

Laconic Whitepaper

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Abstract

Interoperability and composability are essential for growth in the blockchain space, including for decentralized applications (DApps), decentralized finance (DeFi), and the burgeoning sector of non-fungible tokens (NFTs). Decentralized Applications and developers have been unduly constrained by high costs, centralization, scalability, and verifiability of blockchain data.

To enable interoperability and expand utility, different blockchains need to be able to communicate with each other. The necessity for cross-chain communication has led to the proliferation of bridges, which require faster and more flexible access to *verifiable* blockchain data (proofs).

In the DeFi industry, DApps have had to pull large sets of data directly from the Ethereum blockchain in order to properly run operations and service users. This process has a number of limitations: canonical truth (i.e. the establishment of verified data) can take hours, and unnecessarily large data sets are continuously being processed. As a result, costs are incredibly high, and performance is relatively low.

Current data querying tools (e.g. The Graph, Infura, Alchemy, etc.) have strived to resolve these issues with their data caching services for Ethereum. However, these solutions have performance constraints and require unnecessary, in-depth domain expertise, resulting in wasted developer time and effort.

None of these data solutions have been able to provide cryptographic proofs.

For developers and users (e.g. traders), Laconic is the only solution that provides accurate, low-cost, multi-chain verifiable data, by leveraging cryptographic proofs and cutting edge data caching engineering. **Significantly, Laconic is the only blockchain data querying solution that provides cross-chain cryptographic proofs.**

Integrating state-of-the-art data-caching technology and robust systems infrastructure, Laconic is the first and only multi-chain verifiable data marketplace, providing DApp developers and users with unparalleled data access, verifiability, privacy, and control, at a lower cost.

Developed over four years by renowned Ethereum architects and core Cosmos SDK contributors, Laconic encompasses Laconic Stack (LS), a standalone technology platform, and Laconic Network (LN), an ecosystem providing low-cost, decentralized, and disintermediated horizontal scaling solutions that seamlessly connect decentralized applications (DApps) and bridges needing blockchain data with service providers via a state-channel-based payment infrastructure.

For DApp developers, Laconic is the only solution that offers the following benefits:

1. Broad cross-chain compatibility
2. Composability and broader use cases
3. Supports hash-linked data structures including blockchain
4. Only solution that generates cryptographic proofs
5. Faster setup and automation--from months to seconds
6. Lower cost--hundreds to thousands of times less cost than market

For users, Laconic enables greater data access, verifiability, privacy, and control, empowering them to verify the accuracy of data themselves, by creating their own in-browser local cache, without a need for a data availability layer. Users also experience a higher quality of service and better uptime with Laconic.

Laconic Stack provides the next evolution of essential, verifiable caching services for Ethereum blockchain data. Only the required data is transmitted, resulting in the highest efficiency. Laconic Stack makes it easy for DApp developers to include complex views of Ethereum data into their DApps, including the current and speculative views of contract state on a per-slot basis, delivering the data with both optimal performance and verifiability.

For the burgeoning non-fungible token (NFT) space, Laconic Stack also provides an elegant solution. NFTs are garnering more usage than ever, including cross-chain interactions and NFT metadata. Laconic can natively store and make

cross-chain data and detailed provenance available. In addition to any cross-chain history or metadata associated with an NFT, Laconic Stack allows all of this data to be proven to end-users quickly and succinctly, simplifying deployments.

Whether developers choose to only use Laconic Stack or participate in Laconic Network, both their DApps and end-users will experience improved speeds, new capabilities, and augmented privacy. Laconic makes data access, verifiability, privacy, and control significantly faster, easier, and lowers cost for DApp developers and users, enabling blockchain to achieve greater consumer scale and decentralization in this next phase of growth.

Table of Contents

1. Laconic Stack	5
1.1 What problems does Laconic solve, and for whom does it solve them?	7
1.1.1 Solutions for DApp developers	7
1.1.2 Solutions for DApp infrastructure operators	8
1.1.3 Solutions for DApp users	9
1.2 Laconic services	10
1.2.1 Core	11
1.2.2 Laconic SDK	12
2. Laconic Network	12
2.1 What is Laconic Network?	12
2.2 Who are the network participants?	13
2.2.1 members	13
2.2.1.1 Members as Validators	14
2.2.2 DApp Developers, Service Providers, and Users	15
2.3 How is the Network initialized?	15
2.3.1 Network Genesis	17
2.3.2 Incentivized Testnets	17
2.3.3 Optimistic Rollup (ORU) Bridge	18
2.4 Why auction Member Shares?	19
2.4.1 Auction structure	20
2.4.2 Auction pricing and market sentiment (fairness)	21
2.4.3 Sellers' Rewards	23
2.4.4 Exiting the membership	23
3. Laconic Network Token (LNT)	23
3.1 How will the token be distributed?	23
3.1.1 Validator membership	24
3.1.2 Liquidity Mining	25
3.1.3 Community Grants	25
3.2 Governance	26
4. Summary	26

1. Laconic Stack

Laconic Stack is a set of technologies and services that converts blockchain data into InterPlanetary Linked Data (IPLD) blocks¹. These essential, verifiable technologies significantly simplify DApp development and make distributed ledgers accessible to a wider audience of developers by serving as a layer of abstraction between application logic and blockchain-based datastores.

It is highly inefficient for DApps to read data directly from the blockchain, and most do not need to. The vast majority of DApps only require a small subset of data from the blockchain in order to function properly.

In addition to the new functionality provided by blockchains, DApps need to leverage other features found in distributed systems. Laconic Stack provides all of the following features, making it easy for DApps to obtain and utilize the data they need.

- **SQL semantics:** A set of rules that determine a syntax-driven translation of a Structured Query Language (SQL) query to a formal model.
- **Snapshots:** A recording of the state of a blockchain on a particular block height.
- **Replication:** A method for organizing data storage whereby each data element is stored in several copies hosted on different servers.
- **Nearline storage:** Storage that is not immediately available, but can be made online quickly without human intervention.
- **Content-addressing:** Identifying content by what's in it rather than by its location.
- **Large-data blob storage:** Unstructured data that is grouped into “containers” and tied to user accounts.

¹ The InterPlanetary Linked Data or IPLD is the data model of the content-addressable web. It provides standards and formats to build Merkle-DAG data-structures, like those that represent a filesystem. IPLD allows us to treat all hash-linked data structures as subsets of a unified information space, unifying all data models that link data via hashes as instances of IPLD. This means that data can be linked and referenced from totally different data structures in a global namespace. This is a very useful feature that is used extensively in Filecoin.

Laconic Stack automates and simplifies the difficult task of accessing the Ethereum state. As Ethereum clients are singularly focused on supporting consensus, they do not expose their data in a way that is convenient for the caching services required between Ethereum clients and end-users' web browsers.

On Ethereum, chain reorganizations remain possible even after hundreds of blocks are finalized, potentially delaying canonical truth for hours. By storing data from multiple clients in a single, shared database, Laconic Stack makes it easier for developers to generate an accurate, global view of Ethereum's current state, beyond what a single client observes.

By aggregating data from multiple nodes, Laconic Stack can predict chain reorganizations before they happen, determining the canonical state of a contract much faster than existing tools, enabling developers to generate more comprehensive speculative views of the Ethereum state.

Laconic Stack also provides both pending transaction pool (txpool) data and gossiped zero confirmation blocks; the Stack allows the developer to access contract slots directly through an integrated set of tools. In addition to supporting the standard JSON-RPC and GraphQL endpoints found in Ethereum clients, Laconic Stack supports standard SQL database queries of verifiable Eth state, as well as IPFS-based content ID (CID) queries, which help with local caching and data deduplication, allowing developers to access Ethereum data in ways that were previously impossible with Ethereum clients or other caching services.

The full stack of software that makes up Laconic Stack is explained in 1.2.

1.1 What problems does Laconic solve, and for whom does it solve them?

1.1.1 Solutions for DApp developers

Laconic Stack benefits DApp developers by allowing them to quickly transform data from a smart contract into an easily displayable format, like an SQL query. Laconic Stack allows DApp developers to make smart contract data more accessible to their end-users while also preserving those users' privacy.

Developers can leverage the Laconic SDK to develop **Watchers**, which are custom caches of IPLD blocks. *By providing proofs with our IPLD versions of Ethereum data, a DApp can be fully verifiable with hundreds of megabytes instead of the tens of terabytes an archive node requires, dramatically increasing speed and efficiency, and lowering costs.*

Watchers are run by DApp developers to fetch, cache, and query their DApp's data, and coordinate with Laconic Network to scale fetching queries and share verified cached results. Watchers make verifiable copies of Ethereum data more available to DApp end users by connecting to ipld-eth-servers, each other, and browsers via GraphQL over HTTPS, WebSockets, or WebRTC.

Watchers can be developed either for private use or published to the Laconic Network, where the Watcher is instantiated to a network of service providers who can serve the data provided by the Watcher.

In the best cases, where smart contract source code is available, Laconic can take a developer's Solidity or Vyper source code and automatically generate a basic Watcher directly from the smart contract. With this approach, the deployment of Watchers is integrated with the deployment of smart contracts, simplifying the complicated process of operating a DApp.

If the source code is not available, developers can use tools like the IPLD (<https://ipld.io/docs/>) Block Explorer to interactively explore the Ethereum state using GraphQL, simplifying the Watcher development experience.

One of the most salient features of Laconic Watchers is that they are composable. This means that a developer can reference data previously derived from the Ethereum blockchain by means of another Watcher, within their Watcher. If a contract contains a delegate call, the Watcher associated with that delegate call's contract can be automatically leveraged by the Watcher. For more details on Laconic's Watchers, see section 1.2.2.

Laconic can send exactly the data that is requested, for simplicity, optimization, and manageability. Additionally, a user privacy mode can be enabled to mask individual user queries. If a user, for instance a trader on a decentralized exchange (DEX), prefers privacy and wants to obscure their exact data request:

1. They can be sent additional data, making it impossible for a third party to trace which data was specifically requested.
2. All data is transmitted via secure peer-to-peer (P2P) websocket (or WebRTC) connections.
3. Where there are enough nodes to provide the requested data, a user may choose to spread that request across multiple providers, further securing their privacy.

1.1.2 Solutions for DApp infrastructure operators

Laconic Stack offers significant benefits for DApp infrastructure operators as well. The first major benefit is that the entire Stack is completely open source and loosely coupled, enabling operators to change the software as needed. For example, Laconic Stack supports multiple Ethereum nodes and databases, and Watchers can be written in several languages. This optionality makes it easy to integrate Laconic Stack with existing infrastructures.

The entire system is containerized, making it easier for developers and operators to get started quickly.

Laconic Stack also reduces operating costs. The Stack supports multiple Ethereum nodes of different types (Go-Ethereum, OpenEthereum, etc.) and has a new node type that stores messages from the devp2p network (<https://github.com/ethereum/devp2p#the-mission>), without needing to maintain a local database, dramatically lowering costs. By converting Ethereum data into IPLD blocks, browsers and other consumers of Ethereum data can access data more efficiently, using a libp2p network (<https://docs.libp2p.io/introduction/what-is-libp2p/>) instead of a devp2p network. As the ecosystem is moving to libp2p for ETH2, support for libp2p will be important.

Another key benefit of the system's flexibility is that we can rely on distributed database scaling techniques to scale Ethereum data. We work closely with the Ethereum Foundation to maintain our forks of Go-Ethereum, staying in sync with important changes, and merging these changes with mainline Go-Ethereum. Our use of traditional relational databases to index and store Ethereum data makes it easier for operators to rely on existing database tools to increase performance and scalability. By using LS, operators will not need to maintain custom forks, and they will have easy access to previously cost-prohibitive horizontal scaling.

Laconic Stack derives new data sets from the Ethereum blockchain in a provable way. By converting Ethereum data into IPLD blocks in a non-destructive way, the Stack preserves the provability of any data served through the system, including data that is not derived from blockchain data.

Laconic Stack seamlessly integrates with IPFS, and can pin any IPFS content, making it ideal for storing or displaying the full history of an NFT. For such a use case, Laconic Stack allows any cross-chain history or metadata associated with an NFT to be efficiently proven, thus simplifying deployments.

1.1.3 Solutions for DApp users

Laconic Stack offers DApp users:

- Access to improved performance
- More manageable and smaller datasets

- Free redundancy
- Privacy preservation

All these features contribute to lowering the costs of operating DApps, and operators extend these savings to their users.

1.2 Laconic services

Laconic Ltd. is stewarding three initiatives which work together to provide significant benefits to the existing blockchain community:

1. Laconic Stack, a set of services which convert Ethereum data into IPLD blocks.
2. Laconic SDK, which makes it easy for developers to write front ends and other services which consume IPLD-based data structures and proofs.
3. Laconic Network, a multi-sided marketplace that allows DApp developers and service providers to transact in a more cost-effective way and then pass those cost savings on to end-users, providing a sustainable and decentralized operating model for DApp developers.

The major services are described in more detail below. The supplementary services will be described in an additional document.

1.2.1 Core

The Laconic Core includes laconic-geth, PostgreSQL, and ipld-eth-server. The purpose of the Core is to take data from the Ethereum devp2p network and make it available as IPLD blocks. It does this using three services: Laconic-geth, PostgreSQL, and ipld-eth-server. Laconic-geth is a fork of Go-Ethereum which processes statediff objects and either relays the state objects to RPC subscribers or writes them directly to PostgreSQL as IPLD blocks.

The IPLD blocks are stored and indexed in PostgreSQL, dramatically improving the performance of queries. This cache of IPLD blocks is leveraged by ipld-eth-server to

expose enhanced versions of the standard geth JSON-RPC endpoints which are then queried by Watchers as needed to populate their local caches.

1.2.2 Laconic SDK

Laconic SDK allows developers to populate custom caches of IPLD blocks, called Watchers. As stated above, Watchers make verifiable copies of Ethereum data more available to Dapp end users by connecting to ipld-eth-servers, each other, and browsers via GraphQL over HTTPS, WebSockets, or WebRTC.

Watchers are written in TypeScript, and then compiled to WASM (<https://webassembly.org/>). By providing proofs with our IPLD versions of Ethereum data, a DApp can be fully verifiable with hundreds of megabytes instead of the tens of terabytes an archive node requires, dramatically increasing speed and efficiency, and lowering costs.

In order for Laconic SDK to provide all its features to Watcher developers, services additional to the core are required. All services in LS provide GraphQL endpoints, which serve IPLD blocks and proofs.

2. Laconic Network

2.1 What is Laconic Network?

Laconic Network (LN) is an ecosystem of validators, service providers, and DApp operators providing low-cost, decentralized, and disintermediated horizontal scaling solutions for projects leveraging the Laconic Stack and/or Laconic SDK.

Laconic Network Token (LNT) serves multiple functions in the Network design, most saliently by securing incentive alignment across network stakeholders. A utility token, LNT also allows for seamless payments across services, regardless of blockchain or application.

Since LN's principal purpose is to make blockchain data more accessible by simplifying and securing how it's purchased, it's best to think of LN as an overlay or child network to

a collection of existing layer 1 (L1) and layer 2 (L2) networks. It may also be helpful to think of LN more simply as an L2 that helps make Ethereum and other blockchain data more available to end-users.

Other decentralized solutions suffer from poorly integrated stacks, which provide little to no increased value to DApp developers. **Because Laconic Network is founded by infrastructure operators from both the DApp operator and Proof-of-Stake (PoS) validator communities, the legal and economic structures are designed specifically to engage these communities and match service providers with DApps in need.**

Overall, Laconic Network aims to maintain decentralization while preserving the independence of its members and service providers, and ensuring minimal interference from governance. The network also aims to maintain an open, interoperable system that provides the highest quality services at the lowest costs for all parties.

Finally, Laconic Network is wholly dedicated to independent verifiability, which has so far been insufficiently accessible in the blockchain space.

2.2 Who are the network participants?

2.2.1 Members

Laconic Network is operated by Laconic, LLC. The governance of this privately held company occurs solely on Laconic Network. The global members of this LLC are also the Validators of Laconic Network.

All Validators and service providers, whether they are members or not, are responsible for complying with the laws and regulations of their own local jurisdictions, in addition to any agreements formed within the Network or protocols prescribed in the Network bylaws. members, in their capacities as service providers, may need to provide Terms of Service agreements to end-users; *the membership itself will have no legal obligation to token-holders or end-users consuming services on the Network.*

In the current DeFi ecosystem, it can be difficult for infrastructure operators to stay within the community's ideals; centralized services often have good intentions, but risk

becoming single points of failure. Decentralized solutions, on the other hand, may have technical design flaws, which can make it prohibitively expensive for capable service providers to participate.

Decentralization theater frustrates the already difficult task of providing quality services based on Ethereum data. Laconic Network's legal structure and mechanism design equally support DApp developers, infrastructure operators, end-users, and investors.

2.2.1.1 Members as Validators

Laconic members are the only possible **Validators** of the Laconic Network. Validators serve several key functions on the Network.

When Validators produce blocks, they do so in their capacity as members. The services provided by Validators are as follows:

1. Member Share Auctions
2. State injection into Laconic Network from other blockchains
3. Cross-chain Asset Management via an Optimistic Rollup (ORU)
Bridge between Ethereum and Laconic Network
4. Payment channels
5. Data Pinning
6. Watcher Registration
7. Watcher Discovery
8. Service Provider Registration
9. Service Provider Reputation (fraud proofs)

Validators provide Ethereum state data to service providers and can also serve in the role of service providers, running Watchers as well.

2.2.2 DApp Developers, Service Providers, and Users

DApp developers use Laconic Network for a variety of development purposes. A key role of DApp developers on the Network is that of **Watcher Publisher**. As detailed in 1.1.1, a DApp developer may choose to develop a Watcher for private use, or they may wish to publish their Watcher to the registry.

There are two possible cases for Watcher publication; in the first case, a DApp developer has written a smart contract and wishes to allow others access to their cache for a fee. The developer will use the contract's source code to develop a Watcher, which will then be published to the **Watcher Registry**, a collection of smart contracts which facilitate the registration and discovery of Watchers. In the second case, a DApp developer will want to develop a Watcher that monitors a popular smart contract, and may or may not have access to that smart contract's source code. In either case, the DApp developer leverages Laconic SDK to develop the Watcher, and then publishes it to the registry.

Service Providers may or may not be validators. These are the parties who run Watchers and serve data to end users. For any given Watcher, Service Providers will form a Federated Cache. In the **Service Provider Marketplace**, Watcher Publishers will be matched with Service Providers, who will form the Federated Cache for that Watcher. When the Federated Cache for that Watcher serves the data to an end-user, the end-user pays a fee that covers the Federated Cache's fee (which is set in the Service Provider Marketplace between the Watcher Publisher and the Service Provider) as well as the Watcher Publisher's fee, to use their Watcher. The data is validated by the Federated Cache members.

This multi-sided marketplace between Validators, Watcher Publishers, Service Providers, and users generates revenue by serving data. Revenue is also generated from Watcher and Service Provider registration.

2.3 How is the Network initialized?

Laconic Network will be initialized by the seven Founding Members, and the additional Member Shares will be sold in perpetuity to qualified parties via auction. The membership is made up of two different types of members:

1. The seven **Founding Members**
2. Subsequently added members, or **Secondary Members**

The Founding Members take on an initial caretaker role by fairly distributing the

remaining member shares, with the goal of ensuring the future sustainability of the Network. The Founding Members are directing the development of the Laconic Network Software.

Laconic Network software will be released in four major phases:

1. Network Genesis - Deploy single Cosmos SDK node with the Watcher Registry
2. Launch incentivized testnet to identify qualified potential members
3. Deploy a trust minimized bridge system between Ethereum Mainnet and Laconic Network
4. Auction Member Shares to potential members identified in the incentivized testnet

The membership must assert that its network allows end-users to verify the data they receive; this is one of the primary reasons DApp developers will leverage Laconic Network for caching data. Therefore, members must meet certain financial and technical criteria in order to ensure that they will be able to fulfill their obligations, or be able to compensate users should they fail to perform the promised service. Becoming a Validator requires participating in the governance of a legal membership; therefore any entity wishing to become a validator will need to provide KYC information to the membership.

The following subsections describe in greater detail the sequence of events necessary to successfully launch the Network and fairly open it up to Secondary Members. The sequence is designed with the intention of creating a fair launch that both funds and develops a new Cosmos SDK chain.

Instead of selling tokens to passive investors via SAFT (Sale Agreement for Future Tokens), Laconic Network aims to find aligned stakeholders through a series of incentivized testnets and auctions.

2.3.1 Network Genesis

Laconic Network will run as a Cosmos SDK-based network, demonstrating the viability of the project. At this phase, the Watcher Registry will be initialized by the membership with the Watchers required to operate the Network at genesis.

Before mainnet launch:

- The Founding Members will, as the first seven Validators, be running the standalone Laconic Stack and serving data to users.
- They will also be preparing for mainnet launch by:
 - working with mainnet data
 - continuing to develop Laconic Network
 - implementing the Optimistic Rollup (ORU) Bridge, the Laconic Network Token (LNT) contract published on Ethereum, the Laconic Network Member Share contract, also deployed to Ethereum, and finally, the Balancer-like Liquidity Pool.
- In parallel, they will be running incentivized testnets to identify future potential members.

2.3.2 Incentivized Testnets

After the Watcher registry is initialized, the membership will run a series of incentivized testnets, similar to other Cosmos SDK-based incentivized testnets. This process identifies potential members who are technically qualified to operate a validator. Those wishing to be considered must:

1. Serve a minimum amount of data, with a low percentage of failures or disputes (e.g. become a service provider)
2. Demonstrate participation in consensus
3. Inject state from Ethereum into Laconic Network (e.g. not only run a Watcher, but run the full Laconic Stack)

The incentivized testnets will determine potential members by using an on-chain history of Validators correctly performing these three core functions of the Network. Potential

members receive a chance to participate in the auctions to become a Member and Validator of Laconic Network.

We expect that, given a maximum of 60 member shares up for auction, we will identify more than 120 potential members through the incentivized testnets. We assume that a cutoff of 300 potential members with sufficient assets will be more than enough to ensure that every auction will have enough participants for the first two years. If the Network has a shortage of potential members, they will be selected from the pool of verifiers based on criteria to be determined.

Since becoming a Validator requires participating in the governance of a legal membership, any entity wishing to participate in the incentivized testnets will need to provide KYC information to the membership. The testnets will also be used to determine the reference system configuration required for pricing services. The pricing for data and/or the variety of services provided by Validators will be approximated through a series of synthetic tests that simulate best, worst, and average case scenarios, using relevant hardware configurations, including processor, RAM, hard drives, and connectivity.

By determining the costs for that hardware and amortizing the number of transactions over the life of the hardware, we can approximate a single Validator's cost to return a given result. Pricing will be based upon cost; this will subsequently be used as the basis for two very important calculations within the system: total network capacity and fees.

2.3.3 Optimistic Rollup (ORU) Bridge

Contemporaneously with the incentivized testnets, the Founding Members will be preparing the Network for mainnet launch. The preparation will include the following steps:

1. Laconic Ltd. will be running Laconic Stack to serve users
2. The Founding Members prepare for Laconic mainnet launch
 - a. Deploy the Validator multisig
 - b. Deploy member shares ERC721 Contract
 - c. Deploy the LNT ERC20 Contract
 - d. Deploy the Liquidity Pool Contract

- i. Map pool assets to member shares
 - e. Deploy ORU-based bridge and connect it to Laconic Network Validators
- 3. The Founding Members run the Incentivized testnets

For the sake of brevity, these steps will be discussed in further detail in another document. Once the Bridge is live, a user will be able to, leveraging the Laconic Wallet, visit any site that serves Ethereum data and pay for that data via a payment channel opened on Laconic Network.

At this point, the Validators distribute the testnet rewards on Ethereum mainnet and the auctions for Secondary Member shares can begin.

2.4 Why auction Member Shares?

Since query volume correlates to market activity and not token prices, the revenue generated from responding to queries can be equated to the directionally neutral revenue of centralized exchanges. As interest in crypto assets increases, increased volume would mean more payments processed via Laconic Network. This will act favorably on market sentiment, increasing the value of LNT as well as the clearing prices of member shares.

The primary role of Validators on the Network is to facilitate the selling of data to end-users. As query demand grows, so will demand for member shares. Because we expect the demand for member shares to be extremely high and sustained, it makes sense to distribute them to qualified potential members via auction.

The membership will assert that potential members are financially able to participate by requiring that a bidder's vault of LNT and another Approved Asset exist on Ethereum. The bidder's vault must contain assets at least equal in value to the reserve price established at the time of auction. Third-parties will be able to delegate funds to potential members in order to help them meet these funding requirements. Since fees are priced in USD, the reserve price is set in USD.

2.4.1 Auction structure

The initial Founding Members may have paid different cash prices for their validator seats, because of the various technical or non-monetary assets they brought to the nascent Network. Therefore, the first auction starting price will match the highest seat price paid, multiplied by the Reserve Price Factor. At Network instantiation, there are seven Founding Members, and the Network will gain a given amount of total dollars, where dollars represent a unit of money.

The first testnet will run as a standalone Cosmos SDK-based network with a minimum testnet pool size, for a sufficient proving period. This is to ensure there are enough interested, qualified, potential members to participate in the first auction.

Member Shares are sold via Bipartite Dutch Clearing-price Auction. The first half of the bipartite auction is a Dutch auction, which sets the starting price for a clearing-price auction. The second half of the Auction is a clearing price auction.

When a Bipartite Auction is initiated, first the Bipartite Auction is announced on the L2 chain. The extant shareholders determine auction parameters. These parameters comprise a:

Starting Price

Reserve Price (RP)

Reserve Price Increment (RPI)

Minimum escrow requirement (MER) equal to the Reserve Price multiplied by the Reserve Price Factor (RPF).

For the first round of bids, potential members gather value in their vaults in LNT or another approved asset. During the testnet phase, a potential member will only have earned money through fees on Laconic Network. This means that initial participants will, in some cases, require outside capital to meet escrow requirements. Once the interested participants have had time to secure their funds, they can send their bids as single, encrypted messages to the initial validators, or seven Founding members.

Their bids must meet or exceed the tentative reserve price; subsequent bids must increase according to the increment (RPI). Each sealed bid contains a reference to the

bidder's vault, and what fraction of the vault is being bid. Enough bids, at least double the number of seats being auctioned, meeting at least the Reserve Price, must be submitted for the auction to progress to the Clearing Price Auction part.

If there are not sufficient bids, the Starting Price will be lowered incrementally, and subsequent Dutch rounds will be launched until enough bids are gathered. If we do not gather a sufficient number of bids above the Reserve Price, the auction ends with no seats being awarded. The Directors may by Resolution choose to disband the Network or reset the Reserve Price. However, once enough qualifying bids are received, the auction proceeds to the Clearing Price component.

All bids from the Dutch Auction are treated as initial bids in the Clearing Price part, and are made public. All testnet users are eligible to bid, and have a predetermined time in which to submit bids. At the end of that time, the six highest bidders will be awarded their seats, clearing at the sixth-highest bid price. This amount is cleared from the winners' vaults and turned into stake, transitioning those nodes from verification to validation.

The results are published on Ethereum Mainnet, and the six winners become Members. Subsequent auctions will use the Clearing Price from this Auction as their Reserve Price. This ensures that a prospective Secondary Member will never pay less for their Share than an existing Member.

Auctions are triggered whenever the Network is at more than 50% load capacity for more than four hours.

At the end of the first two years after mainnet launch, there may be odd-lot auctions of fewer than six Member Shares. Odd-lot auctions will adhere to the same criteria as six-lot auctions.

More details:

https://github.com/vulcanize/laconic-auction-modeling/blob/main/docs/laconic_network_workbook.ipynb

2.4.2 Auction pricing and market sentiment (fairness)

Each part of the auction serves a distinct purpose: the first part ensures that potential members cannot game Network utilization, attempting to force the existing members into a “down round.” The second part ensures that bidders competitively express their true valuations of the member shares.

This system presupposes that sealed bids, concealed but associated with the vaults they reference, will reveal information in a manner that will encourage competitive bidding. Outside viewers of the bids will have limited insight into their amounts. For example, if a bidder has bid four times, it is clear that the initial bid met at least the reserve price (RP) for the auction, and the subsequent three bids must have increased by at least one increment each. Therefore their minimum possible bid (*MPB*) in this example is:

$$MPB = RP_n + 3 \cdot RPI$$

Where n represents the auction number. As mentioned, the reserve price and increments are set in USD.

Since the first auction of six seats is opened at the price paid by the first seven Founding Members, multiplied by the Reserve Price Factor (*RPF*), any initial bids that exceed the Reserve Price indicate a belief in the future value of the Network, or Market Sentiment.

Each subsequent auction Reserve Price (RP_n) is calculated based on the previous auction's clearing price (CP_{n-1}) multiplied by the *RPF*, which decreases at the end of each auction at a rate of .05 per auction, and more aggressively during the Dutch part of the auction, if the reserve is not met by the first day, as previously discussed in 2.4.1, so that:

$$RP_n = RPF \cdot CP_{n-1}$$

As stated, the *RPF* will begin at 1.5 and decrease at the end of the second phase of each auction where Member Shares are sold. In auctions where the RP is not met during the first phase, the *RPF* will decrease more aggressively. By the tenth auction, the *RPF* should be one. It cannot go lower than one.

2.4.3 Sellers' Rewards

At the end of each auction, LNT Sellers' Rewards are distributed to the cohort of members that existed when the auction started. A Seller's Rewards Factor will be programmed into the auction. This Sellers' Reward incentivizes potential members that believe in the value of Laconic Network to join at the earliest auctions, as those that do will end up with a larger allocation of LNT, and also incentivizes current Members to encourage potential members to bid.

2.4.4 Exiting the membership

As detailed below, Secondary Members are subject to a one-year lockup period of their LNT, while they must successfully function as Validators. Should they fault during this time, their staked assets are forfeit, and their seat is sold in the next six-lot auction.

After the two year period, or after all seats have been sold, a Validator may fault or choose to leave the Network for any reason. In this case, their seat will be sold in an odd-lot auction. The assets that back their member share are returned to them at the end of that odd-lot auction.

3. Laconic Network Token (LNT)

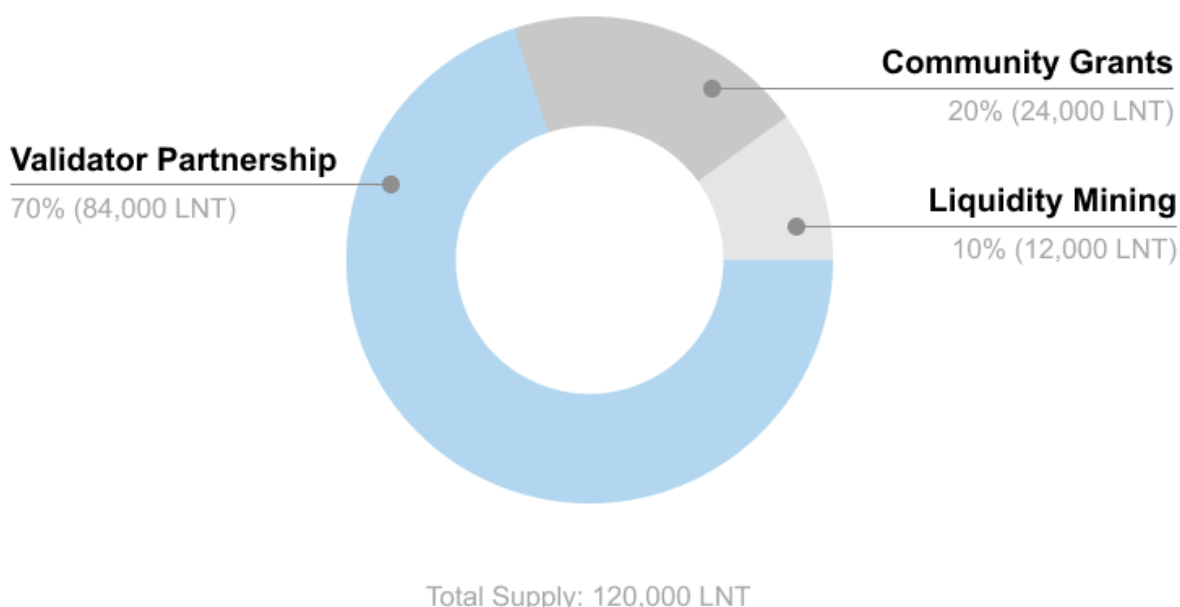
3.1 How will the token be distributed?

All fees, from transactions and state channels, are pooled in a vault as LNT, even though the querier can pay in any Approved Asset, including ETH. After some fixed period of time, these fees are then redistributed to staked users of the system. A percentage is used to pay dividends to the Members, and another percentage is allocated to provide service discounts to LNT holders.

Another percentage is distributed into the Community Grants vault, for the legal, operational, and technical maintenance of the Network.

The total supply of LNT is fixed, and will be initially distributed based on the Articles of Association of Laconic, Ltd. What is presented below is a proposal for a possible token distribution. The official token distribution will be formalized after the seven Founding Members have been established.

Laconic Network Token Distribution



3.1.1 Validator Membership

70% of tokens will be allocated to the Validator Membership and are held in the Liquidity Pool. As Secondary Members are added via auctions, they are acquiring a portion of the LNT allocated to the Validator Membership. The Founding Members in the validator set will be fully vested and unlocked after two years. Secondary Members that are added via auction will be subject to a one-year lockup while they function as validators.

The Sellers' Reward will be distributed from this allocation, and will be fully vested and unlocked immediately. Should the membership decide to allocate an additional LNT reward for winners of the testnet competition, it will come out of this allotment.

3.1.2 Liquidity Mining

10% of the LNT supply is available for liquidity mining, to give network end-users a chance to become stakeholders of LN. During the early phase of the Network launch, end-users can become **ephemeral service providers** by bonding an Approved Asset to run a Watcher in their browser. These ephemeral service providers will be paid a liquidity mining reward in proportion to the relative fees they earn.

For example, the Badger DApp (<https://badger.com>) creates a Watcher to serve historic price data to its users via the Badger website. Badger then publishes it to the Watcher registry. Through their website, they allow users to bond an Approved Asset, then users must keep their browser open and on-line so that they can serve the Badger data to other users and earn rewards in LNT.

Eventually, the vault associated with this LNT will be drained, and bonded LNT will be required for Service Provider registration.

3.1.3 Community Grants

20% of the LNT supply is initially allocated for Community Grants, and is a reserve for software developers and operators who support the Network in an ongoing capacity, improving connectivity, expanding developer outreach, and addressing other issues related to growing and maintaining the Network. The Community Grants will be allocated to a special vault managed by the membership.

The seven Founding Members will have incurred product and community development costs before the launch of the Network, and compensation will be allocated from this vault based on the dollar spot price, with no interest.

As previously mentioned, this 20% is not the only LNT that will be allocated to Community Grants -- as the Network generates fees, a percentage will flow into the Community Grants vault, leaving a sustainable pathway for growth.

3.2 Governance

Because Laconic Network Service Providers operate across multiple legal jurisdictions

and are themselves often Decentralized Autonomous Organizations (DAOs), the company bylaws require that the majority of governance occur on-chain.

The Network has unique governance protocols that define network parameters and properties. These parameters include, but are not limited to: which tokens are approved to be collateralized, the minimum USD value of assets required to be staked, and the percentage of fees that will be allocated to different areas such as the Community Grants vault, dividends, etc..

Parts of the governance process will require the signaling and/or spending of tokens.

Formal governance specifications will be expanded upon at a future date, as the initial protocols will be defined by the Founding Members.

4. Summary

Laconic addresses a number of serious issues that have slowed the adoption of blockchain-based applications, including high costs, centralization, poor user experience, and difficulties associated with privacy preservation.

Additionally, the Ethereum Network is at the center of DeFi, yet current solutions for obtaining Ethereum data are incredibly inefficient, inflexible, high-cost, and lack verifiability (proofs).

Laconic solves these issues with a robust standalone Stack and Laconic Network, providing low-cost, high-speed, accurate, and private data request fulfillment for multiple chains, including Ethereum's current and speculative states.

Laconic Stack dramatically simplifies the process of scaling infrastructure, enabling the community to serve all its caching needs with only a few network members. Many projects and large consumers of Ethereum data will experience significant benefits from holding LNT without necessarily becoming full members, including, but not limited to: staking rewards, discounts on service, and governance rights.

These benefits extend to users who participate in the network. By simply staking LNT within their browser and remaining online, users can directly participate in the network and earn income.

Additional benefits are imparted to blockchain users who need more privacy and are willing to pay for it. Users of the contemporary internet are realizing that in many situations, the service providers they rely on, or the payment processors those providers use, are selling data to their detriment. The technical structure of Laconic Network makes it impossible in most cases for service providers to generate profiles of users' behavior. Laconic SDK provides strong defaults with regards to privacy, while also giving users the option to pay for exactly the amount of privacy they need.

This reduces storage requirements from terabytes to megabytes, reduces verification time from months to seconds, and preserves end-users' financial privacy.

As Watcher Publishers' caching requirements grow, they will aim to become network members in order to experience the horizontal scaling benefits Laconic Network provides. Large DApps will benefit from the economic diversification that comes with holding LNT. As on-chain query demand demonstrates an increasing need for validation, potential members will be enticed to aggressively participate in the network's member share auctions.

Laconic's cutting-edge infrastructure and network design deliver unique and unparalleled benefits to all participants in the DeFi landscape, including DApp operators, developers, and users. The end result is a superior and innovative method of blockchain data-caching that makes DApps more efficient and effective.