



# Sienna Network

Privacy-first, cross-chain decentralized finance protocol.

**Version 1.1**

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# 1.0 Executive Summary

Sienna Network is a cross-chain, privacy-first platform for decentralized finance (DeFi), which empowers its users to manage their finances securely, with no outside interference or intrusion, knowing that outsiders will not be able to view the details of the transaction or compromise their identity to any 3rd parties.

The project is building upon the promise of decentralized finance by delivering financial tools and services which respect and preserve the privacy of individual users. Until now, the financial activities of DeFi users have remained an open book - publicly preserved on the blockchain and forever vulnerable. This level of disclosure has created a chilling effect for the industry, discouraging even remotely privacy-conscious users from participation in the market, whilst concerning regulators who wish to ensure that users, private and professional alike, are properly protected.

Modern blockchain based technologies fall short when it comes to preserving privacy - the nature of the early blockchains brings everything in the open - Sienna looks to solve for the same problem that has been solved by banks for their customers for many years - privacy in terms of your funds and transactions and protected by computational privacy.

Sienna Network's mission is to right this wrong. At the heart of the network are robust financial tools for the assurance of privacy to all consumers. The Sienna Network launches with quality financial products which cover trading and swaps and very soon after lending/borrowing services.

Sienna Network will launch with two primary products. The first is **Sienna Swap**, a decentralized Automated Market Maker (AMM) for private, seamless, P2P token swaps. Sienna Swap provides near instant swapping of standard ERC-20 tokens to their private equivalents (SNIP-20), as well as swaps between private tokens.

The second product, which will follow shortly after launch, is **Sienna Lend**, which facilitates the borrowing and lending of crypto assets, while also offering staking



options for various crypto trading pairs. Sienna Lend includes a number of strong incentivization options which encourage participation in the network.

These products will be complemented by Sienna Network's planned integrations with **Self Sovereign Identities**, which provide users with total control of their personal data in a private decentralized ID. This data can then be leveraged in private smart contracts, such as to demonstrate positive behaviours on the network or to incorporate real world credit scores into Sienna Lend, thus enabling under-collateralized loans.

Sienna Network builds upon a number of pre-existing technologies to make this vision a reality. Foremost is the Secret Network, a blockchain built on Cosmos with Tendermint technology. This technology stack allows privacy-preserving smart contracts, great scalability, fast transactions and low fees. It also offers great utility and flexibility, including cross-chain bridging with Ethereum and other networks including BSC, Polkadot and more via the IBC technology for the Cosmos ecosystem.

Sienna Network is governed by Sienna (SIENNA), a powerful incentivization and utility token which confers considerable functionalities to holders. Each SIENNA token entitles its owner to one vote, with voting on matters such as interest rates, ratios, new rules, collateral limits and more. SIENNA will incentivize desirable activities on the network, generously rewarding users and aggressively bootstrapping the network.

Sienna Network believes the programmable privacy pioneered by Secret Network will give blockchain a professional breakthrough, and Sienna aims to build upon this with compliance-seeking financial solutions integrating decentralized IDs, and real world financial data. Money should be private and anonymous - financial services should respect user data and maintain user privacy. On Sienna Network all this is possible.

## 2.0 Sienna Network

Sienna Network is a privacy-focused DeFi platform designed to protect users from unwelcome surveillance by bad actors, and to preserve their right to privacy. The vision is to create decentralized banking and financial services which are by default completely private, highly scalable, and easy to use. This will usher in a wave of new industry standards for the management and trading of crypto assets and encourage a new wave of DeFi users to enter the space, including professional and institutional users, at the same time enhancing consumer protection to the benefit of regulators.

### Privacy by Default

Sienna Network believes that your privacy is a fundamental right. Until now decentralized finance has promised full financial control and self-reliance, but at the expense of personal privacy. The inherent transparency of blockchain - advantageous in some areas - holds concomitant privacy and security risks. In centralized finance that risk is reduced, but comes at the cost of personal control. For those who prize their personal privacy as well as their financial freedom, neither CeFi nor DeFi has provided all the answers.

Sienna Network is different, and provides complete financial freedom, with privacy by default. Sienna Network is designed to execute private smart contracts with the programmability of Ethereum, while maintaining privacy. This is due to the privacy features from the blockchain Sienna Network is built on top of - Secret Network.

Moreover, the programmable privacy means that verifiable sensitive data (i.e. sender and receiver information) can be exchanged in a completely decentralized manner.

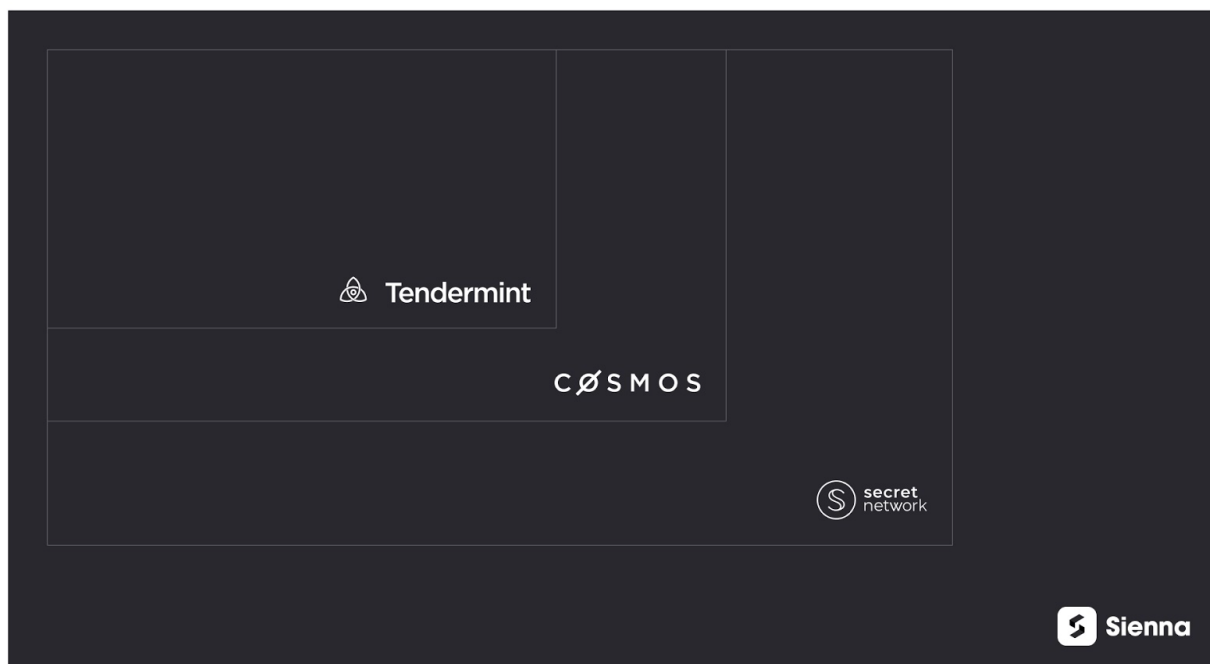
This baked-in privacy ushers in a new wave of impactful features for DeFi including private trading, private lending, private decentralized identities, decentralized credit scores and distributed under-collateralized loans. With the integration of oracle-type data sources these opportunities will only expand.

The privacy and integrity of the network and its financial tools strengthens the value proposition of decentralized finance. This is especially true for institutional participants, who are extremely cautious of exposing their financial strategies and trading activities. This has been a persistent impediment to institutional adoption, slowing growth and in some cases dissuading greater levels of participation.

There is huge potential for a private platform where positions and trades remain private, if desired. In Sienna Network that privacy comes as standard, although, for those who wish or need it, relevant data about sender and receiver can be shared.

## 2.2 Mass Scalability

Sienna Network is built on the Secret Network blockchain, developed with the Cosmos software development kit (SDK) which takes advantage of Tendermint consensus technology. This technology stack allows for the creation of powerful, and highly scalable decentralized applications.



### *Sienna Network's technology stack*

Cosmos is a network of independent but interoperable parallel blockchains, each maintaining individual control in their 'sovereign zone'. Each Cosmos sovereign zone is capable of hosting multiple blockchains running in parallel to each other, facilitating thousands of transactions per second (TPS).

Building on Cosmos SDK allows Secret Network to take advantage of Tendermint with parallel scaling, allowing for much higher throughput than monolithic public blockchains. Sienna Network takes advantage of all of the scalable nodes of its parent chain, thus achieving high throughput in the range of thousands of transactions per second, even under severe network loads.

## 2.3 Protocol Level Interoperability

One of the core benefits of Cosmos is its Inter-Blockchain Communication (IBC) protocol. This makes it possible for blockchains on the network to connect and communicate with each other without ever giving up their native application states or their consensus protocols.

Since the Cosmos Hub keeps a transactional record of all tokens within its ecosystem of sovereign zones, tokens from one platform can be easily transacted to another blockchain, even if both blockchains are running separate application layers and corresponding consensus mechanisms.

Sienna is able to facilitate interoperability within its service offerings without compromising privacy. This is seen by the implementation of cross-chain token swaps, including private token swaps, as well as lending and borrowing. In the product roadmap Sienna Network will seek to implement cross-chain capabilities to other significant blockchain ecosystems such as Polkadot.

With protocol level interoperability Sienna Network seeks to establish itself as *the* de-facto standard for privacy in decentralized finance, successfully operating across multiple chains.

## 2.4 Front-Running Mitigation

Cosmos SDK, IBC, and Tendermint Consensus Protocol allow for a far higher transactional throughput than Ethereum and because of this, much cheaper transaction fees are possible.

Unlike the Ethereum model in which users are caught in a perpetual arms race of ever increasing gas fees, Cosmos offers parallel scaling with near instant transaction times. In this ecosystem the burden of transactions is more easily spread, reducing the necessity of aggressively incentivizing transactions where time is of the essence.

Since transactional throughput on Cosmos is very high, even under strenuous network loads, users no longer need to “front run” their transactions to be assured of timeous completion. Furthermore, due to the utilization of the Secret Network and its Secret Contracts, the transactional information for transactions occurring on Sienna Network are private - eliminating the merest possibility of front-running with the purpose of shorting the market on Sienna Network.

## 2.5 Contributing Towards Institutional Adoption

The lack of privacy in decentralized finance, and issues it creates such as front running, raises barriers for institutional players, making it less likely they will allocate a portion of their portfolio, it also completely rules out any regulated product in the long run.

Sienna Network’s ecosystem assures institutional players by keeping all of their transactions, trading positions, liquidity provisions and more, private. This positions Sienna Network as the gateway for institutional players who wish to engage in decentralized finance, allowing them to add their wealth to this growing sector.

Sienna Network thus makes digital money markets extremely efficient for institutional players. With a range of attractive headline features Sienna Network is making a robust case for greater institutional participation in DeFi.

## 2.6 Making DeFi Easy

If DeFi is to fulfill its true potential and reach beyond the existing market of diehard crypto consumers, it must first broaden its appeal and lower the barriers to entry. To make this vision a reality, Sienna Network intends to focus on education, the user journey and ease of use.

Sienna Network's tools and product lines are designed to be quickly understood, utilizing an intuitive graphical interface that allows users to quickly get to grips with the platform. Sienna Network will further work to educate and inform its user base, helping them to upskill and level up whenever necessary.

### 2.6.1 Education

The contributors at Sienna Network have considerable experience in both traditional finance and blockchain/crypto. This provides them with a broad overview of the sector, as witnessed from multiple vantage points. With a breadth of crypto specialists and experienced traders onboard, Sienna Network will benefit from having the right blend of expertise and industry knowledge to call to develop the best in class educational materials.

Sienna Network will be developing tools and step by step guides which will allow the second generation of DeFi users to learn, absorb and execute a greater range of functions as they become increasingly familiar with the sector. Sienna Network's online documentation will allow for explanations of all aspects of DeFi – from 'WrappedETH' through to 'Yield Farming' etc.

### 2.6.2 User Journey

The contributors at Sienna Network have extensive experience in building products that onboarded tens of millions of users. They created user journeys that brought millions of non-technical people onto the internet as it grew in the late nineties, through bringing internet chat and video calling to many homes, and through website development.

By building upon the same philosophy, Sienna is looking to bring their winning approach to DeFi and Sienna Network.

### 2.6.3 Trust

Users will be able to lend their trust to Sienna Network due to the confluence of a number of interconnected factors. These are:

**Privacy:** With privacy by default users have peace of mind, allowing them to trust in Sienna Network as a safe place to conduct their financial business.

**Security:** Since Sienna is a private and encrypted decentralized network, there is no central repository to risk and no single point of failure which can be exploited. This allows users to trust that their information is highly secure and protected on Sienna Network.

**Clarity:** A user-centric design will lay the foundation upon which user trust is developed as Sienna Network goes live. All user touch points within the network are designed to benefit the user, for the very best levels of comprehension and clarity. Users can easily understand their current position, including winning and losing trades. Users will always be able to access their trading history through the platform and grant relevant 3rd party access if ever required.

**Fairness:** The prevention of front-running further establishes trust with the user base. Sienna Network cannot guarantee user profitability, but can ensure that users do not face unfair exploitation and front running.

**Transparency:** While Sienna Network will always vigorously defend users' right to privacy, the foundation itself will be open, transparent and communicative with its community. It will also submit itself to outside scrutiny and auditing. As part of that commitment Sienna Network has submitted its code to external auditors before it was deployed on the mainnet and made available to the public.

#### 2.6.4 Transaction Fees

Sienna Network is based on Secret Network - a Proof of Stake network featuring low transaction fees. At the time of writing, transactions on the Ethereum network are costing upwards of \$150 US, rendering smaller transactions or experimentation impractical. This is a huge barrier to entry for both new, curious users of DeFi - and of course for the large majority of users. Sienna Network has the goal of reducing barriers to DeFi adoption, and fees are an important aspect of making DeFi easy and an improvement over legacy systems.

## 3.0 Self Sovereign Identities

Sienna Network will provide users with self-sovereign identities (SSI), providing them with unparalleled control over their personal data, allowing them to decide exactly how that data is used. Users are empowered to decide which pieces of information they share, when they share it, and with whom. The data within the SSI remains encrypted, private and secure at all times.

Better still, the self-sovereign identity is engaged with a pseudonymous username or Decentralized IDentifier (DID). This pseudonym allows users to remain completely anonymous to other users while continuing to leverage their personal data within the network.

The user is able to connect useful information (metadata) to their DID which is then incorporated and encrypted into their SSI. Each DID has its own set of rules related to registration, regulation, modification and revocation.



One of the many potential use cases for this technology is the application of credit checks with credit score histories and credit worthiness assessments, which will enable under-collateralized loans. This data can then be fed into a smart contract so a loan agreement can be made. Other use cases include proving to a counterpart - such as a lending pool - that previously taken loans on Sienna Network have been repaid. Another could be demonstrating a history of active participation in the network, and the accumulation of positive user feedback on the platform.

In time Sienna Network predicts that growing regulations which govern exchanges and FIAT bridges will make some form of identification mandatory. As Anonymity and Privacy are two distinctly different matters, Sienna Network will help to future proof its users such that they do not need to act anonymously simply to preserve their right to privacy.

## 4.1 Cross-chain Technology

Sienna Network consists of dual value driving elements which allow participants to gain the best from DeFi while staying completely private. These mechanisms are **Sienna Swap** and **Sienna Lend**.

Each of these core elements are designed with full privacy by default, with great scalability and minimal transaction fees.

**Sienna Swap** is a private decentralized Automated Market Maker (AMM) for private, seamless, P2P token swaps. It provides an instant swap of standard ERC-20 tokens to their private equivalent, and swaps between private tokens on the Secret Network.

**Sienna Lend** facilitates the borrowing and lending of crypto assets, while also offering staking options for various crypto trading pairs. It has a number of lucrative incentivization schemes which will encourage individuals to use the platform including for liquidity mining and governance token rewards.

Sienna Swap is now production ready and will be available to all Sienna Network users on platform launch followed shortly after by Sienna Lend.

## 4.2 Bridge(s)

The Bridge(s) are Sienna Network's user interface for the Bridge technology developed by Secret Network and others. This allows users to swap their tokens into private equivalents called Secret Tokens. All Secret Tokens comply with the SNIP-20 standard, which is a specification for private fungible tokens based on the CosmWasm (Cosmos) module for the Secret Network.

The bridge mints SNIP-20 tokens 1:1 e.g. 10 ETH becomes 10 sETH. Since the bridge is bi-directional, when the Secret Token(s) are burned, an on-chain event unlocks the ERC-20 tokens from the deposit contract they were held.

### 4.2.1 Ethereum Bridge

The typical crossing on the Ethereum ERC-20 bridge functions as follows:

- 1) ETH (or any ERC-20-based token) is sent to an Ethereum lock contract and a working Secret Network address is provided.
- 2) Using a bridge leader, who is responsible for watching new on-chain events, a request for the minting of secretETH is proposed, validated and signed by the leader.
- 3) Since multisig wallets are implemented differently on both networks, the ETH smart contracts are executed automatically when the number of signers pass a certain threshold while the leader on SCRT broadcasts the signed transaction before minting the wrapped tokens accordingly.
- 4) Once minted, secretETH is sent to the user's Secret Network address and can be freely used without hindrance on Sienna Network.
- 5) Upon conversion back to Ethereum, secretETH is burned. The user provides an ETH address where the multi-sig committee creates a transaction instructing the bridge smart contract to allocate ETH back to the user's wallet.

Asset pairs on Sienna Network such as ETH and its equivalent asset, secretETH, are governed by 2 secret contracts. A SNIP-20 contract governs the ETH token and is the contract that a user interacts with to manage their Secret Token.

The second secret contract manages the secret equivalent of the asset once it has been wrapped. As far as the user is concerned there is no difference between a bridged asset and native SNIP-20 assets such as secretSCRT, so all can be managed from a single wallet.

The Sienna Bridge is designed to be highly cost effective. The cost of a complete cycle from ETH to secretEth and back to ETH again is calculated to be 75% lower than the nearest privacy protocol on the market.

While the gas cost of swapping from ERC-20 to secret is settled in ETH, the return journey is significantly less expensive and will be paid with the native token of the Secret Network blockchain, SCRT. The bridge is also designed with speed in mind.

Typically, the time needed to unlock assets on Ethereum is in the order of blocks whereas competing approaches like optimistic roll-ups require a 1 week lock-up during the withdrawal of assets.

#### 4.2.2 Public to Private Bridge

The bidirectionality of the token bridge allows the conversion of any tokens running on Sienna Network to be converted to public entities. This concept is already demonstrated on the Secret Network blockchain with their native token SCRT.

Users are able to wrap Secret Network's sSCRT (SNIP-20) into wSCRT (ERC-20) on Ethereum, and later convert their wSCRT back to sSCRT. This allows for wSCRT to be used across the Ethereum Network interacting with any and all DeFi protocols in the space. This offers a great deal of flexibility and sets the standard for even greater interoperability between public and private networks.

It is important to distinguish between the various components of this ecosystem. Sienna Network adopts the same model as Secret Network with the interplay between SIENNA, and wSIENNA tokens. This is how the model will work on Sienna Network:

**SIENNA:** the native SNIP-20 token for Sienna Network.. Transactions made using SIENNA are fully private and encrypted. Supporting wallets are also private.

**wSIENNA:** a wrapped ERC-20 equivalent of SIENNA that is used to interact with the Ethereum blockchain. Through the ETH/ERC Bridge users can exchange wSIENNA for SIENNA for a 1:1 ratio. Users can also go back to wSIENNA by depositing their wSIENNA tokens to the bridge, which then burns the wSIENNA and releases the native SIENNA token back to the user.

## 5.1 Sienna Swap

The focus for the Sienna Swap AMM is privacy, scalability and ease of use. Minimal transaction fees will allow for more affordable trading between public and private token pairs, including the conversion of ERC-20 tokens to their 1:1 backed public or private equivalents on Sienna Network.

If transacting with secret token equivalents or native SNIP-20 tokens (SIENNA, secretETH, secretSCRT) then Sienna Swap will always execute the trades with full privacy, preventing front-running and maintaining user anonymity.

Unlike traditional centralized exchanges with order books which have to match and delay trades, Sienna Swap's Automated Market Maker (AMM) functions entirely on smart contracts, making it truly trustless, decentralized and censorship resistant.

Sienna Swap's AMM is implemented via a dual liquidity pool that is provided by the users of Sienna and the ecosystem itself. The dual liquidity pool allows functions via a dual deposit system, eliminating waiting times since the pool is always present and liquid. The efficiency of this system is in sharp contrast to order book exchanges in which users must wait for a matching bid in order to execute their trade.

Trades on Sienna Swap are executed via the liquidity pool reserved for relevant supported tokens. On launch, Sienna Swap will support a larger number of assets within its ecosystem than similar privacy AMMs.

## 5.2 Pair Liquidity

Sienna Swap utilizes a market maker algorithm to maintain its reserves in relative equilibrium. Reserves are pooled together through a network of liquidity providers who supply tokens for the trading pair in exchange for a proportional share of the transaction fee.

Mathematically, the core of any AMM resides within its algorithm or relative price curve. From this, the price of the tokens involved can be determined. Sienna Swap's AMM is based on the same mathematical principle.

The variables of an AMM are the reserve amount  $x_i$  of each token  $i$ .

The formula for a generalized constant product market maker allows for the fluctuation of price while preserving liquidity: .

$$\prod x_i = k \quad (1)$$

Where  $x_i$  relates to any token pair  $x_i$  &  $x_j$  and  $k$  is a constant. This means that the product of each token's reserve amount remains constant. Substituting  $x_i$  &  $x_j$  for  $A$  and  $B$ , (1) becomes

$$AB = k \quad (2)$$

The price is represented by  $-dA/dB = A/B$  which denotes the change of reserves on both sides such that if either of the tokens' liquidity drops (i.e. token reserves running out from their respective pools), the respective token's price moves to infinity. Thus satisfying the liquidity problem even in extreme scenarios.

Equation 2 is only satisfied when the product of each token's reserve amount remains constant. Therefore in order to satisfy the need for a constant product, when a liquidity provider increases liquidity for one of the tokens, they must do the same for the other token at an equal amount.

However in order to overcome this limitation and provide greater flexibility to liquidity providers, a Balancer style AMM needs to be implemented. With this specific AMM, the price curve is a particular N-dimensional surface:

$$\prod x_i^{w_i} = k \quad (3)$$

where  $w_i$  is the normalized weight of  $x_i$ . When a liquidity provider adds to the token pool, the smaller the weight  $w_i$ , of the relative pool distribution ratio, the fewer tokens will need to be added. For example, the pool can be specified to have a 20/80 split which refers to the normalized weights of the two tokens being 20% and 80% respectively.

Sienna Swap's constant product market maker algorithm is taken a step further through a model which takes impermanent loss into consideration. Impermanent loss occurs when a liquidity provider needs to add tokens to both sides of the equation. Balancer AMM does allow a liquidity provider to add tokens to a single side but that only occurs through the buying of other tokens in the pool while simultaneously rebalancing the pool through an arbitrated effort. A balanced AMM is only but a band-aid solution to impermanent loss. In order to implement a solution for this, Sienna Swap's AMM uses an external price oracle, which then governs the AMM price curve. The price curve for a pool of a pair of tokens that comprise of a base and quote token is as follows:

$$P_{margin} = iR \quad (4)$$

The price curve consist of two parts:

$$R = 1 - k + (B/B_0)^2 k \text{ when } B < B_0$$

$$1 / (1 - k + (Q/Q_0)^2 k) \text{ when } Q < Q_0$$

where

$B_0$  = aggregate number of base tokens deposited

$Q_0$  = aggregate number of quote tokens deposited

$B$  = number of base tokens in pool

$Q$  = number of quote tokens in pool

$i$  = market price provided by an oracle

$k$  = parameter in the range (0, 1)

Since this AMM isolates the price curve of each token, liquidity providers are able to deposit a certain token on either side without having to worry about impermanent loss.

## 5.3 Liquidity Pools

Liquidity providers can withdraw their liquidity from the pools they have deposited to. Tokens are then withdrawn at the current exchange rate, not at the rate of their initial deposit. The consequence of this is that value can be lost due to market fluctuations, arbitrage and impermanent loss. Sienna aims to introduce features that will mitigate impermanent loss.

## 5.4 Fees

When conducting a token swap, the user pays 0.3% to facilitate the transaction. From this, liquidity providers are allocated 0.28% for commissions, paid proportionally to their overall share of the liquidity pool.

The remaining 0.02% of the total 0.3% trading fee is automatically sent to a multisig wallet, which every quarter buys SIENNA at market price and then sends the SIENNA to another multisig contract which has a lock for 10 years, thus reducing the circulating supply without burning tokens. Governance will decide 10 years from now what those tokens should be utilized for.

Sienna Network does not at launch take any commission on trades conducted on the platform.



This currently only functions for pairs where one of the tokens is SIENNA. In a future version it will be default for all pairs. Support for all non-SIENNA pairs will follow shortly.

## 6.1 Sienna Lend (later)

Sienna Lend is a private and decentralized lending platform, facilitating lending and borrowing services between both public and private cryptocurrencies. Sienna Lend is also highly efficient, providing near instant transactions at a fraction of the cost of Ethereum.

Sienna Lend enables anyone to privately deposit crypto assets and to start earning interest, or to borrow cryptocurrencies by providing collateral. Most importantly, and in contrast to other platforms where the ledger is exposed to the public, Sienna Lend users never have to worry about third parties snooping in on their positions, their earnings, or on any of their other financial activities.

When borrowing the interest rate on Sienna Lend is either variable or fixed. The variable interest rate is adjusted by calculating supply and demand for the given asset. Adjustments to the interest rate, types of assets listed, collateralization rates and other factors will be decided upon by the Sienna Network community.

## 6.2 Fiat On-ramping

Sienna will make it easy for institutional players to enter the Sienna Network DeFi with fiat onramps, thus bringing much greater liquidity to the ecosystem.

## 6.3 Under-collateralized Loans

Sienna Network is built on the Secret Network, empowering the DeFi sector with fully private smart contracts. This means that Sienna can verify and utilize sensitive data, and feed it into smart contracts, while at the same time ensuring that the data remains encrypted and protected.

Sienna Network is therefore able to verify private data from the world of traditional finance without ever compromising the identity of the holder of that data. In this way Sienna can support under-collateralized loans by utilizing real world credit scores to determine the loan collateralization ratio. The user's credit score will be verified on the blockchain and assigned to the user's decentralized identity, which then can be used to obtain a more favorable collateralization ratio. The Sienna community will be able to decide the parameters for the collateralization ratio based on credit score parameters, previous history and behavior on the platform.

## 6.4 Tokenized Assets

Users will be able to provide crypto assets as collateral in order to borrow assets, including stablecoins, cryptocurrencies, and tokenized assets such as real estate, stocks, gold, NFTs and more, thereby widening the liquidity spectrum.

## 6.5 Suppliers

Users supply an asset to its respective liquidity pool, from which they'll receive representation tokens, siTokens, in return. The siTokens are proportional to the amount of the user's contribution to the respective liquidity pool and for interest earned over time by supplying liquidity. The siTokens accrue interest over time and can be converted back into their respective underlying asset.

By supplying liquidity users will also be rewarded with Sienna's native token as part of the incentivisation program.

## 6.6 Borrowers

Users can borrow crypto assets on Sienna Lend by supplying crypto assets as collateral in return for a selected asset. Users which participate by utilising services available on the Sienna Network will receive rewards of the native token SIENNA.

## 6.7 Interest Rates

Interest rates on Sienna Lend are based on a utilization ratio, where  $U$  = utilization,  $a$  = supply & demand.

$$U_c = \text{Borrows}_a / (\text{Cash}_a + \text{Borrows}_a)$$

The borrowing interest rate of the market  $a$  can be computed as followed:

$$\text{Borrowing Interest rate}_a = \text{Base rate} + U_a * \text{Reserve rate}_a$$

The supply interest rate for the market is obtained through the borrowing interest rate, reserve factor, and total amount of borrowers, or total the spread  $S$  in each respective market.

$$\text{Supply Interest rate}_a = \text{Borrowing Interest rate}_a * U_a * (1-S)_a$$

Sienna token holders have the power to decide the interest rate model.

## 7.1 The Sienna Token

### 7.2 Token Overview

The native digital cryptographically-secured utility token of the Sienna Network (**SIENNA**) is a transferable representation of attributed functions specified in the protocol/code of the Sienna Network, and which is designed to be used solely as an interoperable utility token on the network.

SIENNA is a utility token which enjoys a dual function in the ecosystem, acting as the governance token and the incentivization mechanism to encourage positive behaviour from users, so they are each incentivised to contribute to and maintain the Sienna Network ecosystem. SIENNA is an integral and indispensable part of the Sienna Network, because without SIENNA, there would be no incentive for users to expend resources to participate in activities or provide services for the benefit of the entire ecosystem on the Sienna Network. Given that additional SIENNA will be awarded to a user based only on its actual usage, activity and contribution on the Sienna Network, users of the Sienna Network and/or holders of SIENNA which did not actively participate will not receive any SIENNA incentives.

SIENNA does not in any way represent any shareholding, participation, right, title, or interest in the Company, the Distributor, their respective affiliates, or any other company, enterprise or undertaking, nor will SIENNA entitle token holders to any promise of fees, dividends, revenue, profits or investment returns, and are not intended to constitute securities in Singapore or any relevant jurisdiction. SIENNA may only be utilised on the Sienna Network, and ownership of SIENNA carries no rights, express or implied, other than the right to use SIENNA as a means to enable usage of and interaction within the Sienna Network.

SIENNA can be earned by users who contribute to the Sienna Network, in particular utilizing Sienna Lend and providing liquidity. Holders of SIENNA are entitled to vote on proposals which determine the future direction for the protocol.

**Symbol:** SIENNA

**Decimals:** 18

**Contract Address:** TBA

**Type:** SNIP-20

**Network:** Secret Network

**Total Supply:**

10 million

**Circulating Supply:**

350,000 SIENNA at launch.

Distributed to:

300,000 SIENNA tokens locked for liquidity on our AMM once it launches.

200,000 tokens are allocated for the public sale on DAO Maker and Polkastarter, of which 25% will be unlocked at TGE (Token Generation Event).

## 7.3 Use Cases

### 7.3.1 Governance

In order to promote decentralised community governance for the network, SIENNA would allow holders to propose and vote on governance proposals to determine future features and/or parameters (such as interest rates, ratios, new rules, collateral limits etc) of the Sienna Network, Sienna Swap or Sienna Lend, with voting weight calculated in proportion to the tokens staked. Users owning 1% of the total token supply are able to create proposals that anyone can vote on if they own at least one SIENNA. For the avoidance of doubt, the right to vote is restricted solely to voting on features of the Sienna Network; the right to vote does not entitle SIENNA holders to vote on the operation and management of the Company, its affiliates, or their assets or the disposition of such assets to token holders, and does not constitute any equity interest in any of these entities. The arrangement is not intended to be any form of joint venture or partnership.

Additionally, all token holders with more than 1% (100,000) of SIENNA tokens can submit a proposal to the network. Once a proposal is submitted voting will be public within seven days from the submission of the proposal.

### 7.3.2 Protocol Incentivisation

Over 36% of the governance token's total supply has been allocated to reward mechanisms via various interconnected incentivisation programs across the entire network.

The Sienna Network itself is simply a blockchain protocol which, by design, does not own or run any computing/storage servers, so third-party nodes are required for processing transactions and maintaining the blockchain. Providers of these services / resources (nodes) would require payment for the consumption of these resources (i.e. "mining" on the Sienna Network) to maintain network integrity, and SIENNA will be distributed to pay these providers.

Similarly, in order for the Sienna Network to function properly, users would need to be incentivised to play the role of liquidity providers and stake their digital assets into the market making pools. As compensation for opportunity costs, these liquidity providers which help to provide the core functionality of swaps on the Sienna Network by staking or including assets to liquidity pools in exchange for liquidity provider tokens would be rewarded with SIENNA tokens (i.e. "liquidity mining" on the Sienna Network).

There will be various incentive programs for distribution of SIENNA tokens introduced over time to encourage positive or beneficial behaviour within the ecosystem, and in each case the reward will be distributed according to each user's relative contribution after various adjustment and correction parameters.

Sienna Network will gradually mint the SIENNA token for protocol usage, ensuring there is a proper and fair decentralized distribution of the token. This will help to create an optimal environment for true decentralized democracy and influence over the Sienna Network.

### 7.3.3 Cross-chain settlement

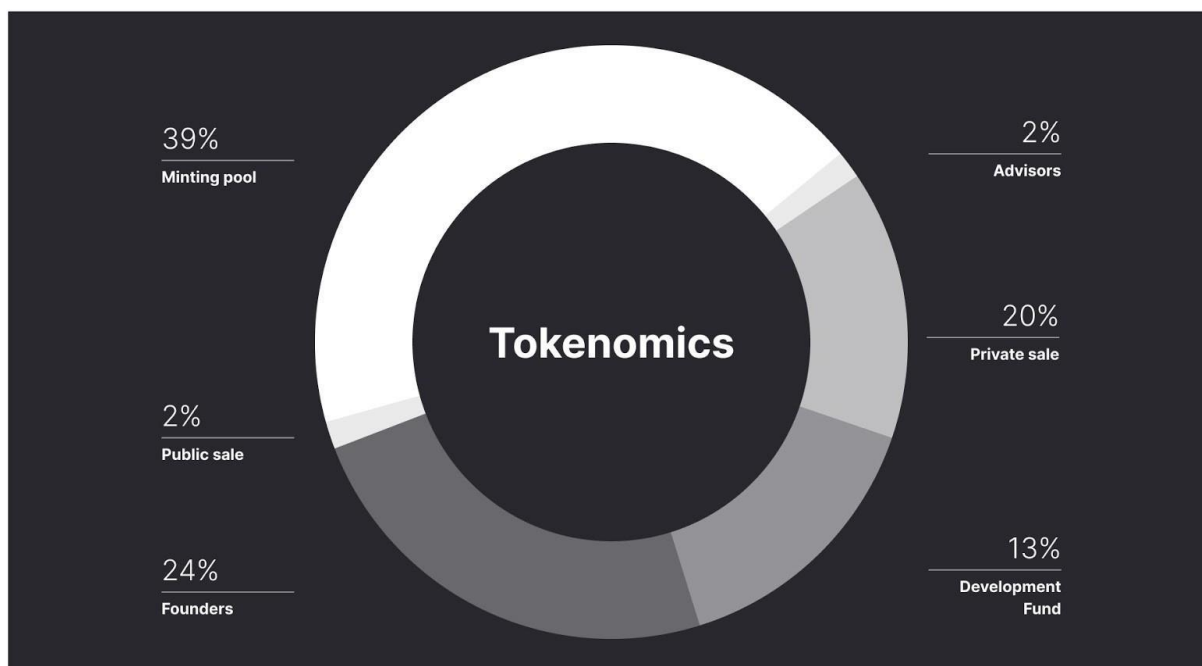
SIENNA will be used for cross chain settlements across other blockchains such as Ethereum, Cosmos, Polkadot, and Binance Smart Chain, thereby permitting a broader spectrum of shared liquidity.

## 7.4 Token Launch and Allocation

The SIENNA governance token will be launched via an initial dex offering (IDO) on Polkastarter and DAO Maker platform with liquidity added to Uniswap thereafter.

In total, 10M SIENNA will ever be minted with 350,000 tokens locked for liquidity on day one. The total number of tokens to be released for sale during the IDO event will be 400,000 at Polkastarter and 800,000 at DAO Maker, with each token on sale at \$6.

SIENNA will thereafter follow a gradual emission strategy with the bulk of the tokens allocated to the minting pool. The full breakdown of token allocation is as follows:



### 39% Minting Pool

The largest block of SIENNA tokens is earmarked to the minting pool. 2,500 SIENNA will mint per 24 hours.

The initial pairs subject to 2.000 SIENNA rewards in total are:

SIENNA / sSCRT



SIENNA / sETH

SIENNA /

sUSDT sWBTC /

sETH

The remaining 500 newly minted SIENNA will be allocated to a Sienna Network-controlled wallet and the proceeds will be used for competition incentives, community assistance grants and similar purposes.

#### **24% Founders**

Vesting: Locked for 6 months, then released daily over 20 months.

#### **20% Private sale**

Vesting: Locked for 3 months, then released daily over 16 months.

#### **2% Public Sale**

200,000 tokens are allocated for the public sales on DAO Maker & Polkastarter.

#### **13% Development fund**

Vesting: Locked for 12 months, then released daily over 24 months.

#### **2% Advisors**

Vesting: Locked for 6 months, then released daily over 16 months.

In particular, it is highlighted that SIENNA: (a) does not have any tangible or physical manifestation, and does not have any intrinsic value (nor does any person make any representation or give any commitment as to its value); (b) is non-refundable and cannot be exchanged for cash (or its equivalent value in any other digital asset) or any payment obligation by the Company, the Distributor or any of their respective affiliates; (c) does not represent or confer on the token holder any right of any form with respect to the Company, the Distributor (or any of their respective affiliates), or its revenues or assets, including without limitation any right to receive future dividends, revenue, shares, ownership right or stake, share or security, any voting, distribution, redemption,

liquidation, proprietary (including all forms of intellectual property or licence rights), right to receive accounts, financial statements or other financial data, the right to requisition or participate in shareholder meetings, the right to nominate a director, or other financial or legal rights or equivalent rights, or intellectual property rights or any other form of participation in or relating to the Sienna Network, the Company, the Distributor and/or their service providers; (d) is not intended to represent any rights under a contract for differences or under any other contract the purpose or pretended purpose of which is to secure a profit or avoid a loss; (e) is not intended to be a representation of money (including electronic money), security, commodity, bond, debt instrument, unit in a collective investment scheme or any other kind of financial instrument or investment; (f) is not a loan to the Company, the Distributor or any of their respective affiliates, is not intended to represent a debt owed by the Company, the Distributor or any of their respective affiliates, and there is no expectation of profit; and (g) does not provide the token holder with any ownership or other interest in the Company, the Distributor or any of their respective affiliates.

Notwithstanding the SIENNA distribution, users have no economic or legal right over or beneficial interest in the assets of the Company, the Distributor, or any of their affiliates after the token distribution.

To the extent a secondary market or exchange for trading SIENNA does develop, it would be run and operated wholly independently of the Company, the Distributor, the distribution of SIENNA and the Sienna Network. Neither the Company nor the Distributor will create such secondary markets nor will either entity act as an exchange for SIENNA.

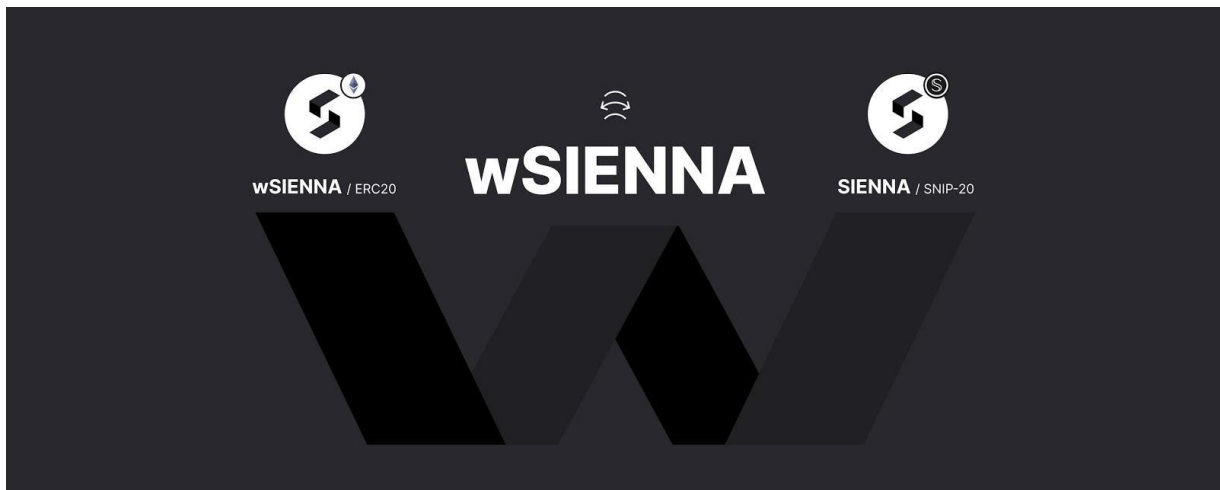
## 7.5 wSIENNA

wSIENNA (wrapped SIENNA) is an ERC-20 version of the native SIENNA token. When Sienna is live, it will be listed on a decentralized exchange and will be compatible with Secret Networks' Ethereum bridge.

The total and circulating supply will always be the same regardless of how many wSIENNA or SIENNA are traded. If, for example 100,000 wSIENNA are circulating, then 100,000 SIENNA are already locked; hence, it is a zero sum balance.

Locking SIENNA on the bridge mints wSIENNA. When a user wants their SIENNA back all they need to do is to send it to the bridge, which then burns the wSIENNA and releases SIENNA from its smart contract.

It is important that users remember that while SIENNA is a privacy token, wSIENNA is not. Furthermore, to vote at the Sienna Network protocol, users must swap their wSIENNA into SIENNA.



## 8.0 Compliance

As crypto regulation develops, various organisations are developing standards to support regulatory obligations that authorities and industry organisations are installing.

Sienna Network's contributors have a thorough understanding and experience working with regulatory frameworks and are taking necessary steps to ensure compliance with regulations which apply. Networks and Systems that cannot work within and comply with regulatory compliance are ultimately doomed to fail and will never achieve mainstream adoption.

To assist organisations using Sienna to comply with their obligations, and to enable products that are compatible with regulatory regimes, Sienna Network incorporates the following concepts:

- Sender and receiver information are encrypted and sent as part of a transaction.
- The encryption supports user issuing of viewing keys thus allowing relevant parties with these keys to view transaction information details.
- The Decentralized ID concept ensures that real world IDs can be used as part of the sender and receiver information.
- Decentralized, self-sovereign, IDs can be sourced from organisations that are developing in line with the sector, and satisfying the quality requirements that would be expected to fulfill the legal purpose.

The base framework for these concepts is embedded in Secret Network protocols, preserving privacy to protect users, and incorporating 'privacy by design' as called for under data protection legislation.

## 9.0 Roadmap

Sienna Network roadmap is prioritized to accelerate adoption via access to assets on other chains, by removal of barriers for entry into DeFi, and with not-yet-seen in DeFi product innovation such as over- and under-collateralized lending.

We know that DeFi will soon require functionalities that allow regulated institutions, including custodial crypto custodians and exchanges, to interact, and we will be at the forefront of answering their needs. Identity and KYT thus are key priorities.

Adding tokenized assets to Sienna Network is also a roadmap priority.

With the speed of change in the crypto environment, we may change this roadmap, but we will only do this if better options are available that support our core values.

### **2021**

#### Q2

- TGE and launch of Sienna Network
- Polkadot Bridge Support
- Binance Smart Chain bridge support
- Fiat gateway for incoming funds from retail users

#### Q3

- Lending
- Decentralized Identities
- Pools utilizing decentralised identities, allowing Know Your Transaction (KYT) for transaction analysis

#### Q4

- Tokenized Assets - initial support
- A secret

## 10.0 Closing Statement

Decentralized finance brings a great many benefits to its users, allowing transactions to occur without the need for intermediaries and without third party interference. There are, however, some lingering issues which the sector must now address. Chief among these is the transparency and immutable qualities of Blockchain which have created a DeFi sector with a severe deficit of privacy. At the same time, current protocols are prohibitively expensive to use.

**Until now, users have therefore had to choose between the personal financial freedom of decentralized finance, or the personal financial privacy of centralized finance. Never were both achievable at the same time - Sienna Network solves for this core problem.**

Sienna Network is a course correction for the industry, delivering all of the many benefits within the space, while at the same time protecting users from the unwanted prying of third parties. Sienna Network's users can freely interact with powerful DeFi products in peace of mind, enjoying the same levels of privacy, or even greater, as in centralized finance,

In the simplest terms possible, Sienna Network is the best of both worlds.

Sienna Network will spur the sector on to new frontiers, providing trading, borrowing and lending tools that are wholly private. These protocols will be used in combination, and interacting with, self sovereign identities, which will allow users to leverage their personal data without ever compromising their security.

These factors place Sienna Network at the vanguard of privacy-first decentralized finance. Now is the time to unlock the full potential of DeFi.

## 11.0 Glossary of Terms

### **DeFi**

An abbreviation for decentralized finance, a term which refers to financial and banking services which operate through the application of blockchain technology without the requirement of centralized authorities or intermediaries.

### **Sienna Network**

A privacy-preserving DeFi platform with robust financial tools built on the Secret Network blockchain.

### **Sienna (SIENNA)**

A governance token which serves Sienna Network and confers voting rights and privileges to token holders.

### **Secret Network**

Secret Network is the first blockchain with privacy-preserving smart contracts. Applications built on Secret Network such as Sienna Network utilize encrypted data without exposing it to anyone - even the nodes in the network.

### **Cosmos**

A network of independent blockchains which can easily communicate with each other through the Cosmos Hub.

### **Sovereign zone**

An independent blockchain within the Cosmos network. This includes the Secret Network and by extension, Sienna Network.

### **Tendermint**

The technology on which Cosmos, and by extension, Sienna Network is built.

### **IBC**

Inter-blockchain communication.

## 12.1 Risk

Sienna Network platform does not differ from others. A number of significant areas of risk exist with new technology platforms, and in the worst case, the surfacing of these risks can result in the loss of assets entrusted to the platform or other users.

These include, but are not limited to:

### 12.2 Smart contract exploits

Programming or logic errors in smart contracts can render them vulnerable to attack vectors or even to failure. SiennaNetwork will submit all smart contracts to audit by Certik, a well known crypto auditing company. Their findings are then fed back to the developers. This work will be continued on an ongoing basis. Separately Sienna Network has introduced a bug bounty program designed to encourage our community to report issues they discover in a timely and responsible manner. Nevertheless, smart contract exploits represent an area of potential risk.

### 12.3 Manipulation of oracles

Oracles gather data from the external world and supply this information to smart contracts. If this information is incorrect, incomplete or manipulated, the smart contract may return unintended results. Oracles will be subject to the same audit and bug bounty program as smart contracts, but remain an area of potential risk.

### 12.4 Manipulation of Pricefeeds

Accurate and reliable price-feeds are essential for a well functioning decentralized exchange and automated market maker such as Sienna Swap. Whilst Sienna Networks build redundancy and security protocols into the core architecture, there is risk that an error in coding or logic could cause price-feeds to be used incorrectly, and there is a possibility that systematic attacks on multiple price sources could cause the pricing used by SiennaNetwork to differ from the correct pricing. Such an event could lead to losses, and unwanted arbitrage possibilities.



## 12.5 Hacks

In common with all other systems of this type, hacks and exploits may occur at any time and with unknown attack vectors. The consequences of these can be significant for both the individual user and SiennaNetwork. Users should be aware of this risk and ensure that their own operational security and resilience reflects their risk tolerance

## 12.6 Data loss

SiennaNetwork does not store Personally Identifiable Data. The nature of blockchains means that certain information about transactions and wallet identities is exposed in public. As explained below, SecretNetwork is designed in such a manner that all information is cryptographically secure. Nevertheless there is a chance that future breakthroughs in quantum computing, or exploits to the encryption algorithms could reveal information. The user of the network explicitly understands and accepts any consequences of such exposure. The use of the network is conditional of acceptance of this risk.

## 12.7 Audit

All significant smart contracts, oracles and bridges will be subjected to independent audits. Audit reports will initially be circulated within the teams responsible for the appropriate code or systems design. It is anticipated that reports will be made public in the fullness of time. The community will be encouraged to participate in audit work, and funds in the form of Sienna Governance Tokens will be made available for audit findings and audit work. Sienna Network is audited by [Certik](#).

## 12.8 Bug Bounty Program

Bounty hunters who discover bugs in any aspect of SiennaNetwork, Secret Network or interactions with other systems are encouraged to submit their findings to an independent bug evaluation and monitoring service on [bugs@sienna.network](mailto:bugs@sienna.network) These

will be reviewed in confidence, prioritized for fix and any emergency deployments begun. The service will determine bug rewards, paid in SIENNA tokens or Secret Tokens, and will also coordinate with the reporter any community recognition that is mutually decided. We believe that this is an important part of Sienna Network community, and will ensure that the scheme is promoted and is achieving the desired outcome.