Cointelegraph Research

ECLIPSE

From Rollups to Runtime:

Evaluating Eclipse's SVM-Driven L2

Cointelegraph Research Report



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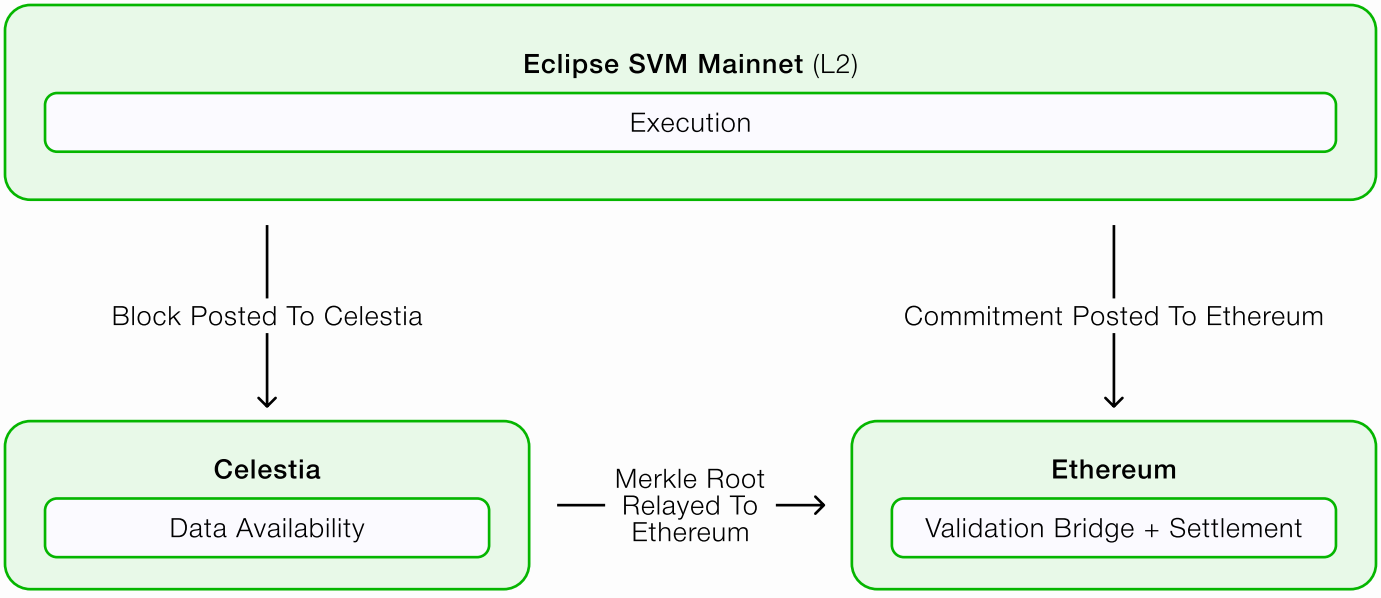
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Eclipse: Origins of the project

Eclipse is a modular Layer-2 blockchain designed to merge multiple specialized layers for execution, consensus and data availability. The network executes transactions with the Solana Virtual Machine (SVM), anchors settlement on Ethereum via a validating bridge, and outsources data availability to Celestia. This architecture positions Eclipse as an SVM-based Ethereum L2 rather than yet another EVM rollup.

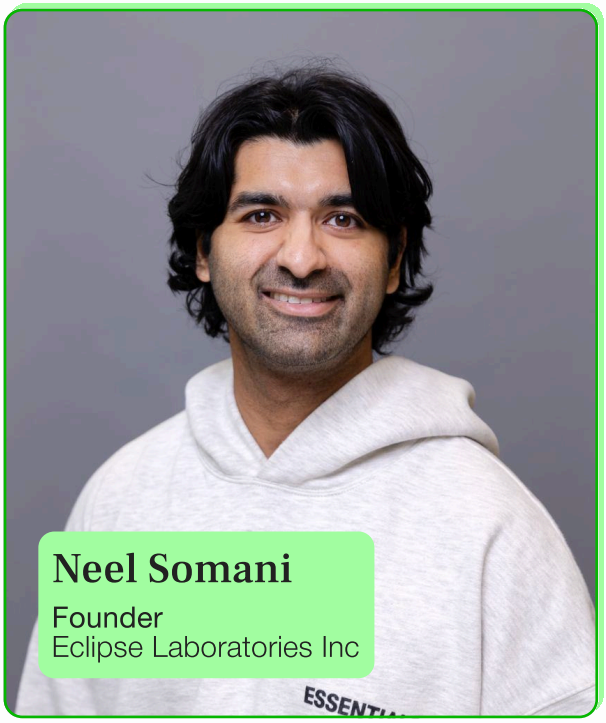
It is therefore anchored in Ethereum, the liquidity centre of the onchain economy, while leveraging the performance characteristics of parallelized execution. Unlike standard optimistic or ZK-rollups, Eclipse uses RISC Zero to implement zero-knowledge-based fault proofs *(Figure 1)*. This report will examine the project's origins, tech stack, token economics, ecosystem composition, and strategic roadmap in detail.

Figure 1: Eclipse Blockchain Architecture



Source: Eclipse

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Eclipse emerged in 2022 under the direction of Neel Somani, whose formative experience spanned quantitative research at Citadel and computer security research during his studies at the University of California, Berkeley. The project's genesis is closely intertwined with the aftermath of the Terra collapse in May 2022. Reporting at the time documented Somani's decision to leave traditional finance to build in the Terra ecosystem shortly before its implosion. He then pivoted to rollup infrastructure and cross-chain execution, a decision that ultimately culminated in Eclipse.

One early spur to his work was Fuel Network, a high-performance execution environment that deliberately departed from the EVM by introducing its own virtual machine and a different programming language. The FuelVM and the Rust-inspired Sway language are non-EVM and are intended to unlock parallel execution and other features that backward-compatible EVMs struggle to deliver. While this promises performance, it also creates switching costs for EVM-native developers.

Eclipse circumvents this issue by using the highly performant but also widely adopted Solana Virtual Machine. In fact, Eclipse's seed round announcement is the first ever use of the term "Solana Virtual Machine".

Neel Somani described his vision as follows:

> **Ethereum needs a single, scalable, composable layer-2 capable of handling 99% of all use cases. Other L2 ecosystems have only optimized for full EVM compatibility, which has resulted in a highly fragmented, slow and undifferentiated L2 landscape. Eclipse integrates the high-performance SVM with deep pools of liquidity on Ethereum, while maintaining the hard constraint of verifiability.**

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Project History

Eclipse's origins are best understood as a sequence of decisions in response to recent lessons in the rollup ecosystem. The team first explored the portability of the SVM across multiple networks, then codified a single, general-purpose architecture that married SVM execution to Ethereum settlement and Celestia DA.

Before it settled on its current design, Eclipse ran a series of tests to determine whether the SVM could function effectively as a rollup execution layer. In February 2023, Eclipse partnered with Polygon to release Polygon SVM, a Solana-compatible Layer-2 that enabled Solana programs to run within Polygon's ecosystem. This initiative demonstrated that the SVM could be instantiated as a modular rollup outside Solana's base chain. Weeks later, Eclipse collaborated with Injective to launch Cascade, an SVM rollup tailored to the Cosmos IBC ecosystem.

These experiments were conducted during a period of broad headwinds for the Solana ecosystem following the FTX collapse in late 2022, which materially depressed SOL's price and sentiment. Eclipse decided to adopt the strengths offered by parallel runtimes while anchoring settlement on ETH, where liquidity, developer tooling, and institutional assurances were deepest.

Eclipse's approach at first aimed to absorb the useful aspects of the Rollups-as-a-Service (RaaS) model, such as configurability and modular flexibility, while avoiding its pitfalls. In July 2023, Neel Somani (then CEO of Eclipse) presented a talk titled "Rollups-as-a-Service Are Going To Zero" at the Modular Summit, critiquing the economic sustainability of proliferating app-specific rollups.

His argument was that RaaS providers occupy a structurally weak position in the value chain. The core components of a rollup, namely execution, settlement, and data availability, are commoditized by shared infrastructure, leaving little room for durable value capture or differentiation. As a result, a model based on hosting thousands of isolated rollups with separate sequencers, bridges, and liquidity pools would inevitably lead to fragmented liquidity and unsustainable economics.

In response, Eclipse replaced its earlier plan for customizable modularity with a fixed architecture that integrates the SVM for execution, Ethereum for settlement, and Celestia for data availability. Rather than acting as a framework for deploying many rollups, Eclipse evolved into a shared, high-performance layer-2 that concentrates liquidity and security while retaining modularity at the architectural level.

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On Nov. 7, 2024, Eclipse launched its public mainnet, described as the first SVM-based L2 on Ethereum. The announcement marked the transition from previous cross-ecosystem experiments to a single, general-purpose L2.

Development Financing

Eclipse closed $15 million across pre-seed and seed rounds. Polychain led the pre-seed, and Tribe Capital led the seed. The financing was framed around the thesis of customizable rollups and early work toward an SVM-centric stack.

As the mainnet architecture solidified, Eclipse Labs announced a $50 million Series A on March 11. 2024, co-led by Placeholder and Hack VC. It brought the total capital raised to $65 million. Funds were used to accelerate mainnet adoption and ecosystem development.

Leadership at Eclipse Labs also evolved as the project moved from research to production.

In mid-May 2024, Somani appointed Vijay Chetty as CEO following Somani's departure. Later, in August 2025, Eclipse announced a wider restructuring, also naming Sydney Huang as CEO. This move is part of a shift toward building in-house applications on top of the L2.



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Eclipse's modular architecture

Eclipse's design embodies the principles of modular blockchain architecture in a concrete and standardized form. Instead of using interchangeable components, the system has three distinct functional layers, namely execution, settlement, and data availability.

The execution layer operates through the Solana Virtual Machine (SVM), which provides high throughput and parallel transaction processing. Ethereum functions as the settlement and security layer, anchoring finality. Celestia serves as the data-availability layer that offers scalable storage capacity verified through data-availability sampling.

This fixed configuration is the outcome of Eclipse's earlier experimentations with modular designs. Over time, the project transitioned from a configurable framework to a single, performance-optimized architecture that seeks to combine scalability with the security and liquidity of the Ethereum ecosystem.

Execution layer design choices

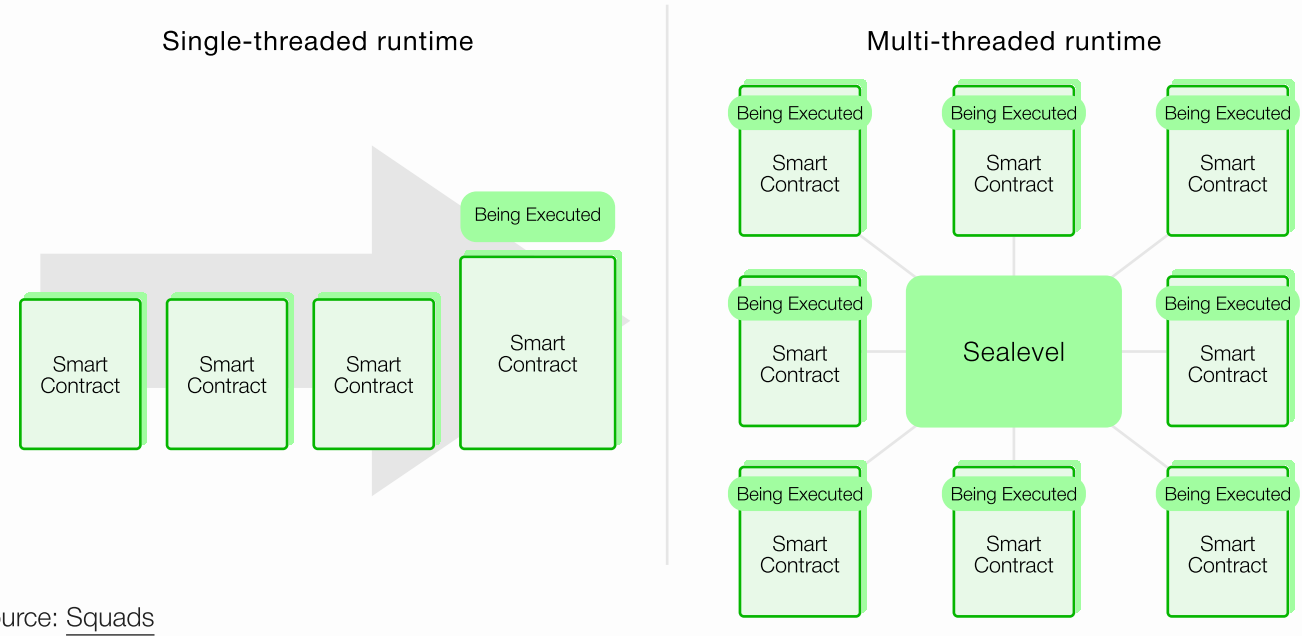
Parallelized execution has largely been absent from the Ethereum ecosystem but is standard on the latest generation of blockchains. Solana implements it through the Sealevel extension. It gives the SVM the ability to schedule and execute transactions concurrently so long as they do not access the same accounts. This allows blockchain throughput to scale with modern multi-core hardware *(Figure 2)*.

Parallelizations of the EVM do exist on certain layer-1 chains, such as Sei and Monad, which both introduce optimistic parallel execution engines beneath the standard EVM semantics. However, no layer-2 rollup has deployed or implemented a production-grade parallel EVM. The integration of the SVM makes Eclipse the first layer-2 that delivers parallel execution combined with Ethereum's settlement.

The SVM's account-access model requires that transactions declare all parts of the state they will read or write before execution. This design gives the runtime complete visibility into data dependencies and allows it to schedule non-conflicting transactions across different cores with provable safety.

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Figure 2: Sealevel Vs Single-Threaded EVM



Source: Squads

As a result, parallelism in the SVM is explicit and deterministic. Developers encode concurrency in their programs by ensuring that transactions touch disjoint accounts.

In contrast, EVM transactions can access the state dynamically. This forces parallel EVM implementations, such as Sei and Monad, to infer independence at runtime through speculative execution or formal methods. This runtime discovery introduces additional overhead and the risk of rollbacks. Eclipse's SVM-based execution, on the other hand, achieves parallelism by construction and scales predictably with multi-core hardware.

To leverage this parallelism as much as possible, Eclipse operates with a small sequencer set, namely Luganodes and the Foundation itself. A limited number of high-performance nodes are responsible for ordering and batching transactions before they are posted to Ethereum for settlement.

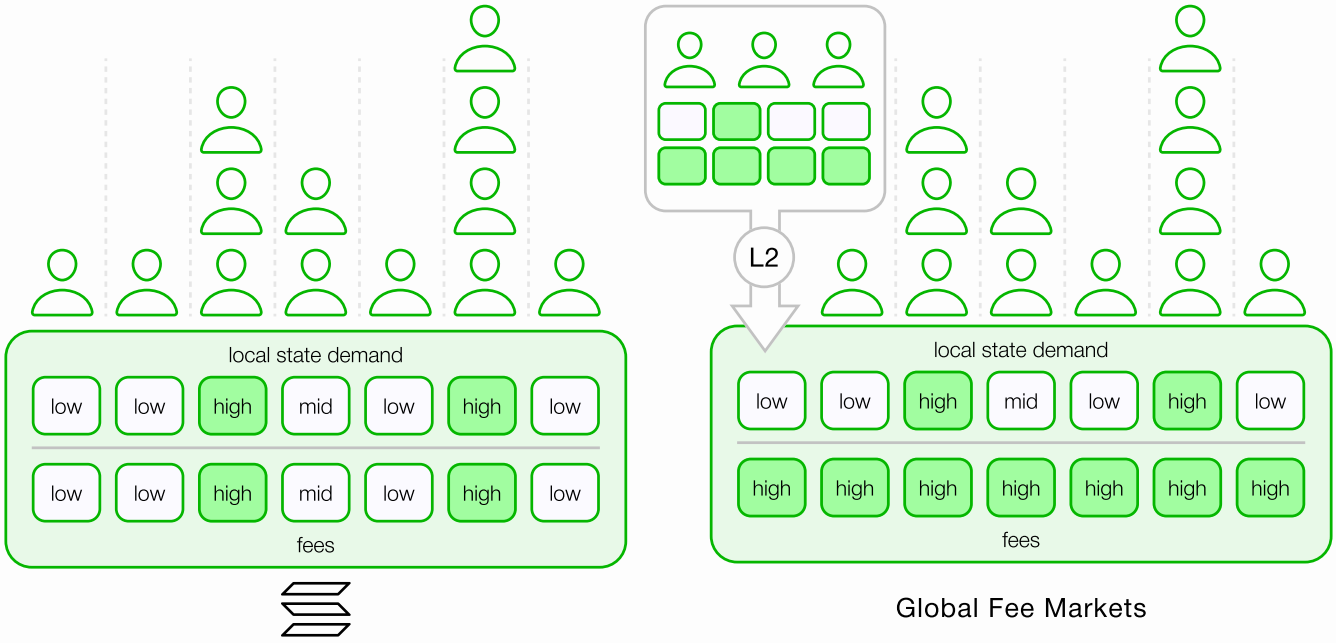
A compact sequencer configuration minimizes coordination latency and allows each node to exploit the full capacity of the underlying hardware. It also reflects a pragmatic trade-off: Eclipse prioritizes SVM throughput before expanding to a more decentralized sequencing model. Somani noted that Eclipse intends to operate the SVM at performance levels far beyond typical Solana validator configurations, achievable only because the network currently relies on a compact, high-performance sequencer set.

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Localized fee markets form an important part of Eclipse's execution model. Fees are not set globally but at the level of individual programs or state partitions. Each program effectively maintains its own queue of transactions. Hence, users who interact with unrelated accounts do not compete for the same block space. This design prevents congestion in one active application from raising fees across the entire network.

The network still operates under a shared capacity limit for block production and validator resources. This structure, combined with the SVM's parallel execution, can keep latency stable and fees predictable even when one application experiences heavy load *(Figure 3)*.

Figure 3: Localized Vs Global Fee Markets



Source: Helius

Settlement and DA

Settlement occurs on Ethereum, where a validating bridge contract anchors Eclipse's layer-2 state. This bridge records verified state roots and ensures that finality and dispute resolution inherit Ethereum's security guarantees.

In case the layer-2 sequencer becomes unresponsive or attempts to censor transactions, Eclipse's design includes force-inclusion mechanisms that allow users to submit transactions directly to Ethereum. This ensures that activity on the rollup cannot be permanently halted or censored by the sequencers. However, it does not yet provide an unilateral exit from the rollup onto the main chain.

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For data availability, Eclipse publishes to Celestia, a purpose-built DA network that uses data-availability sampling (DAS) to allow light clients to probabilistically verify that full block data has been published without downloading it in its entirety.

By decoupling DA from Ethereum's limited bandwidth, Eclipse targets higher aggregate throughput and lower per-transaction publication costs. The trade-off, a standard one for off-L1 DA, is that users must accept the DA layer's own cryptoeconomic security and liveness assumptions. DAS materially improves the trust profile by enabling the broad, independent verification of availability.

Fraud proofs

Eclipse's proving system uses RISC Zero to implement ZK-accelerated fraud proofs. This is a hybrid design that applies zero-knowledge technology to the optimistic rollup model. In this framework, transactions are assumed valid unless challenged, but disputes are resolved using succinct zero-knowledge proofs instead of classic state serialization. In regular optimistic rollups, disputes are resolved through an interactive verification game that bisects the execution trace over roughly log (n) rounds. Eclipse's approach avoids this process. Instead of revealing each intermediate state, the entire contested computation is encapsulated in a single zero-knowledge proof generated by RISC Zero. This eliminates the need for onchain state reconstruction, reduces latency, and lowers the cost of dispute resolution.

Also, unlike in a regular ZK-rollup, Eclipse does not generate proofs for every batch. Proof generation occurs only when a dispute arises. This selective approach preserves the economic efficiency of the optimistic model, since the computationally intensive zero-knowledge proving remains unnecessary under normal conditions where sequencers behave honestly. To discourage frivolous challenges and align incentives, any participant initiating a dispute must post a bond that is forfeited if the challenge fails. Successful challengers, by contrast, are rewarded from the sequencer's collateral.

Conceptually, this design keeps the optimistic rollup model of challenge and proves, where disputes are resolved through verifiable proofs rather than trusted intermediaries. The SVM's register-based architecture also makes proof generation more efficient, since every instruction operates on a well-defined set of registers rather than unbounded memory references.

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Tokenomics and Token Utility

Overview, allocations and lockups

The Eclipse protocol introduced its ES token as the network's native economic primitive in July 2025. The network still uses ETH as the default gas asset, which keeps it aligned with the broader Ethereum ecosystem. However, Eclipse also features a native paymaster mechanism that allows users to pay transaction fees in ES instead of ETH. In addition, it functions as a governance token, granting holders the ability to vote on MEV redistribution rates and protocol upgrades. Finally, ES is designed to become a bonding and staking asset for fraud-proof challenges once permissionless proving is implemented.

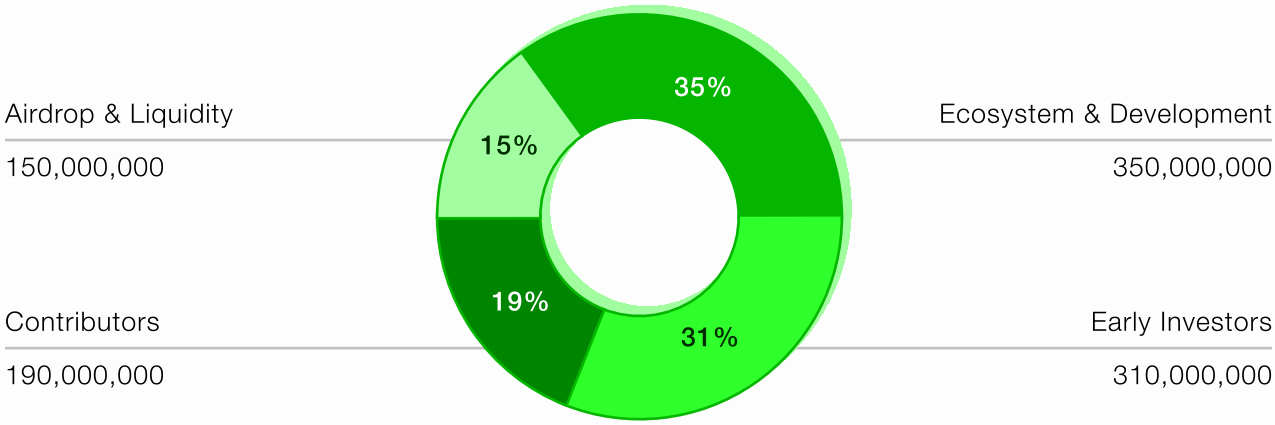
The paymaster mechanism is conceptually similar to Ethereum's account-abstraction paymasters, though implemented natively within the SVM rather than through ERC-4337 contracts. It enables token-denominated gas payments without altering base-layer consensus. In practice, the paymaster abstracts conversion and accounting and allows users to interact entirely in ES. The paymaster-based gas model depends on robust account-handling infrastructure and reliable oracle and accounting design to avoid denomination mismatches or implicit fee subsidies.

A fixed 1,000,000,000 ES were minted at genesis. The initial allocation is divided into four buckets: 15% for airdrops and liquidity, 35% for ecosystem and development, 19% for contributors, and 31% for early supporters and investors *(Figure 4)*.



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Figure 4: Eclipse Tokenomics

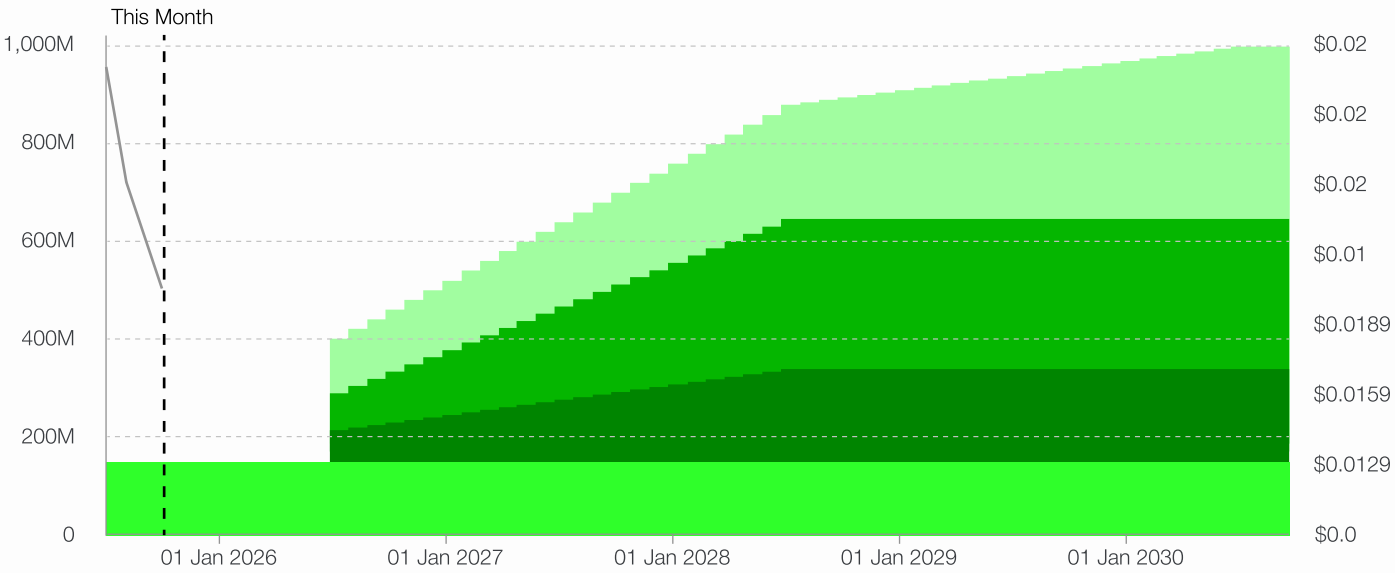


Source: Tokenomist

Within the 15% airdrop-and-liquidity bucket, the Foundation specified a 6% day-one airdrop and 4% reserved for a subsequent "season 2" airdrop. The remainder was earmarked for market-making, exchange listings, and liquidity incentives to bootstrap decentralized-finance activity and TVL.

Community-facing tranches are liquid from launch, while internal and investor holdings are subject to multi-year vesting and lockups, namely four years for contributors and three years for investors *(Figure 5)*. As of Sept. 18, 2025, third-party market data services show approximately 150 million ES in circulation (15% of max supply), consistent with the sizing of the airdrop-and-liquidity bucket after the initial distribution period.

Figure 5: Eclipse's Vesting Schedule



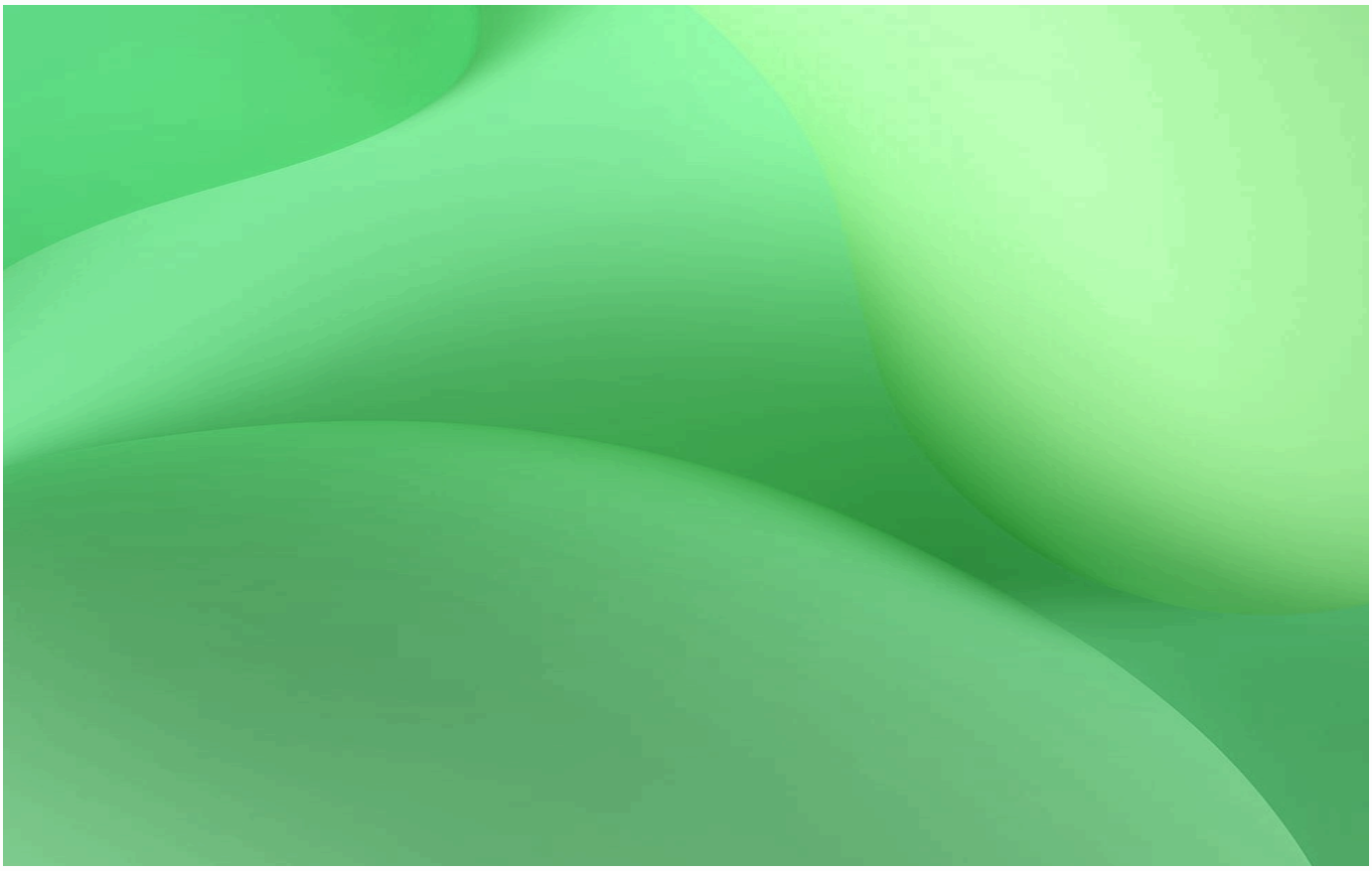
Source: Tokenomist

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Governance, staking to applications, and security bonds

ES is used as the protocol's governance token. The Foundation has reserved the right to adjust governance pathways in the future. Eclipse lists decisions that may be put to tokenholders in the future, including protocol upgrades, MEV redistribution fee take-rates, and sequencing policy for heavily staked applications. These heavily staked applications are high-throughput or systemically important DApps that lock large amounts of ES. In the future, they may receive limited autonomy through application-specific sequencing rules. These rules would let them influence how their own transactions are ordered.

Eclipse's governance model builds on research into Solana's Jito markets, where validator tip flows are used to align incentives between block producers and applications. By enabling tokenholders to adjust MEV redistribution parameters and staking rules, Eclipse seeks to connect application-level participation to network-level value creation. These mechanisms are policy instruments rather than guaranteed cash flows, but they show how governance and token ownership are intended to shape the economic behavior of the SVM runtime.



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Ecosystem and Use-Case Landscape

Eclipse's ecosystem demonstrates that high-performance SVM applications can operate within Ethereum's security and liquidity framework. It brings together a mix of decentralized finance protocols, NFT and consumer platforms, games, and core infrastructure providers. At the same time, the network supports cross-virtual-machine asset movement through integrations such as Hyperlane, which connect Eclipse to both Ethereum and Solana.

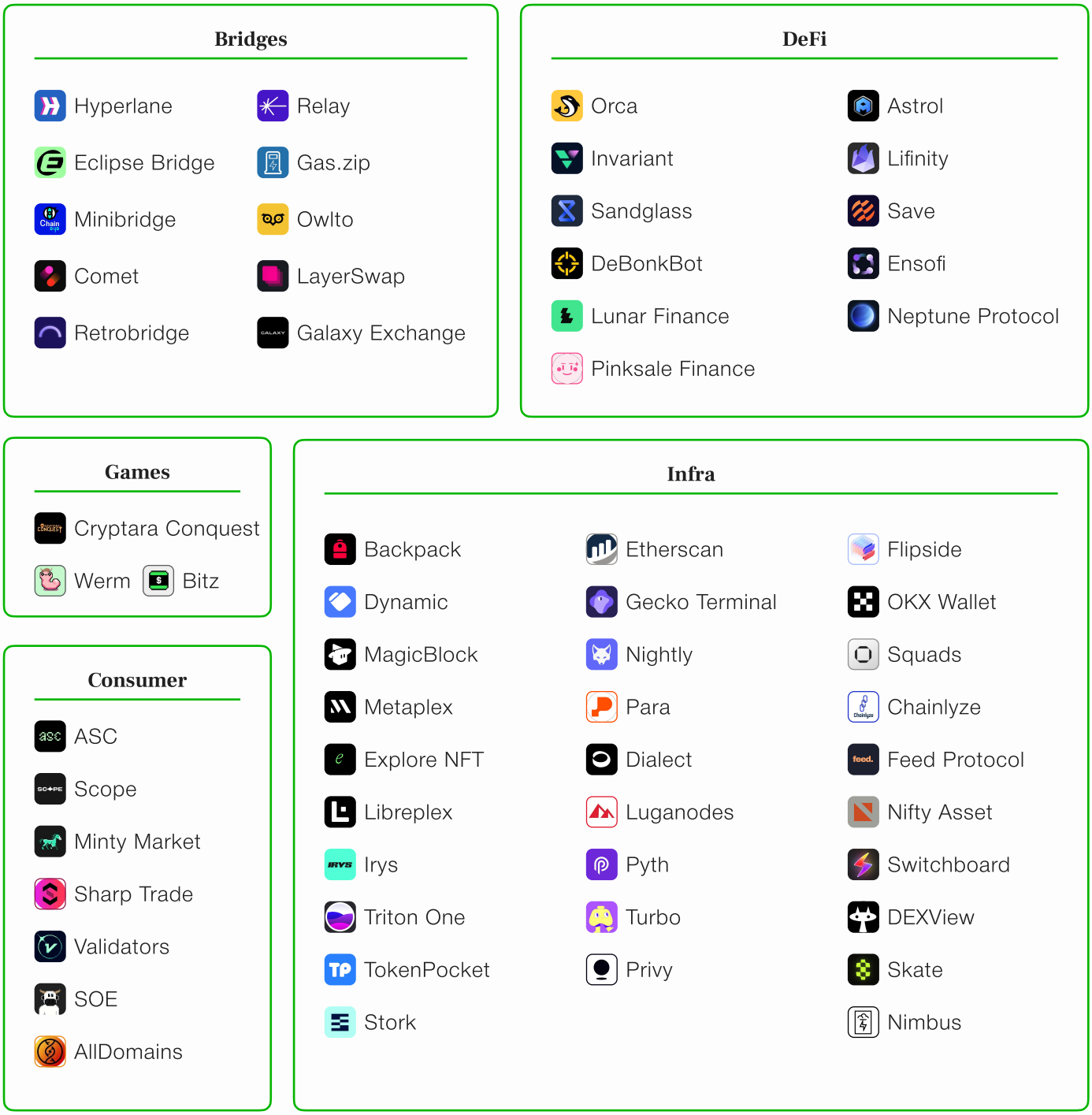
Tooling is as important as the number of applications. The ecosystem now includes explorers, analytics platforms, charting tools, and wallet integrations familiar from EVM environments. Both SVM-native and multichain service providers have added Eclipse support. Backpack and OKX Wallet list the network among their supported chains, and NuFi has announced experimental integration, its first for an SVM chain.

Eclipse reported 60+ DApps and service providers available at public mainnet launch on Nov. 7, 2024 *(Figure 6)*. As of mid-2025, chain-level telemetry aggregators show Eclipse accounted for $23M in bridged TVL/TVS, with a 24h DEX volume of USD $680k and bridge flows of USD $679k.



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Figure 6: Eclipse Ecosystem Map



Source: Gate.com

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Decentralized finance on Eclipse

According to data from DefiLlama and GeckoTerminal, current total DeFi value locked on Eclipse is about $4M, with an average daily decentralized-exchange volume of roughly $150-$250k. The Orca automated market maker, one of the first exchanges to go live on Eclipse, supports active trading in pairs such as ES/ETH and USDC/ES, with about $400k in liquidity.

Concentrated liquidity routing is offered through Invariant. Lending primitives complement exchange liquidity. The ecosystem features two money-market implementations, Save and Astrol, that mirror the borrowing and lending market on the EVM in Eclipse's SVM runtime. A native over-collateralized stablecoin design rounds out the early DeFi stack. Neptune Protocol, now operating under the Nova branding in some communications, builds USDN as a decentralized dollar on Eclipse.

Oracles and bridging complete this base layer. Pyth first announced price feeds for Eclipse developers on the testnet and later extended support to the mainnet. These feeds supply low-latency data that many SVM-based DeFi protocols rely on for trading and risk management. Hyperlane's routes connect Eclipse to Ethereum and Solana and let USDC, SOL, and WIF move between domains.

It uses a permissionless and non-custodial bridge design, where messages are verified by independent validators rather than a centralized custodian. This approach allows Eclipse to support DeFi activity between SOL and ETH without relying on proprietary bridge operators or trusted intermediaries.

Eclipse is also experimenting with restaking and yield markets. The tETH initiative introduced a unified restaking token that combines liquidity from major Ethereum liquid staking tokens such as stETH, rETH, and cbETH. The unified tETH asset allows holders of these tokens to participate in restaking opportunities and yield strategies on Eclipse without fragmenting liquidity across different wrappers. This model has already produced a market of liquid restaking instruments, including platforms such as Sandglass, which let users trade or reinvest staking rewards directly on Eclipse.

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NFTs, gaming and consumer apps

The Eclipse ecosystem features permissionless minting, marketplaces, and curated launchpads. Minty Market advertises itself as the first permissionless NFT marketplace on Eclipse. Its "ASC" Genesis collection and the Scope launchpad are native issuance platforms rather than mere bridges of assets minted elsewhere.

Guides from infrastructure providers show that basic creator tools are already available on Eclipse. For example, QuickNode offers a tutorial on minting NFTs with the Nifty Asset Standard. A native block explorer, Eclipsescan, and analytics from Flipside improve network visibility and help sustain user growth beyond initial NFT launches.

Eclipse's catalogue of games lists Cryptara Conquest, a dungeon shooter developed with a dedicated Eclipse chapter, along with smaller titles such as Werm and Bitz. These lighter games act as short-session examples that test the SVM's parallel execution under real load.

Social applications are still at an early stage, but several projects already link user interaction and attention markets. Dialect provides onchain messaging and notification tools used by many consumer apps, while Sharp Trade introduces prediction-market functions. The Validators NFT collection and the official ASC mint help form a sense of community and identity for early Eclipse participants.

Bridges, settlements, and the path to cross-VM liquidity

A core goal for Eclipse is to build connectivity across chains. Native Eclipse bridge channels provide users with an official route into the rollup, while partner bridges, such as Relay and Hyperlane, offer faster crosschain transfers. Together, these systems support Eclipse's two-sided liquidity strategy, which enables DeFi activity to flow between ETH and SOL without requiring that developers or users leave their existing asset bases.

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Roadmap and Strategic Vision

Consumer applications focus

Eclipse Labs has pivoted to building consumer-facing applications in-house while continuing to operate the chain. Over time, a successful consumer product could serve as an anchor that draws users, builds liquidity, and helps set UX standards for other developers to follow. How well Eclipse manages this balance will shape the openness and resilience of its ecosystem in the coming years.

This application-first strategy remains compatible with protocol development. This will include an expansion of the architecture with Ethereum-based data availability, a permissionless fraud-proof system, and clearer governance rules that include timelocks and a narrowly defined Security Council.

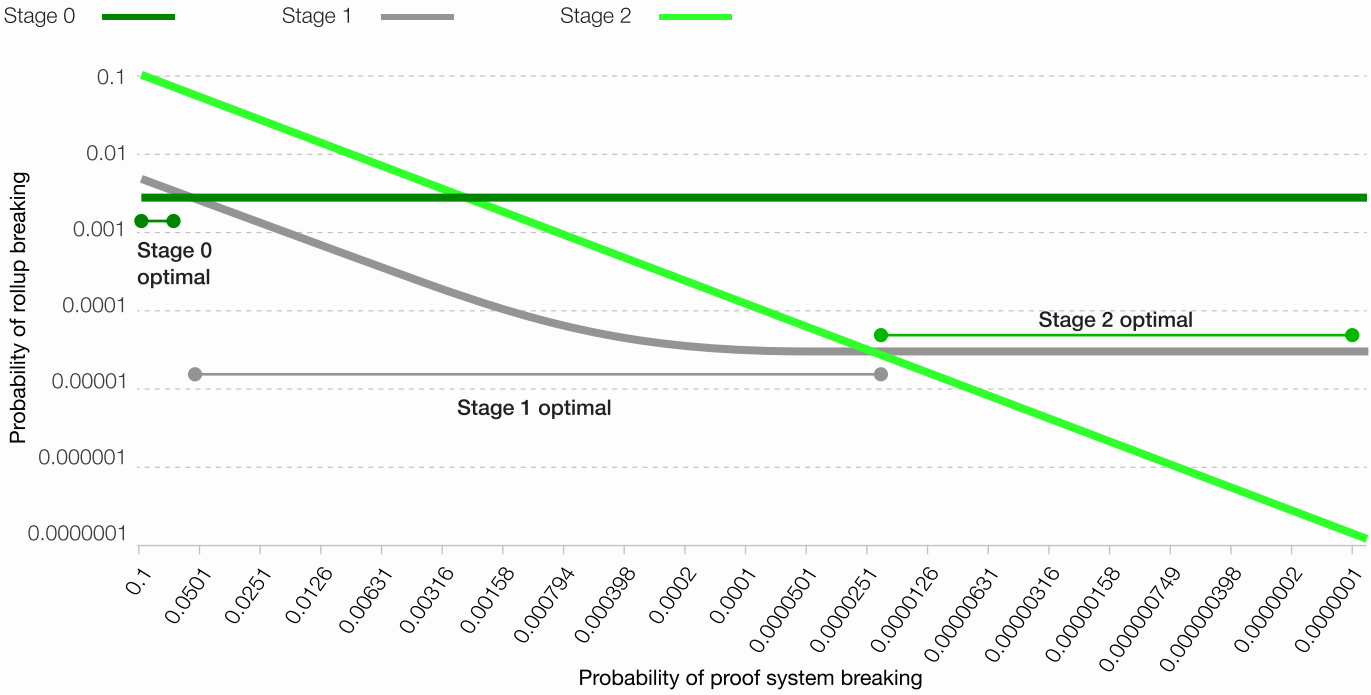
L2BEAT framework and Eclipse's path to Stage 2 rollup

L2BEAT's Stages framework aims to evaluate rollups by the openness of their fault-proving systems and by concrete decentralization guarantees *(Figure 7)*. Stage 0 implies significant operator trust. Stage 1 features strong user protections through a security council. On Stage 2, code, not a committee, governs the system's safety. Eclipse's stated goal is to progress to Stage 2, which has three binding requirements, namely permissionless fraud proofs, an upgrade exit window of at least 30 days and a Security Council whose emergency powers are limited to errors that can be proven onchain.



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Figure 7: Stages Framework



Source: L2Beat

Before a project can reach Stage 2, it must first meet the Stage 0 prerequisites. At this level, a rollup must clearly identify itself as a rollup and post its L2 state roots to Ethereum. It must also make enough data available on Ethereum for anyone to reconstruct the full L2 state and publish open-source software that performs this reconstruction from L1 data. In addition, the project needs to operate a soundproof system and permit at least five independent actors to submit fraud-proofs. If the rollup publishes state diffs instead of raw calldata, the proof system must verify that every state change is captured.

L2BEAT currently lists Eclipse under the “Other” category and describes it as a sidechain powered by the SVM. Under current definitions, Eclipse does not yet satisfy the rollup prerequisites, primarily because the data required to reconstruct the state is not published on Ethereum. This is the baseline against which a Stage 2 plan must be charted.

Eclipse has introduced a ZK data-availability challenge that verifies Celestia’s DA commitments on Ethereum at a roughly constant cost of about 300,000 gas. The system aggregates many Celestia blobs per batch and reduces the cost for third parties to verify data-availability claims. Although this is an important milestone, it does not satisfy the Stage 0 rule that all data necessary to reconstruct the L2 state must be stored directly on Ethereum.

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Conclusion

Eclipse advances a clear and testable idea: Solana's account-based, parallel runtime can combine with Ethereum's settlement security and Celestia's scalable data availability to form a neutral, high-throughput layer-2 network. Execution in the SVM addresses the single-threaded bottleneck that limits most rollups. Ethereum settlement secures exits and finality, while Celestia's data-availability layer expands bandwidth and lowers publication costs.

Eclipse's thesis can be tested in practical ways. During periods of high demand, applications that use separate states should keep stable latency and low failure rates, showing that parallel scheduling and local fee markets truly isolate workloads. Independent participants should be able to execute data-availability and fraud-proof challenges at reasonable cost rather than depend on trusted operators. Governance should set MEV redistribution and sequencing policies that lower cross-application interference and align fees with user experience. If these outcomes appear in the next development cycles, Eclipse will have proved its design as more than a theoretical exercise.

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