to implement just that for us.

Khalifa Staking Rewards & Token Issuance

The staking method in Khalifa is an EPoS(Extended Proof of Stake) based staking mechanism and this mechanism advocates equality, randomness and fairness in the staking system in securing the network as well as earning staking rewards in the process. It basically is the best solution out there to counter inequality in the block production of a Blockchain Network such as Khalifa and block fees/rewards sharing/distribution methods on-chain. And the validators can earn the KHL tokens to pay for their service as validators that run and secure the network. Therefore, this qualifies as Halal. All protocols in Khalifa are halal (permissible in Islam). A definite amount of rewards are paid out per `payout_period`, validators, nominators and the treasury are rewarded from that reward pool of 200 Million KHL, 10%(20 Million KHL) to the treasury, 90%(180 Million KHL) to the Validators and Nominators. There is a minimum stake amount of 200 SEE for nominators (which would be lowered as the community grows), while Validators and Providers have a hardware requirement and a minimum stake of 50,000 KHL (which would be lowered as the community grows). A payout period is made up of 24 hour long eras made up of 1200 sessions of 4 minutes each, nominators/Providers need to wait for the next era to initiate. The protocol allows any Setheum Provider to take part and allows nominators to choose which Providers they want to elect and stake with them.

Penalty and Slashing Mechanism in Setheum

In both Setheum Mainchain and Khalifa Subchain, staked funds of unstable or malicious nodes are slashed to incentivise stability, availability and reliability of nodes in the Setheum Network.The slashing mechanism is set in place to ensure reliability and availability of network participants such that the consensus verifiers are assured, protected and a penalty is given in the form of slashing to the concerned validator(s).

The penalty includes slashing a portion of the validator's staked SEE tokens as well as removing the Verified identity Badge of the validator. The slashed amount is not burned right away but rather transferred to the network treasury, such that the slashed validator can appeal to get its funds returned within a certain period (ie. AppealPeriod), the slashed funds cannot be returned to the validator after the AppealPeriod has passed, thus stays in the Treasury.

The formula for the SlashRatio is as follows:

$$\chi = Min\{\frac{3 \times [\rho - (\frac{n}{10} + 1)]}{n},\ 1\} \times 0.07$$

where,

n is the total amount of validator nodes,

ρ is the amount of offline validator nodes,

and χ is the SlashRatio.

Standard & Liquid Staking Mechanisms

There are two types of Staking protocols in Setheum, the `StandardStaking` and `LiquidStaking`.

Setheum Standard Staking

In Setheum's Standard Staking protocol, it is a **CPoS+CPoW (Cloud Proof of Work + Cloud Proof of Stake)**, stakers(validators/nominators) commit the SEE token for staking on the network therefore securing the Setheum Network and earning staking rewards in return. The SEE is the staking token, however `CloudRresources` are able to be used as a way to increase a provider's `StakingQuota` so that more staked SEE could be part of the `active-stake` that earns staking rewards. A provider can provide cloud resources to increase their `StakingQuota` so that they can have space in the active-stake to stake more active SEE to earn more SEE with part/all of their `inactive-stake` making it part of the `active-stake`. Providers also earn SETR rewards made via the quota allocated to the pool from Cloud Storage payments made in the `storage-order` module of the `cloud-stack-s2`.

Khalifa Standard Staking

In Khalifa's Standard Staking protocol, stakers(validators/nominators) commit the KHL token or the SETR token or the recommended KHL-SETR pair for staking on the network therefore securing the subchain and earning staking rewards in return. It is different from Setheum's Standard Staking because Setheum uses CPoS (Cloud Proof of Stake) and Khalifa uses **EPoS (Extended Proof of Stake)**. There is a StakingQuota similar to Setheum's and it is a dual-currency staking mechanism where the primary staking token is the KHL and the secondary staking token is SETR. The KHL is the main staking token, however the SETR is able to be staked alone or alongside KHL, the SETR is not issued as reward because SETR staking is a way to increase a validator's StakingQuota so that more staked KHL could be part of the active-stake that earns staking rewards. A validator or even a nominator can stake SETR to increase the StakingQuota of the validator so that they can have space in the active-stake to stake more active KHL to earn more KHL rewards from part/all of their inactive-stake making it part of the active-stake.

Liquid Staking

Stake SEE while holding LSEE (Liquid SEE)for your market activity for the Setheum Mainchain coin. Stake KHLand/or SETR while holding LKHL (Liquid KHL) and LSETR (Liquid SETR) for your market activity with Khalifa Subchain coin and token.

When you stake a PoS chain's native currency, the token is locked in the system rendering it illiquid in order to secure the blockchain network. This is a very effective way to secure the network, however it is not efficient in terms of token economics, the more liquid the token is, the more efficient its market is.

So what is the solution, here comes in Liquid Staking, as the name indicates, it is a way to stake tokens for securing the network while preserving the liquidity of the token in the market without compromising network security, but most liquid staking protocols out there are liable to compromising the security of the network, why, because they are not decentralised thus if they obtain the majority of the network tokens, these protocols can in fact be an attack vector for the network.

In Ethereum 2.0 for example, the liquid staking protocol Lido finance makes for a good example of my point, it extremely centralises the network as we have seen that Lido finance controls over ⅓ of ETH staked in the network, and the ratio needed to be able to attack the network is ⅓, this makes the network prone to centralised attacks and censorship therefore making it more centralised. Setheum's liquid staking protocol solves that, it is a native built-in decentralised protocol built on Setheum's DAGESTAN consensus engine, but separate from DAGESTAN, using DAGESTAN as its backbone.

Token Allocations

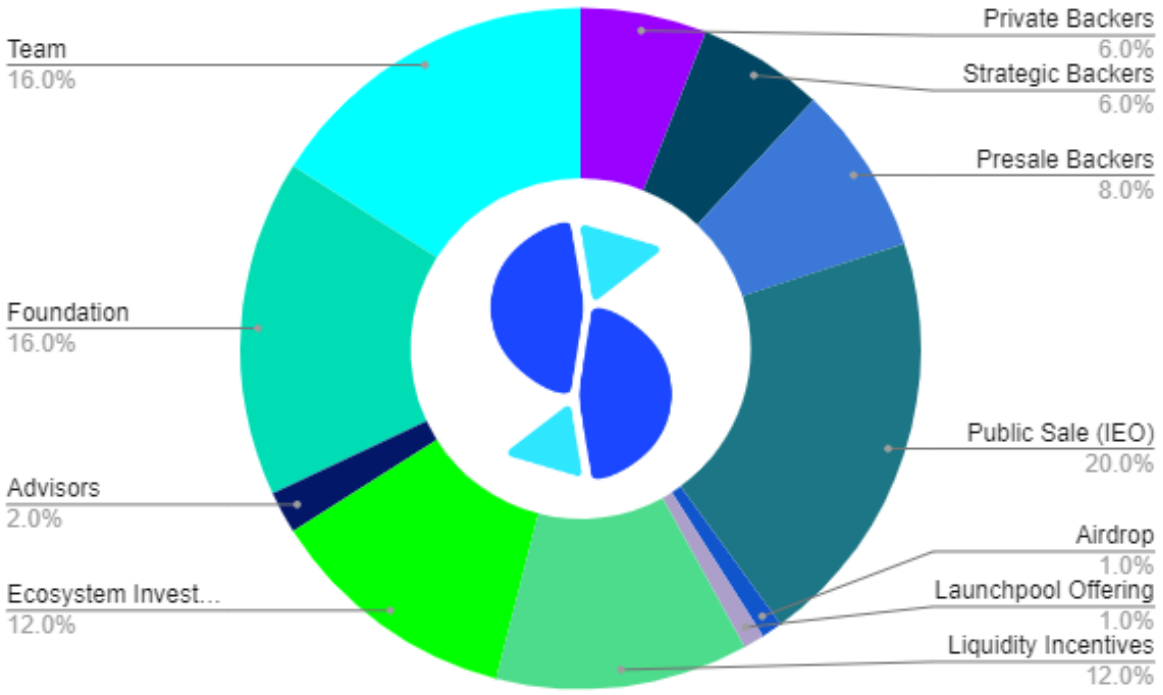

Fig-2: Setheum SEE Token Allocations Pie Chart

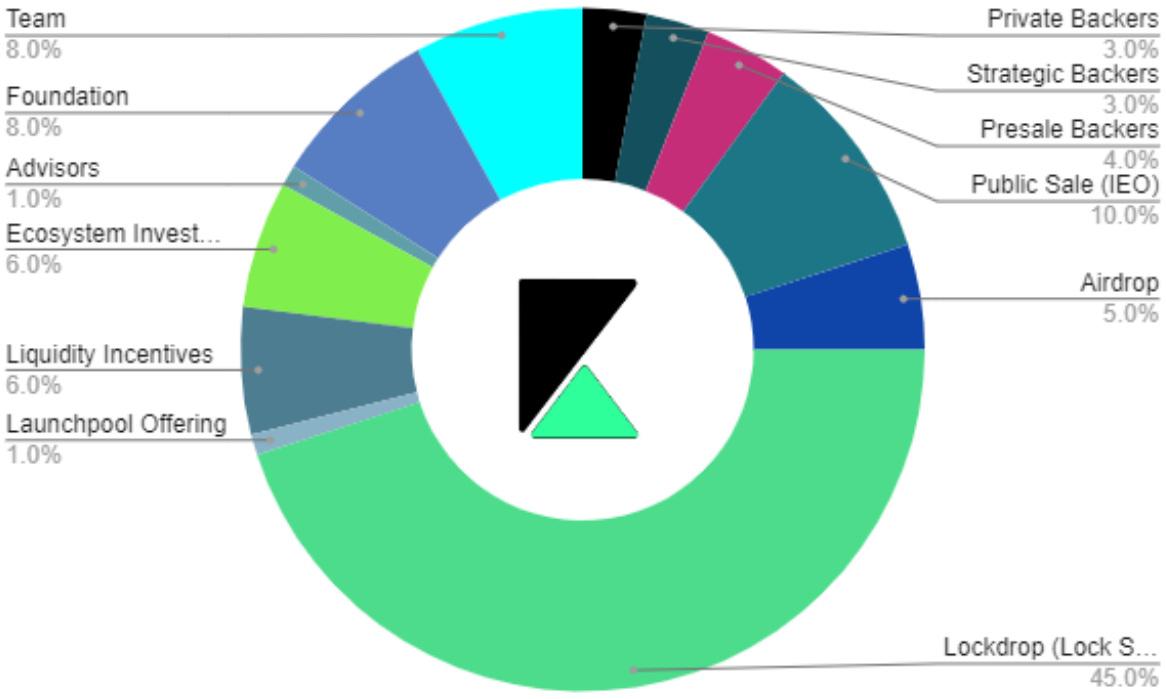

Fig-3: Khalifa KHL Token Allocations Pie Chart

Allocations	**SEE**	**KHL**
Private Backers	6% (600,000,000)	3% (60,000,000)
Strategic Backers	6% (600,000,000)	3% (60,000,000)
Presale Backers	8% (800,000,000)	4% (80,000,000)
Public Sale (IEO)	20% (2,000,000,000)	10% (200,000,000)
Airdrop	1% (100,000,000)	5% (100,000,000)
Lockdrop (Lock SEE/KHL for KHL)	—	45% (900,000,00)
Launchpool Offering	1% (100,000,000)	1% (20,000,000)
Liquidity Incentives	12% (1,200,000,000)	6% (120,000,000)
Ecosystem Investment Fund (EIF)	12% (1,200,000,000)	6% (120,000,000)
Advisors	2% (200,000,000)	1% (20,000,000)
Foundation	16% (1,600,000,000)	8% (160,000,000)
Team	16% (1,600,000,000)	8% (160,000,000)
Total	**10,000,000,000 SEE**	**2,000,000,000 KHL**

Fig-4: Setheum SEE and Khalifa KHL Tokens Allocations Table

Funding Round	**Pricing**	**Allocation**	**Raise (U$D)**
Private Backers	$0.0018	6% (600 Million SEE)	$1,080,000
Strategic Backers	$0.0022	6% (600 Million SEE)	$1,320,000
Presale Backers	$0.003	8% (800 Million SEE)	$2,400,000
Public Sale (IEO)	$0.004	20% (2 Billion SEE)	$8,000,000
Total	**-**	**32% (3.2 Billion SEE)**	**$12,800,000**

Fig-5: Setheum SEE Allocated Tokens Sales Events Table

Vesting

Vesting is very important to be implemented, the initial issuance of tokens are to be vested for certain allocations to protect the community in general. There are various mechanisms and options in Setheum's vesting protocol that range from native vesting to smart contract vesting, cliff vesting to linear vesting, fungible and non-fungible token vesting etc.

The parameters allow for three options regarding schedule types, cliff vesting, graded vesting, and linear vesting. LP tokens, ERC721 NFTs as well as ERC20s and various token standards covered by Sethem's MultiCurrency and MultiLocations Asset standards can be vested in the protocol.

- **Native Vesting:** This category of vesting is carried out fully on the protocol's pallet and governed by the General Council;
- **Time Lock Vesting:** This category of vesting is carried out via the protocol's pallet and deployed as smart contracts, they are not upgradeable unlike native vesting. Anyone can deploy their own Time Lock Vesting Schedules.
- **Transferable Vesting:** This class of vesting allows for transferability of vesting schedules from one beneficiary to another. It is not in the form of tokens but replaces the `owner` with the `new_owner`.
- **Non-Transferrable Vesting:** This class of vesting does not allow for transferability of vesting schedules.
- **Cliff Vesting:** This type of schedule gets vested all at once at a specific timestamp (`vesting_period`).
- **Graded Vesting:** This type of schedule gets vested in grades of varying ratios over a specific period of time where tokens are vested in varying configurable ratios every `vesting_period`.
- **Linear Vesting:** This type of schedule gets vested gradually in a linear progressive over a specific period of time where tokens are vested in equal amounts every `vesting_period`.

Token Vesting Schedules

Vesting Schedules will commence at `genesis`.

Allocations	**Vesting Schedules**
Private Backers	60% (360mSEE/72mKHL) unlock, 40% (240mSEE/48mKHL) locked for 15 months linear vesting
Strategic	50% (300mSEE/60mKHL) unlock, 50% (300mSEE/60mKHL) locked for 12 months linear vesting
Presale Backers	50% (400mSEE/80mKHL) unlock, 50% (400mSEE/80mKHL) locked for 12 months linear vesting
Advisors	60% (120mSEE/24mKHL) unlock, 40% (80mSEE/16mKHL) locked for 18 months linear vesting
EIF	50% (600mSEE/120mKHL) unlock, 50% (600mSEE/120mKHL) locked for 3 years linear vesting
Team	50% (800mSEE/160mKHL) unlock, 50% (800mSEE/160mKHL) locked for 4 years linear vesting
Foundation	50% (800mSEE/160mKHL) unlock, 50% (800mSEE/160mKHL) locked for 5 years linear vesting

Fig-6: Setheum SEE and Khalifa KHL Allocated Tokens Vesting Schedules Table

Airdrop & Lockdrop

Allocations are made for airdrop, to be done on-chain. Time and details are yet to be announced. As for Lockdrop, lock LSEE and/or LKHL to earn KHL rewards for up to 12 Months based on the percentage you own in the pool(s). To be done on-chain (Setheum Mainnet), time yet to be announced. Below are the pools involved in the Lockdrop:

Liquid SEE Pool: 400 Million KHL (20% of supply).
Liquid SETR Pool: 400 Million KHL (20% of supply).
Liquid KHL Pool: 100 Million KHL (5% of supply).

Token Metrics

Fig-7: Setheum SEE Initial Circulating and Locked Supply Token Metrics Table

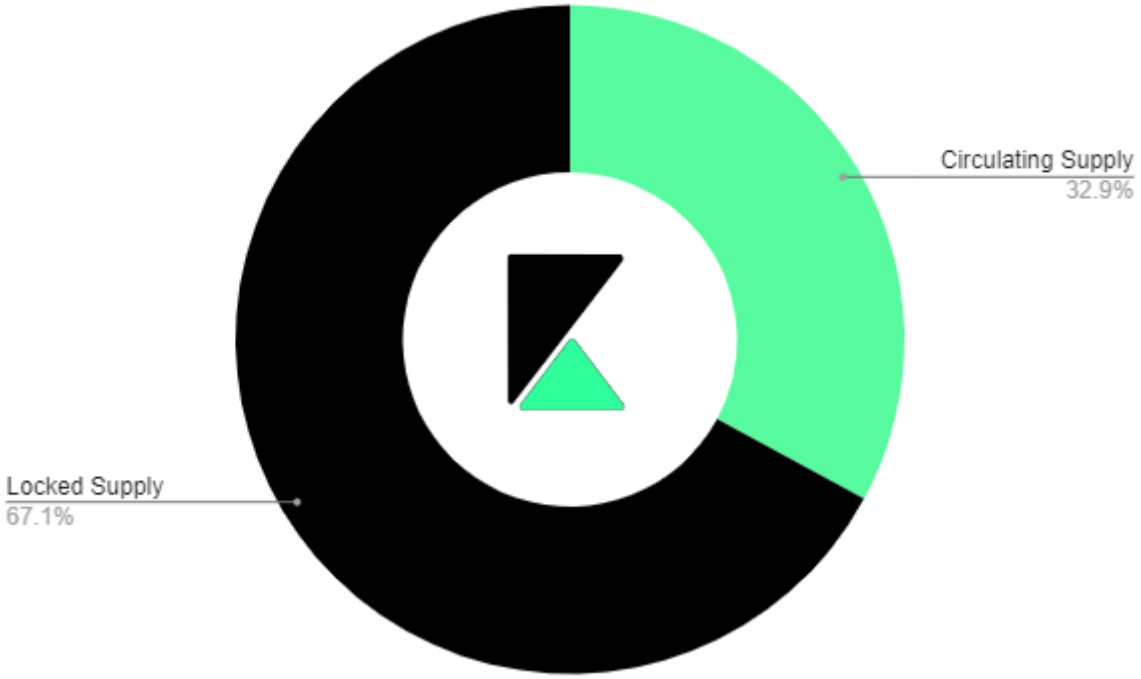

Fig-8: Khalifa KHL Initial Circulating and Locked Supply Token Metrics Table

Metric	SEE	KHL
Market Price	$0.004	$0.001
Market Cap	$22,320,000 (22.32m USD)	$658,000 (658k USD)
Fully Diluted Market Cap	$40,000,000 (40m USD)	$2,000,000 (8m USD)
Total Supply	10,000,000,000 (10B SEE)	2,000,000,000 (2B KHL)
Locked Supply	44.2% (4.42 Billion SEE)	67.1% (1.342 Billion KHL)
Circulating Supply	55.8% (5.58 Billion SEE)	32.9% (658 Million KHL)
Annual Inflation	1 Billion SEE	200 Million KHL

Fig-9: Setheum SEE and Khalifa KHL Initial Supply Token Metrics Table

Setheum Cloud S2 Storage Order

A `storage-order` in S2 is the mechanism used to allocate storage resources from providers to cloud users. The `storage-order` mechanism enables users to order cloud storage services to pay and store their files on the Setheum Cloud Network for the long term.

The user makes a storage order on the S2 Cloud at large and not to a specific node/provider in the network. The `storage-order` mechanism is pooled on the network whereby a pool of nodes store a file's replicas and the payment is also pooled and rewarded to the pool of nodes storing the user's file(s) replicas. Providers also earn `SETR` rewards made via the quota allocated to the pool from Cloud Storage payments made in the `storage-order` module of the `cloud-stack-s2`.

Setheum Cloud C2 Compute Order

The `compute-order` mechanism in Setheum Cloud Compute (C2) is used to allocate compute resources from providers to cloud users. Th `ComputeOrder` mechanism enables users to make orders for Cloud Compute services to use compute resources of the network, which are allocated to them by C2's feeless `StakeToComputeOrder` algorithm which is responsible for allocating `ComputePower` relative to the user's percentage of stake in the `StakeToComputeOrderPool`.`Owning/Staking` 1% of the `StakeToComputeOrderPool` guarantees a `ComputePowerAllocation` of 1% of the `ComputePower` of the entire network.

ECDP: Ethical Collateralized Debt Position

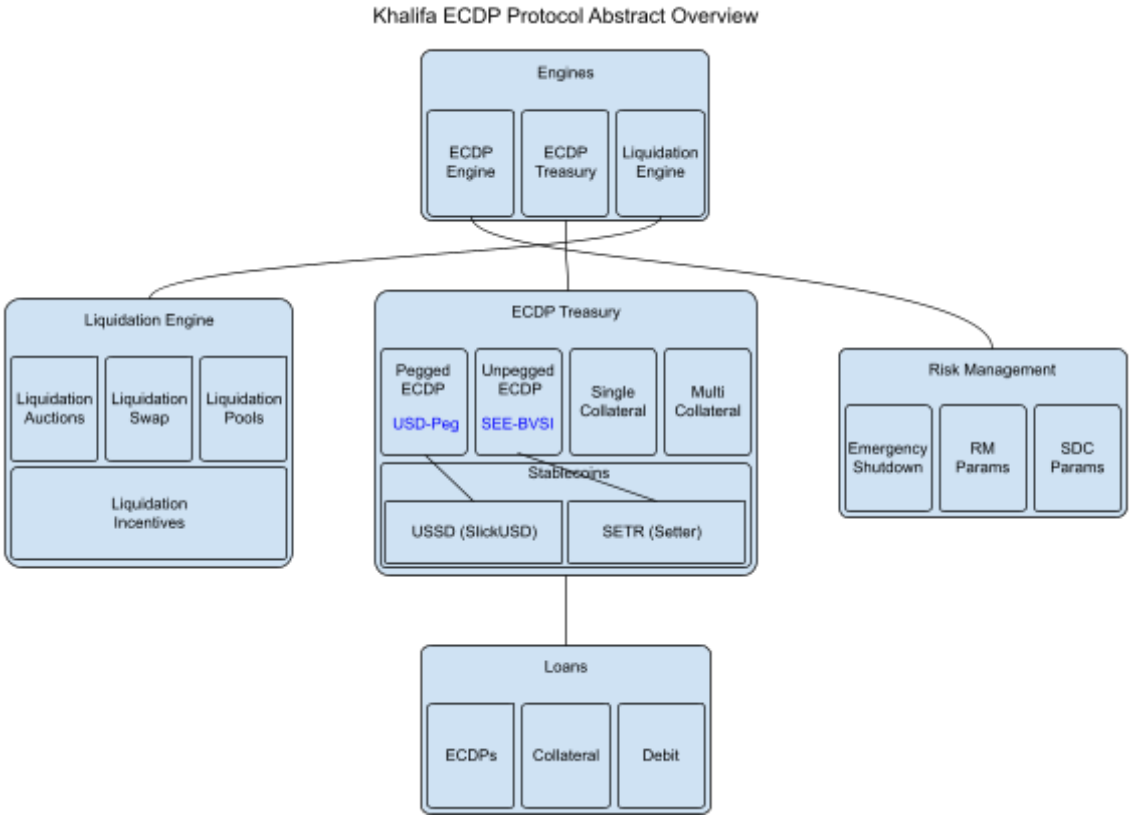

Fig-10: Khalifa ECDP Protocol Abstract Overview

Get Shari'ah Compliant Zero-Interest over-collateralized Stablecoins backed by multiple cryptocurrencies from Khalifa's ***ECDP (Ethical Collateralized Debt Position) protocol***. Inspired by MakerDAO Protocol, the CDP (Collateralized Debt Position) protocol on Ethereum, the Setheum's **"ECDP" (Ethical Collateralized Debt Position)** has zero interest rates, zero stability fees, and zero-liquidation-penalty, and is fully halal and collateralized. This differentiates ECDP from a traditional CDP Protocol, making it halal. And it is ***Multi-Collateral.*** Just reserve some collateral to mint some **ECDP asset**, when returning the loan just return exactly what was loaned and unreserve the collateral with no fees and no interest. This lets the muslim world also participate in the industry and take part in trading and yield making strategies that are within their dome of principles, for me this is a gamechanger that I wished was there for me, therefore I am building it for people like me who need it but haven't been given the chance to be pleased by it, and also non-muslims that want to break-free from the interest-based alternatives to a more efficient system based on truth, fairness and equality. Every currency issued through the ECDP Protocol is backed in excess by a cryptocurrency and is stabilised through the Protocol - a flexible dynamic system of **"ECDPs" (Ethical Collateralized Debt Positions)**, on-chain governance and incentivized key actors. The ECDP loans system design in Khalifa is inspired by the first decentralised stablecoin MakerDAO protocol (in the case of pegged stablecoins) and RAI stablecoin protocol (in the case of unpegged stablecoins), which has become the DeFi building block in the Ethereum ecosystem.

Unlike in Ethereum, where an external liquidator is required to monitor and close dangerous positions, which is by and large due to limitations in Ethereum, the **ECDP** Protocol is able to use the substrate Off-chain Worker (an automatic scheduler unique to parity's Substrate) to automate the process and inherently increases the security and stability of the stable currency.

The Ethics of ECDP, Stablecoins in Khalifa Suite

As we already know, price-stable cryptocurrencies combine the best of both worlds, both fiat currencies and cryptocurrencies like Bitcoin, but not many have a clear plan for the usability let alone the adoption of such a currency. Cryptocurrencies and stablecoins in particular, were designed as a direct result of shortcomings in financial markets and in the global economy – lack of capacity for cross-border payments, high transaction fees, opacity on banking systems, investor risks, market hours and exchange limitations, etc. And since the value of a currency is driven by its network effects, a successfully progressive new digital currency needs to maximise adoption in order to be useful. Creating just another stablecoin is not enough, the "use case" is what matters more. Are there any practical use cases apart from trading in exchanges, airdrops and staking? There is high demand for decentralised, price-stable currencies that should be both fiat-pegged and absolutely cryptonomic in nature, eliminating fiat's inflation fracas and bitcoin's volatile nature. And when it succeeds, then it will have a significant impact as one of the best use cases for cryptocurrencies and a dam of market liquidity. Khalifa Ethical DeFi Suite makes that balance of truthful trustless equilibrium between fiat currencies and cryptocurrencies.

Khalifa is building a concept we call **"ECDP" (Ethical Collateralized Debt Position)** to issue a multi-stablecoins with multi-collateral cryptocurrency backing, and also maintains its decentralised nature while also avoiding extreme price volatility and hyperinflation. Khalifa's ECDPs combine the benefits of assets like Bitcoin, Ethereum, while providing the price stability of stablecoins, creating features that maximise the better of both ecosystems. The price-volatility of cryptocurrencies is a well-studied problem by both academics and market observers (see for instance, Liu and Tsyvinski, 2018, Makarov and Schoar, 2018).

Most cryptocurrencies, including Bitcoin, have a predetermined issuance schedule that, together with a strong speculative demand, contributes to wild fluctuations in price. Bitcoin's extreme price volatility is a major roadblock towards its adoption as a medium of exchange or store of value. Intuitively, nobody wants to pay with a currency that has the potential to double in value in a few days, or wants to be paid in a currency if its value can significantly decline before the transaction is settled. But other cryptocurrencies that have infinite supply also have speculations as to how they can sustain hyperinflation in the long run, what happens to their PPP (Purchasing Power Parity) when their always infinitely increasing supply is a matter of concern.

So we need a balance right in the middle, and a mechanism to curb both volatility and inflation, in order to harness the economic stability of cryptocurrencies - their best day to day use cases hide behind the curtains of economic stability.. Khalifa gets rid of that curtain, for God says let there be light, so then why do we prevent it from reaching us even though we're in the dark. The problems of high volatility are aggravated when the transaction requires more time, i.e; for deferred payments such as mortgages or employment contracts, as volatility would severely disadvantage one side of the contract, making the usage of existing digital currencies in these settings prohibitively expensive.

At the core of how the Khalifa Suite solves these issues is the idea that a cryptocurrency with a collateral backed supply would maintain a stable price, retaining all the censorship resistance of Bitcoin, and making it viable for use in everyday transactions just like the fiat. However, price-stability is not sufficient for the wide adoption of a currency.

Currencies inherently have strong network effects: a customer is unlikely to switch over to a new currency unless a critical mass of merchants are ready to accept it, but at the same time, merchants have no reason to invest resources and educate staff to accept a new currency unless there is significant customer demand for it. For this reason, Bitcoin's adoption in the payments space has been limited to small businesses whose owners are personally invested in cryptocurrencies. That is, the Khalifa Suite with its equanimity in fostering stability and propping adoption in the Khalifa Suite of Protocols, represents an eloquent complement to 'Fiat currencies' and 'Cryptocurrencies' as means of payment and stores of value.

Types of ECDPs - Pegged and Unpegged

There are two types of ECDPs(Ethical Collateralized Debt Positions) namely pegged and unpegged ECDPs. Below are the two types of ECDPs and their comparisons.

- **Pegged ECDP:** A pegged ECDP is based on a stablecoin that is pegged to another asset, eg. USD. The USSD (Slick USD) is a type of pegged ECDP stablecoin. The pegged ECDP is valued at a 1:1 against its peg by the ECDP protocol, having a stable ratio with its peg.
- **Unpegged ECDP:** An unpegged ECDP is also based on a stablecoin that is not pegged to any other asset, however it is a stablecoin that maintains its stability relative to the BVSI(Blunt Volatility Scale Index) of its collateral (a currency whose value is redeemable in the accepted collateral with the stable asset).

  The Unpegged ECDP is stabilised by a blunted volatility index mechanism we call ***BVSI(Blunt Volatility Scale Index)*** *which mirrors the volatility in value of its basket of currencies but in a very blunt manner such that it stays relatively stable and only moves the price a few basis points giving it the features of a floating but stable currency*.

Comparison between Khalifa Stablecoins - Pegged/Unpegged

Criteria	Unpegged (SETR)	Pegged (USSD)
✔️**Multicollateralised**	✅	✅
✔️**Overcollateralized**	✅	✅
✔️**Debt-based System**	✅	✅
✔️**Zero-Interest Debt**	✅	✅
✔️**1 USD Peg**	❌	✅
✔️**Unpegged**	✅	❌
✔️**PID Controller**	✅	❌
✔️**Liquidation Protection**	✅	✅

The ECDP Process

- **Depositing Collateral:** The user creates an ECDP by depositing one of the accepted collaterals.
- **Borrowing Stablecoin and Opening ECDP:** The user requests and borrows the desired asset(USSD or SETR) according to the collateral parameters set by governance based on the chosen and collateral.
- **Paying back :** To close an ECDP, the user pays back the borrowed asset, with no-interest of course, and no stability fees, they need to deposit enough to pay back the outstanding debt in their ECDP, with zero-interest policy, there is no need to pay a stability fee or any accumulated interest whatsoever.
- **Closing the ECDP:** After the protocol receives the outstanding asset debt, the ECDP becomes debt-free, and then the ECDP holder can retrieve their collateral, the ECDP is then closed by the protocol.

Comparison between Khalifa Stablecoins and Others

Criteria	USSD	SETR	RAI	SAI	DAI	UST	Centralised (USDT, USDC)
✔️Multicollateralized	✅	❌	❌	❌	✅	❌	❗
✔️Overcollateralized	✅	✅	✅	✅	✅	❌	❌
✔️Crypto Backed	✅	✅	✅	✅	✅	❌	❌
✔️Not Algorithmically backed	✅	✅	✅	✅	✅	❌	✅
✔️1 USD Peg	✅	❌	❌	✅	✅	✅	✅
✔️Unpegged	❌	✅	✅	❌	❌	❌	❌
✔️No Critical Centralised Point	✅	✅	✅	✅	❌	❌	❌
✔️Transparent System	✅	✅	✅	✅	✅	✅	❌
✔️Decentralised System	✅	✅	✅	✅	✅	✅	❌
✔️BVSI Based System	❌	✅	✅	❌	❌	❌	❌
✔️Halal System	✅	✅	❌	❌	❌	❌	❌
✔️Debt-based System	✅	✅	✅	✅	✅	❌	❌
✔️Zero-Interest Debt	✅	✅	❌	❌	❌	❌	❌
✔️PID Controller	❌	✅	✅	❌	❌	❌	❌
✔️Risk Management System	✅	✅	✅	✅	✅	❌	❗
✔️Liquidation Protection	✅	✅	✅	❌	❌	❌	❗
✔️Multi-Strategy Liquidation	✅	✅	❌	❌	❌	❌	❌
✔️Emergency Shutdown	✅	✅	❌	✅	✅	❌	❌
✔️Safe Unwind (Safe BankRun)	✅	✅	✅	✅	✅	❌	❌

Fig-12: Comparison between Khalifa Stablecoins and others

Risk Management in the ECDP

The Financial Council has governance rights and responsibilities for managing risks of the ECDP protocol in the Khalifa DeFi Suite, including authorising risk parameters adjustments (manual and/or scheduled). Multiple asset types with distinct risk profiles are accepted as collaterals for ECDPs, therefore, all risk parameters of the ECDPs and liquidation parameters are separately set up across various collaterals and are to be adjusted on the Protocol through on-chain governance by the Financial Council. More collaterals could be added through runtime upgrades by system governance.

ECDP Liquidations

Liquidations in the ECDP protocol are there to help keep the system healthy. There are several types of Liquidation Methods available. How are these methods chosen by the `LiquidationEngine`, the methods are chosen based on the abstraction of the algorithm below:

```
fn liquidation_engine(collateral: Collateral, debit: Debit) -> LiquidationMethod {
   if collateralisation_ratio > liquidation_ratio {
      // collateral is safe
      LiquidationMethod::None
   } else if collateralisation_ratio <= liquidation_ratio
            && collateral.is_listed_in_liquidation_pool() {
             if get_swap_amount(collateral, debit) <
             liquidation_pool_premium * collateral.amount() {
              let slippage = (swap_rate - get_market_rate(collateral))
                 / get_market_rate(collateral);
              if slippage <= acceptable_slippage &&  get_swap_amount(collateral, debit) <
                 liquidation_pool_premium * collateral.amount() {
                       // liquidate using the swap liquidation on DEX
                       LiquidationMethod::LiquidationSwap
              } else if slippage >= acceptable_slippage &&
                 get_swap_amount(collateral, debit) <
                 liquidation_pool_premium * collateral.amount()
                 && liquidation_pool_liquidity >= debit.amount() {
                       // liquidate using the swap liquidation on DEX
                       LiquidationMethod::LiquidationSwap
                }
             }
   } else if collateralisation_ratio <= liquidation_ratio
            && collateral.is_listed_in_liquidation_pool()
            && liquidation_pool_liquidity >= debit.amount() {
            // liquidate using the liquidation pool
             LiquidationMethod::LiquidationPool
   } else {
      // liquidate using the auction
      LiquidationMethod::Auction
   }
}
```

In simple words; If the collateralization ratio is greater than the liquidation ratio, it indicates that the collateral is safe, and thus the function returns LiquidationMethod::None. If the debt is unsafe and the collateral has a liquidation pool, the function proceeds with the liquidation process where if the buy-back is cheaper via `LiquidationSwap` than on a `LiquidationPool` and the slippage is acceptable, then it proceeds with the swap liquidation method. Else if the buy-back is cheaper via `LiquidationSwap` than on a `LiquidationPool` and the slippage is unacceptable and there is enough liquidity available in the liquidation pool, it proceeds to use the `LiquidationSwap` method. Else if the collateral has a liquidation pool and there is enough liquidity available in the pool for that liquidation, the `LiquidationEngine` then decides to use the `LiquidationPool` method to liquidate the assets. Else, the `LiquidationEngine` uses the `LiquidationAuction` to liquidate.

Liquidation Pools

The ECDP Liquidation Pools are there to help in asset liquidations in the ECDP Protocol. The `LiquidationPool` is a decentralised money pot that holds pooled funds in the form of the debit stablecoin from `LiquidationProviders` (LPs), the funds are then accessible to the ECDP protocol to automatically swap with collateral that is meant to be liquidated. The `LiquidationPool` has a preset premium called the `LiquidationPoolPremium` that is a discount for selling the collateral to the `LiquidationProviders` (LPs). The `LiquidationPool` operates quite similar to a DEX's `LiquidityPool` in the sense that the premium earned by LPs is shared proportional to an LPs ownership in percentage relative to the total funds at any given time. `MultiCollateral` Stablecoins have multiple `LiquidationPools`, one for each collateral, while `SingleCollateral` Stablecoins have a `LiquidationPool` that is used to liquidate the `SingleCollateral`. There are also incentive rewards for `LiquidationProviders` (LPs) to incentivise liquidity provision to the `LiquidationPool`.

Liquidation Swaps

ECDP liquidations can be done via a `liquidation-swap` if slippage is within the range of `AcceptableSlippage`, it is basically a method to swap the collateral on the built-in DEX in Khalifa DeFi for buying back the stablecoin which is paid back into the system to burn it out of existence.

Unpaid Debt

Unpaid debt is considered as the outstanding debit that could not be bought back at a point in time during times of extreme market conditions. It is recorded in the system as excess debt that is paid back later via collateral liquidations, the collateral that is not able to be sold during this period will be collected by the `ECDPTreasure` for later liquidation, the outstanding debit is recorded in the system as debt to be repaid with later liquidation(s).

ECDP Risk Management Parameters

The Risk Management Parameters are set in place to manage risk in the system to keep a healthy ECDP system. Market conditions affect the state of these parameters, therefore the params can be updated as per collateral volatility, stablecoin demand & supply, they can be set to low or high thresholds to fit market needs and collaterals can be removed and added all by on-chain Governance.

Pegged-ECDP Risk Management Parameters

- **`MinCollateralRatio`:** The minimum collateral to debt ratio needed to issue debt.
- **`LiquidationRatio`:** The collateral to debt ratio at which the debt is unsafe and liquidated.
- **`HardDebtCeiling`:** The maximum total amount of debt issuance under a specific collateral type. It is never exceeded once it is reached, it can however also be updated by governance.
- **`SoftDebtCeiling`:** The soft cap amount of total debt issuance under a specific collateral. It can be exceeded by debt whereby the debt is above the **`SoftDebtCeiling`**. Once it is reached, more debt can be issued but only adhering to the **`SDC`**/**`SoftDebtCeiling`** parameters, which are:

  * **`SDCCollateralRatio`**: Often greater than usual (ie. 250%);

  * **`SDCLiquidationRatio`**: Often greater than usual (ie. 170%)

  * **`SDCCollateralAsset`**: Can only get loans with one collateral (ie. `SETR`), this is always **`SEE`** in **`SETR`** Unpegged ECDP protocol;

  * **`SDCMaxLoanAmount`** The maximum amount of loan that can be borrowed to an account during the **`SDCPeriod`**:

  * **`SDCPeriod`:** is the time period when the `SoftDebtCeiling` in the system has been reached or exceeded.

#	Collateral	Min Collateral Ratio	Liquidation Ratio	Hard Debt Ceiling	Soft Debt Ceiling	SDC Collateral *(Only One Currency)*	SDC Collateral Ratio	SDC Liquidation Ratio	SDC Max Loan Amount
1	SEE	200%	120%	$30M	$25M	SETR	250%	170%	$19K
2	KHL	200%	120%	$25M	$20M	``	``	``	``
3	BTC	180%	120%	$38M	$35M	``	``	``	``
4	ETH	180%	120%	$33M	$30M	``	``	``	``
5	BNB	180%	120%	$37M	$30M	``	``	``	``

Fig-22. Example of inserted Pegged ECDP Risk Management Parameters

Pegged ECDP Price Stability Mechanisms

The **USSD** is designed to peg to the US Dollar at a ratio of 1:1 that the Network aims to maintain the value of one **SlickUSD (USSD)** approximately to one US Dollar at all times. Our strong peg to US Dollar is achieved through a risk management mechanism in the **SlickUSD** Protocol, together with council governance, the DEX and the Price Feed Oracles.

- **When SlickUSD > $1:**
    1. **Governance** would **increase the** `SoftDebtCeiling` to support and encourage more debt issuance which results in more supply which brings down demand, therefore pulling back the price to its $1 peg.
    2. **Governance** could also **increase the** `HardDebtCeiling` to enable, support and encourage more debt issuance which results in more supply which brings down demand, therefore pulling back the price to its $1 peg.
    3. **Arbitrageurs** would use the opportunity to move the price back to its peg.
- **When SlickUSD < $1:**
    1. **Governance** would also **reduce the** `SoftDebtCeiling` to discourage more debt issuance by making it smaller, slower and more expensive, which results in more buying which in turn props up demand, therefore pushing the price back to its $1 peg.
    2. **Governance** would also **reduce the** `HardDebtCeiling` to discourage and ultimately/eventually disallow more debt issuance which results in more buying which in turn props up demand, therefore pushing the price back to its $1 peg.
    3. **Arbitrageurs** would use the opportunity to move the price back to its peg.

Unpegged-ECDP Risk Management Parameters

- **`LVSICollateral`:** The collateral asset that backs the stablecoin. It is the index that the stablecoin mirrors and is collateralized by. It is the LVSI (Low Volatility Stable Index) tracking the price movement of the collateral and blunting down its volatility into relatively stable low volatility price movements. The `LVSICollateral` of **SETR** is **SEE**.
- **`MinCollateralRatio`:** The minimum collateral to debt ratio needed to issue debt.
- **`LiquidationRatio`:** The collateral to debt ratio at which the debt is unsafe and liquidated.
- **`RedemptionRate`:** The rate at which the stablecoin is being devalued or revalued against the collateral which results in changing the `RedemptionPrice`. It is expressed as a percentage per year and can be either positive or negative depending on whether the `MarketPrice` is above/below the `RedemptionPrice`. A positive `RedemptionRate` means that **SETR** is being revalued and its `RedemptionPrice` is **increasing over time**. A negative `RedemptionRate` means that **SETR** is being devalued and its `RedemptionPrice` is **decreasing over time**. It is determined by the **PID Controller**, the algorithm that adjusts the rate based on the deviation between the `MarketPrice` and the `RedemptionPrice`.

- **`RedemptionPrice:`** The price that the protocol targets for the stablecoin to be valued on the open market. It is the internal price of `SETR that the system tries to match with the market price. It is used to mint the stablecoin against its collateral and to redeem collateral from the ECDP. The `RedemptionPrice` is meant to almost always float as it does not target a peg.
- **`HardDebtCeiling:`** The maximum total amount of debt issuance under a specific collateral type. It is never exceeded once it is reached, it can however also be updated by governance.
- **`SoftDebtCeiling:`** The soft cap amount of total debt issuance under a specific collateral. It can be exceeded by debt whereby the debt is above the `SoftDebtCeiling`. Once it is reached, more debt can be issued but only adhering to the `SDC`/`SoftDebtCeiling` parameters, which are:

  * **`SDCCollateralRatio`**: Often greater than usual (ie. 250%);

  * **`SDCLiquidationRatio`**: Often greater than usual (ie. 170%)

  * **`SDCMaxLoanAmount:`** The maximum amount of loan that can be borrowed to an account during the `SDCPeriod`.

  * **`SDCPeriod:`** is the time period when the `SoftDebtCeiling` in the system has been reached or exceeded.

LVSI Collateral	Min Collateral Ratio	Liquidation Ratio	Redemption Rate	Redemption Price	Hard Debt Ceiling	Soft Debt Ceiling	SDC Collateral Ratio	SDC Liquidation Ratio	SDC Max Loan Amount
SEE	200%	120%	5%	$2.58	$30M	$25M	250%	140%	$7,000

Fig-22. Example of inserted Unpegged ECDP Risk Management Parameters

Unpegged ECDP Price Stability Mechanisms

The **SETR** is designed to be unpegged and relatively stable. The stability of the Setter is achieved through a PID Controller, a risk management mechanism in the **Setter** Protocol, together with council governance, the DEX and the Price Feed Oracles.

The **Setter (SETR)** uses a variant of a PID (Proportional Integral Derivative) controller as a means for maintaining market price stability. It makes use of a proportional term (***P***), an integral term (***I***) and a derivative term (***D***) for influencing the future values of a time series. The PID controller works by continuously measuring the error between the **`MarketPrice`** and the **`RedemptionPrice`** and then adjusting the **`RedemptionRate`** to reduce this error. The proportional term (***P***) is responsible for reducing the current error, while the integral term (***I***) is responsible for reducing past errors and the derivative term (***D***) is responsible for predicting future errors.

- **When SETR `MarketPrice` > `RedemptionPrice`:**
    1. The **PID Controller** would make debt inexpensive by **decreasing the** `RedemptionRate` which in turn encourages minting more debit to keep supply and demand in equilibrium by propping up supply, thus bringing down the `MarketPrice` back to the `RedemptionPrice`.
    2. **Governance** would **increase the** `SoftDebtCeiling` to support and encourage more debt issuance which results in more supply which brings down demand by propping up supply, therefore pulling back the `MarketPrice` to the `RedemptionPrice`.
    3. **Governance** could also **increase the** `HardDebtCeiling` to enable, support and encourage more debt issuance which results in more supply which brings down demand, therefore pulling back the `MarketPrice` to the `RedemptionPrice`.
    4. **Arbitrageurs** would use the opportunity to push the `MarketPrice` down to the `RedemptionPrice`. They are incentivised to mint `SETR` and immediately sell it for profit in the open market.

- **When SETR `MarketPrice` < `RedemptionPrice`:**
    1. The **PID Controller** would make debt expensive by **increasing the** `RedemptionRate`, discouraging the minting of debit to keep supply and demand in equilibrium and prop up the `MarketPrice` to the `RedemptionPrice`.
    2. **Governance** would also **reduce the** `SoftDebtCeiling` to discourage more debt issuance by making it smaller, slower and more expensive, which in turn increases demand while decreasing supply, therefore pulling up the `MarketPrice` to the `RedemptionPrice`.
    3. **Governance** would also **reduce the** `HardDebtCeiling` to discourage and ultimately/eventually disallow more debt issuance which results in less supply which in turn props up demand, therefore pulling the `MarketPrice` up to the `RedemptionPrice`.
    4. **Arbitrageurs** would use the opportunity to pull the `MarketPrice` up to the `RedemptionPrice`. They are incentivised to buy `SETR` from the open market and immediately pay back their outstanding debt for profit.

Conclusion

This paper is light and does not fully entail the functionalities, features and/or economics of either or both Setheum and Khalifa. It however contains the tokenomics and some important economics of the blockchains and their cryptocurrencies. For more details into the protocols in these blockchains and the economics of those protocols and how they all fit and work together, check the whitepapers.

References and Further Reading

1. Muhammad-Jibril B.A. (Khalifa MBA), ***Setheum Network: A Secure Confidential And Interoperable Decentralised Cloud Compute And Storage Network With A Layer-2 Infrastructure for Subchains and Smart Contracts | Technical White Paper - v15***, [online] Available: https://github.com/Setheum-Labs/Setheum-Labs-White-Papers/
2. Muhammad-Jibril B.A. (Khalifa MBA), ***Khalifa Blockchain: An Ethical DeFi Optimised Layer-2 Blockchain Built on Setheum for DeFi Confidentiality, Interoperability and Scalability | Technical White Paper***, [online] Available: https://github.com/Setheum-Labs/Setheum-Labs-White-Papers/