Cointelegraph Research

WATERFALL

Waterfall Network:

A New Approach to Scaling Without Sacrificing Decentralization



Cointelegraph Research Report

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Introduction

> The blockchain trilemma, initially introduced by Vitalik Buterin, has long been thought to define the limits of blockchain infrastructure. Layer-1 protocols have historically optimized for only two of three desirable characteristics — scalability, decentralization, and security (Figure 1).

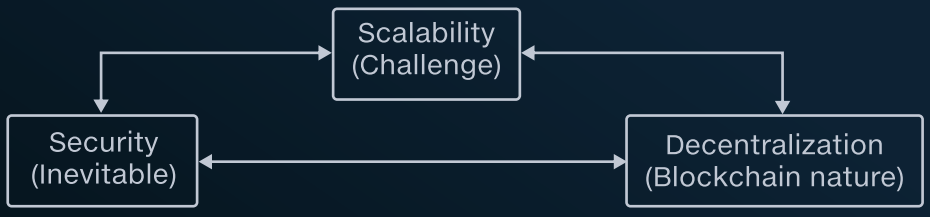
Ethereum prioritized decentralization and security at the cost of throughput. Solana achieved high performance but centralized validator control. Various other protocols attempted modular workarounds through Layer-2s, sidechains and multi-chain architectures that lead to other drawbacks.

The limitations stem from the underlying data structure of blockchains themselves. Traditional distributed ledger technologies (DLTs) rely on a linear chain of blocks, which inherently restricts parallel execution.

As network demand increases, performance degrades, or centralization pressure builds. Academic studies, including a 2023 benchmark analysis by Kahmann et al., confirm that the sequential nature of blockchains poses a persistent bottleneck.

The study highlights that while consensus improvements such as proof-of-stake (PoS) offer marginal gains, the real limitation lies in the one-dimensional structure of traditional blockchains, which cannot be trivially parallelized.

FIGURE 1: THE BLOCKCHAIN TRILLEMA



Source: ResearchGate/ @Abdelatif Hafid et al.

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Directed Acyclic Graphs (DAGs) have emerged as a viable alternative. DAG-based DLTs reimagine ledger design by replacing linear blocks with a graph structure where each transaction references multiple predecessors. This architecture enables native parallelism, and allows high-throughput transaction processing without depending on validator centralization, sharding, or external rollups.

The same study by Kahmann et al. found that DAG systems significantly outperformed linear blockchains in terms of transaction throughput and latency in controlled test environments.

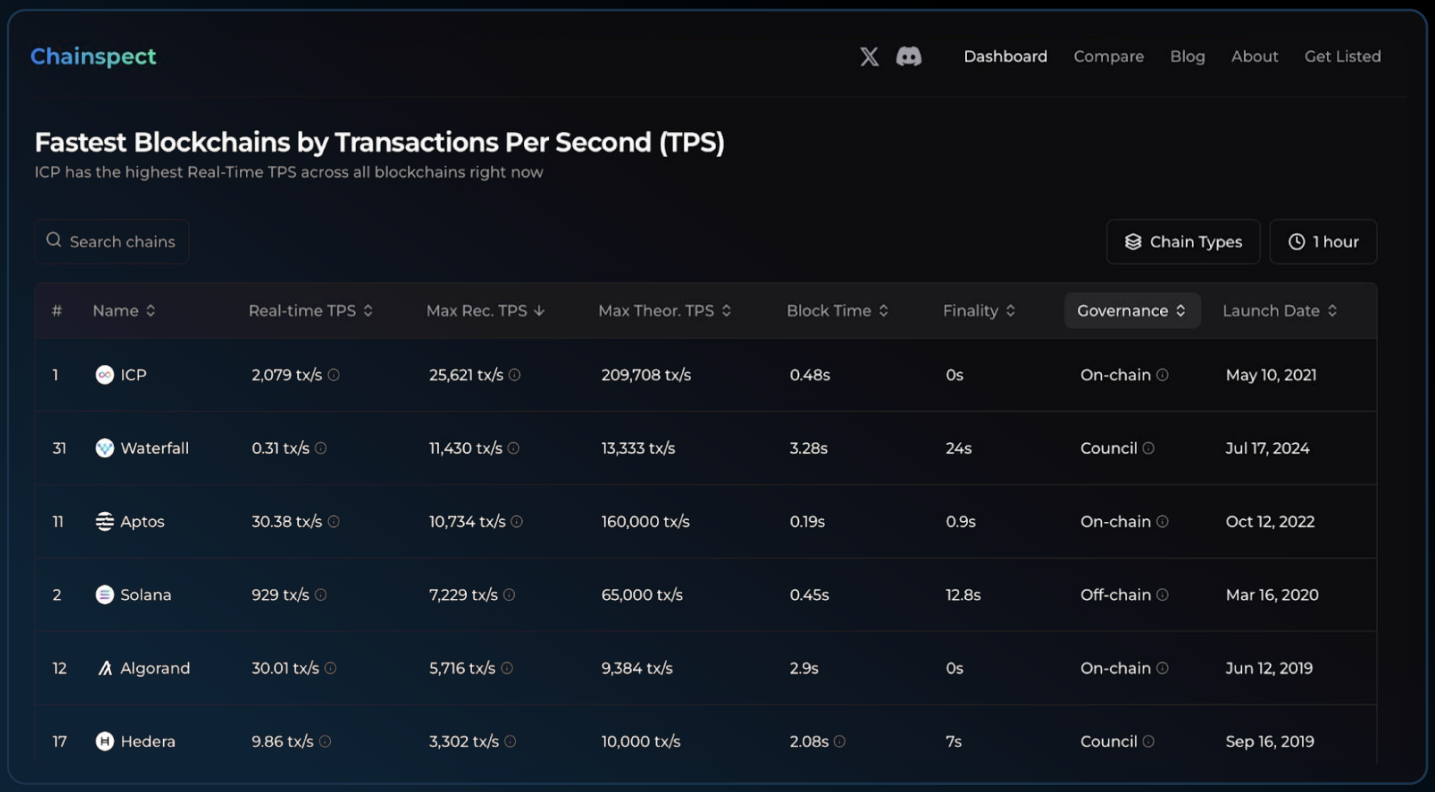
Waterfall Network exemplifies this next generation of infrastructure. It is a layer-1 protocol built on a DAG architecture and secured by PoS.

Unlike earlier DAG systems that forgo programmability or sacrifice determinism, Waterfall pursues a novel design path that enables parallel execution, preserves deterministic ordering, and retains full EVM compatibility. This way, the bottlenecks of linear blockchains are removed while the determinism required for smart contract execution is preserved.

Waterfall's approach is backed by award-winning, peer-reviewed academic research and supported by metrics that place Waterfall among the top-performing networks in the industry. According to independent benchmarking by Chainspect, Waterfall reached a throughput of 11,430 transactions per second (TPS), but with the latest test, it has grown to 12,777 transactions per second (TPS). This outperforms the latest high-performance EVM-based chains, such as Monad and SEI, as well as non-EVM chains, such as Solana and Aptos (Figure 2).

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FIGURE 2: COMPARATIVE L1 DASHBOARD FROM THE INITIAL THIRD-PARTY MAINNET PERFORMANCE TEST OF WATERFALL



#	Name	Real-time TPS	Max Rec. TPS	Max Theor. TPS	Block Time	Finality	Governance	Launch Date
1	ICP	2,079 tx/s	25,621 tx/s	209,708 tx/s	0.48s	0s	On-chain	May 10, 2021
31	Waterfall	0.31 tx/s	11,430 tx/s	13,333 tx/s	3.28s	24s	Council	Jul 17, 2024
11	Aptos	30.38 tx/s	10,734 tx/s	160,000 tx/s	0.19s	0.9s	On-chain	Oct 12, 2022
2	Solana	929 tx/s	7,229 tx/s	65,000 tx/s	0.45s	12.8s	Off-chain	Mar 16, 2020
12	Algorand	30.01 tx/s	5,716 tx/s	9,384 tx/s	2.9s	0s	On-chain	Jun 12, 2019
17	Hedera	9.86 tx/s	3,302 tx/s	10,000 tx/s	2.08s	7s	Council	Sep 16, 2019

Source: Chainspect

Its consensus is also designed for a large number of validators, reaching over 1.5 million during global testing in the Google Cloud Web3 Startup Program. This technical performance has gained Waterfall some institutional credibility, as it recently joined the Linux Foundation's Decentralized Trust Labs. Its core research has also earned recognition from the IEEE TEMS TC on Blockchain, with an award scheduled for presentation at the Nanyang Blockchain Conference in August 2025.

This report assesses Waterfall's technical foundations, economic structure, validator dynamics, and application ecosystem. In doing so, Cointelegraph examines whether Waterfall's architecture offers not just a scalable blockchain but a durable, permissionless foundation for the next generation of decentralized systems.

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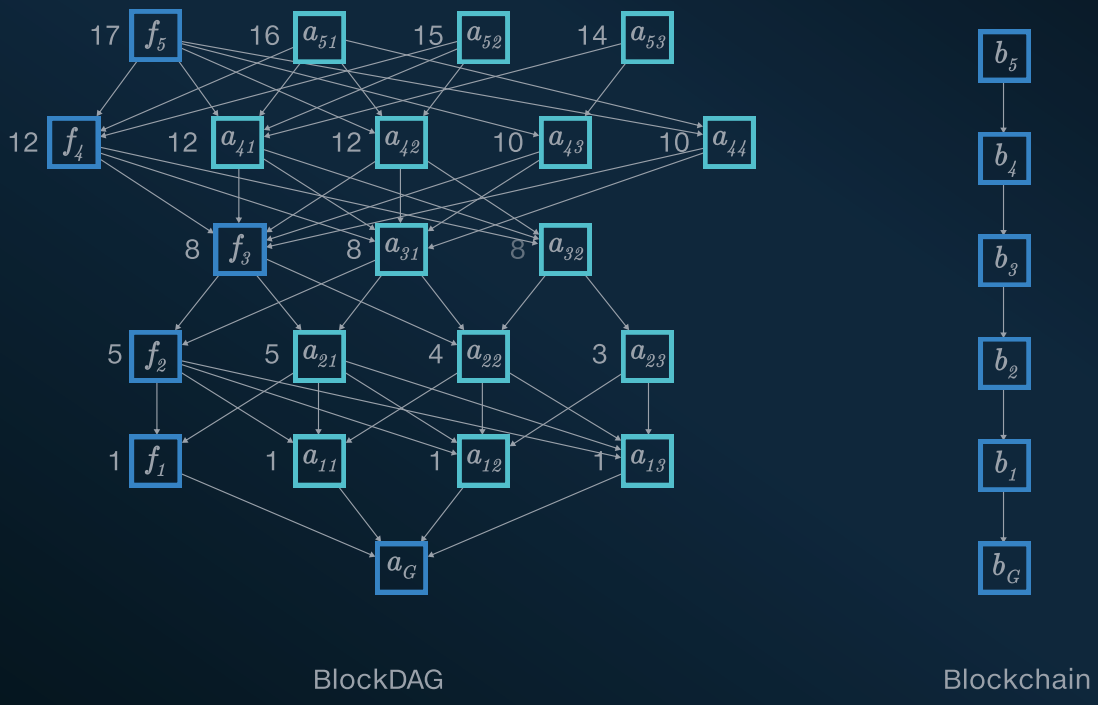
1. Technical Architecture of the Waterfall Network

> Waterfall Network is a layer-1 protocol that implements a Directed Acyclic Graph (DAG) as its foundational ledger.

A DAG, or Directed Acyclic Graph, is a non-linear data structure that arranges blocks as vertices in a directed graph. Each new block or transaction references one or more prior blocks.

This eliminates the requirement for global sequencing at the moment of transaction creation. Instead of a single ordered chain, the ledger evolves as a concurrent graph of interlinked blocks, growing in many directions without forming cycles (Figure 3).

FIGURE 3: COMPARISON BETWEEN CHAIN-BASED AND DAG-BASED LEDGER STRUCTURES



Source: Waterfall Research Paper

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Each vertex in this graph is a cryptographic acknowledgment of prior blocks and forms a causal history without requiring strict block-by-block propagation. Because blocks can be added independently and in parallel, network throughput increases proportionally with activity.

It is not bottlenecked by a central block producer or global consensus checkpoint. This and other measures will enable nodes to process and propagate transactions asynchronously while still preserving convergence and global consistency through accumulated confirmations.

1.1 Execution and Consensus on Waterfall

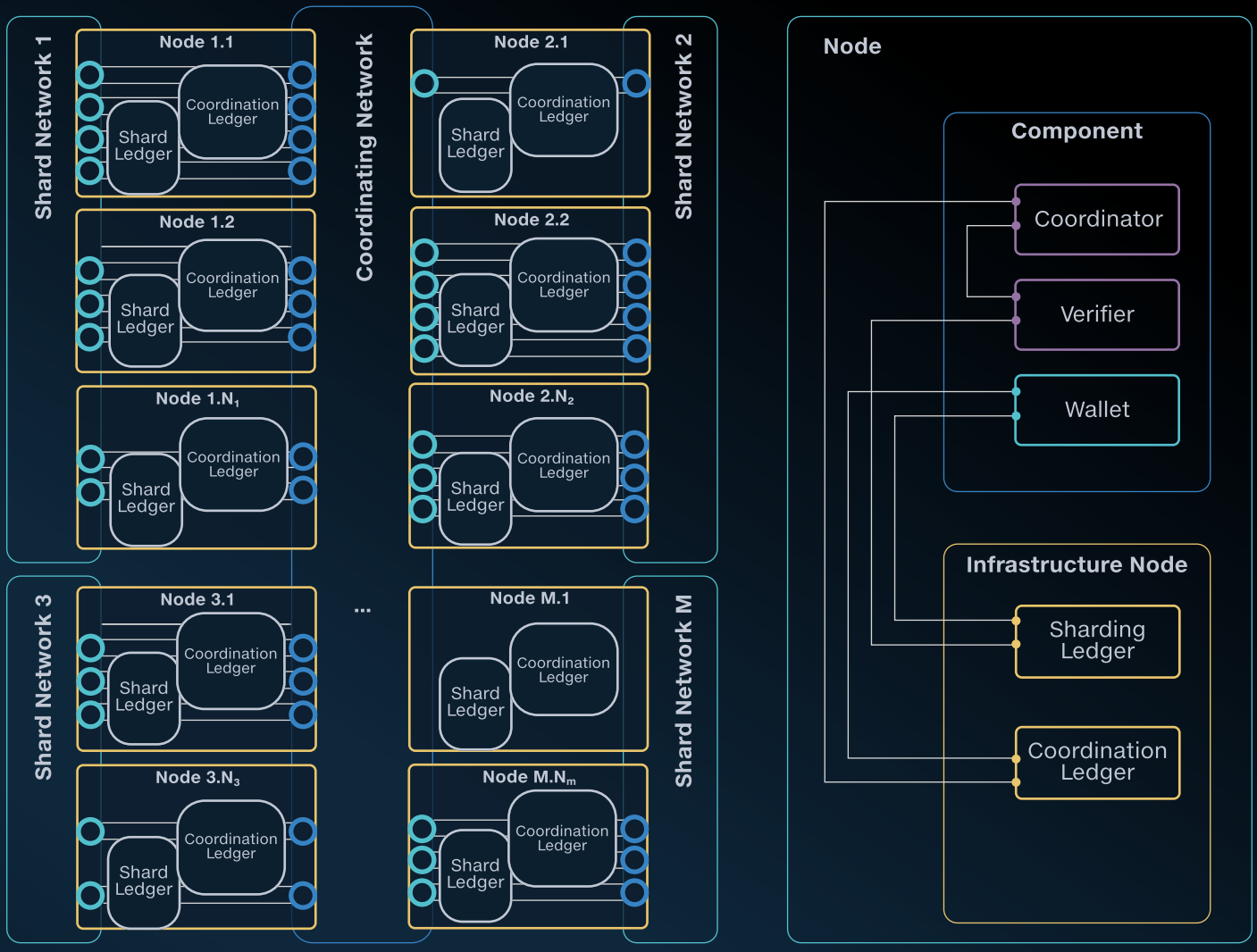
To operationalize the DAG data structure, Waterfall is separated into two tightly integrated subsystems: the Shard Network and the Coordinating Network (Figure 4).

The Shard Network handles transaction ingestion, state management, and DAG construction. Each shard is planned to consist of one or more subnetworks, and in every slot, a validator within each subnetwork will have the right to produce a block.

These blocks include references to previous blocks, called tips, and are broadcast to the network. However, since DAGs do not order blocks by default, the protocol relies on the Coordinating Network to finalize and linearize the BlockDAG submitted by the shards.

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FIGURE 4: SYSTEM-LEVEL ARCHITECTURE OF WATERFALL'S NODE COMPOSITION AND MULTI-NETWORK INFRASTRUCTURE LAYOUT.

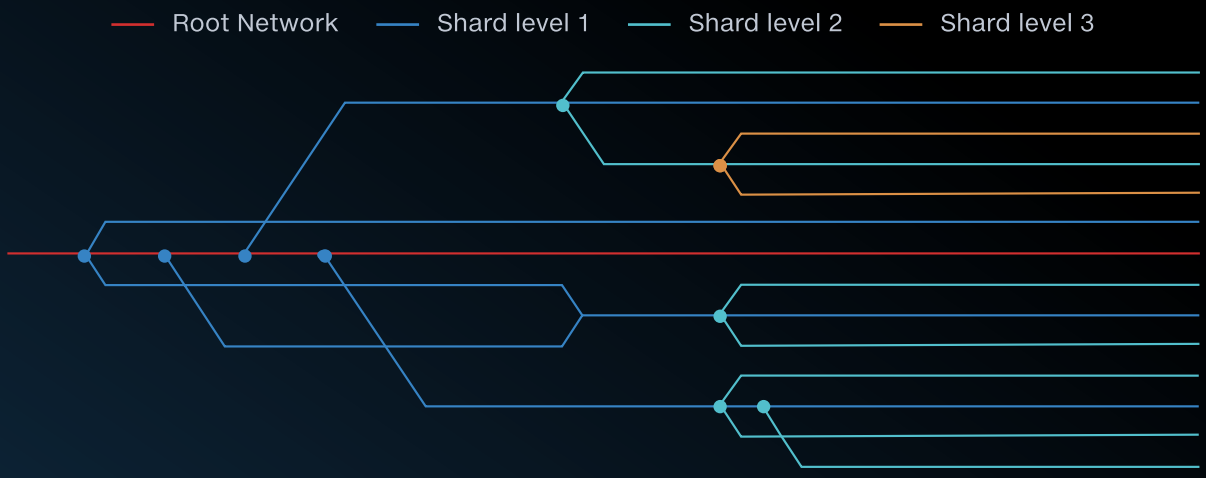


Source: Waterfall docs

The Coordinating Network operates as a blockchain with fixed slot intervals. Its primary function is to finalize unreferenced DAG blocks and determine a canonical order (Figure 5). This is achieved through a consensus algorithm that selects spine blocks from the DAG, identifies their parents, and constructs an ordered list based on height and hash precedence. This network is planned to be updated to also be a DAG to further increase network performance.

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FIGURE 5: STRUCTURE OF THE PLANNED UPDATE OF WATERFALL'S COORDINATING NETWORK

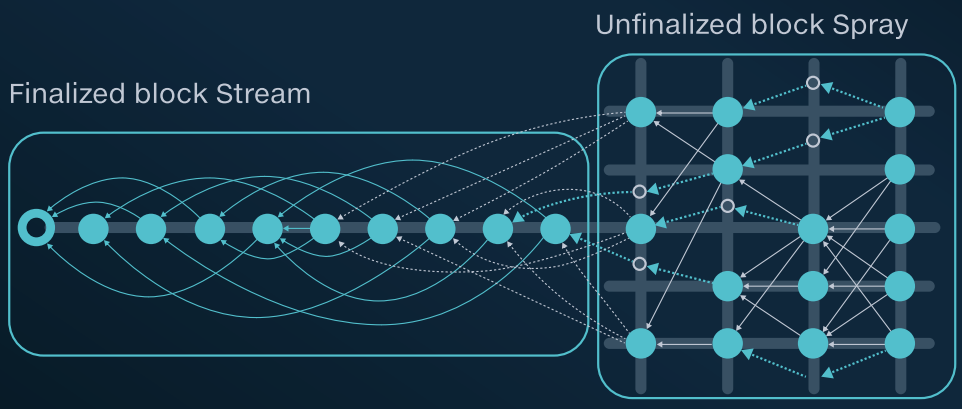


Source: Waterfall Docs

This ordering process draws conceptual inspiration from GHOSTDAG and PHANTOM but has been implemented as a proprietary algorithm. The finalized sequence is referred to as the Stream.

Blocks not yet ordered remain in the Spray. Each finalized block contains a reference to its parent and includes Merkle roots of state, transaction, and receipt trees (Figure 6).

FIGURE 6: AN OVERLAY OF THE TRANSACTION ORDERING PROCESS IN WATERFALL NETWORK



Source: Waterfall Whitepaper

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1.2 Networking and Node Infrastructure

Each server in the network is considered a Node and can host multiple Validators. A Validator is a logical entity composed of two addresses: a Verifier, which produces and signs blocks, and a Coordinator, which participates in finalization and consensus.

The Verifier is responsible for block creation in the Shard Network, while the Coordinator engages in the voting and message aggregation process within the Coordinating Network. Time is divided into slots, grouped into epochs, which are, in turn, grouped into eras. Slots define the smallest time unit for block creation, and epochs synchronize validator assignments.

The system assigns validator roles on an epoch basis. Each validator is associated with a unique index derived from their deposit data. Upon activation, a validator may receive any of several roles: block producer, block attester in the Coordinating Network, or aggregator for network-wide messages.

Roles are recalculated at the start of each epoch, and validators are expected to check their assignments and participate accordingly.

Moreover, validator role assignments are probabilistically optimized using a control algorithm described in the network's consensus specification. This probabilistic optimization reduces role monopolies and helps Waterfall achieve high validator throughput without sacrificing Byzantine fault tolerance. In practice, this will manifest in more resilient propagation during high-traffic periods, and later, it is planned to be optimized with uniform subnetworks and shard workloads.

To initiate participation, a validator must submit a deposit transaction to the Shard Network. This transaction includes the validator's BLS public key, withdrawal credentials, and a digital signature. Once the Coordinating Network has confirmed the block containing this transaction, the validator enters an activation queue.

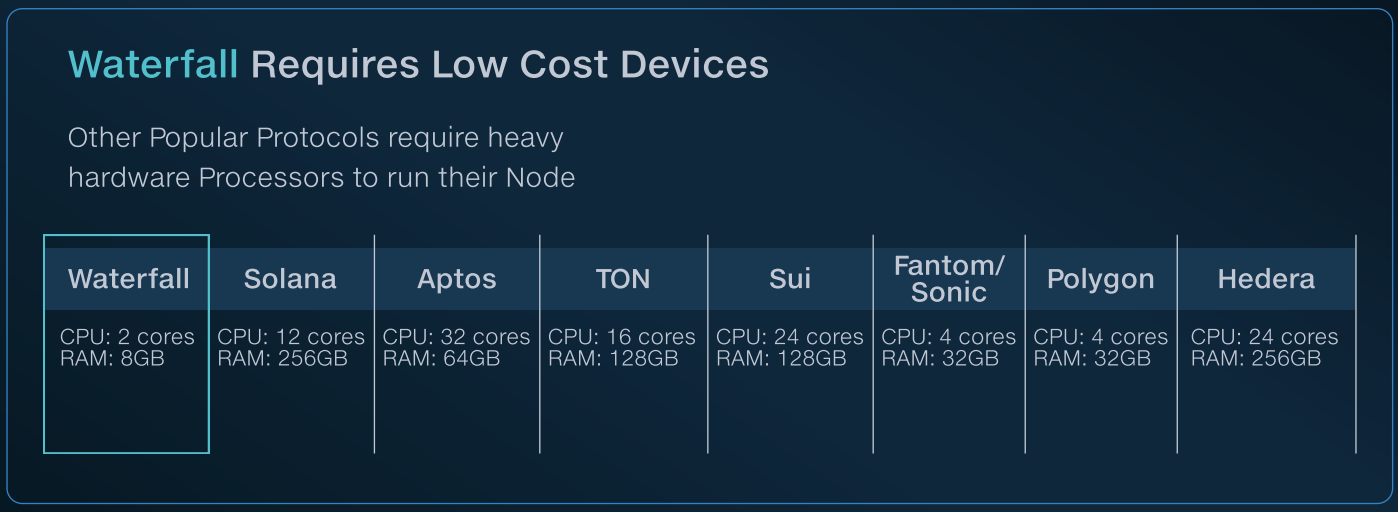
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After approximately one era, the validator is activated and begins receiving roles. If the validator initiates an exit, a delay is enforced to allow for penalty enforcement and data rebalancing. Misbehavior extends the delay further and ensures the protocol can apply slashing if necessary.

Unlike many layer-1 blockchains that require high-performance server infrastructure, Waterfall sets minimal hardware requirements for validator participation. A two-core CPU and 8GB of RAM are sufficient to operate a node (Figure 7).

This lowers the barrier to entry and allows for broader decentralization, including participation from individuals and communities in regions where hardware availability or power infrastructure may be limited (Table 1). To contextualize this inclusivity, the table below compares Waterfall's validator requirements against other leading proof-of-stake and DAG-based protocols.

FIGURE 7: VALIDATOR HARDWARE COMPARISON ACROSS MAJOR PROTOCOLS



Source: Waterfall Docs

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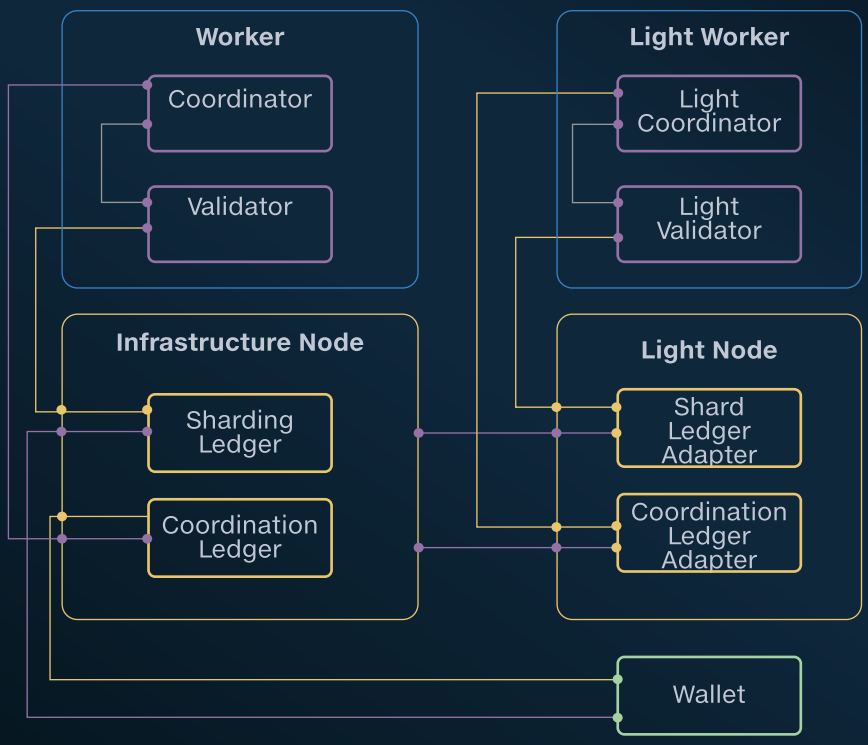
To manage validator heterogeneity without fragmenting consensus, Waterfall will use a validator class known as Light Validators. The specialized validator class is planned to participate in block relay and DAG propagation, but does not vote in Coordinating Network finality rounds. These nodes can operate under significantly reduced bandwidth and CPU constraints.

The protocol assigns them key roles such as cross-shard message forwarding, DAG spraying, and local state root compilation.

Light Validators are coordinated by full nodes and contribute indirectly to consensus security through redundancy and inclusion proofs. This design minimizes the dependency on heavyweight infrastructure without compromising finality, and it supports long-term decentralization by allowing a diverse validator landscape to coexist functionally.

Waterfall's ability to support both high-performance Validators and low-resource Light Validators is a key differentiator among DAG protocols, where high throughput often implies validator centralization (Figure 8).

FIGURE 8: ARCHITECTURE OF WATERFALL'S NODES AND WORKERS



Source: Waterfall Medium Documentation

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Waterfall proposes a more distributed model to handle long-term data storage. Rather than requiring every node to store the entire ledger, the protocol proposes Archive Nodes and Full Nodes with separate roles. Archive Nodes will store the full history and can reconstruct the entire ledger.

Full Nodes store only segments of the ledger, while Machine Learning-enabled Controller Nodes will monitor data availability and optimize distribution. This approach reduces the load on individual nodes and allows the protocol to maintain decentralization even as throughput increases.

TABLE 1: WATERFALL NODE TYPES AND SPECIALIZATION

Node Type	Role in Waterfall	Minimum Specs	Voting Rights
Light Node	Block producer, DAG propagation, no voting	Very Low	No
Full Node	All the above and Finalization and DAG linearization, Stores full state, Supports querying.	2-core, 8GB RAM	Yes
Archive Node	All the above and Stores full transaction history	High	Yes

Source: Cointelegraph, Waterfall Docs

1.3 State Transition within Waterfall's DAG architecture

Waterfall uses the Ethereum Virtual Machine as its execution environment. Each account has a nonce, a balance, a storage root, and a code hash.

The storage root encodes account-specific data in a prefix Merkle tree, a structure that allows efficient verification without full-state replication.

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Each block header includes three separate Merkle roots: one for the global state, one for transactions, and one for receipts. This allows nodes to verify account balances or execution outcomes independently, which is useful for thin clients and light infrastructure.

The protocol's messaging stack is built on RLPx, a transport protocol used in Ethereum. Once two nodes connect, they exchange a status message containing the protocol version, network ID, last finalized block number, and the set of unfinalized DAG tips. If these values do not match, the nodes enter a synchronization phase.

They exchange block headers, transaction bodies, and receipts until both reach a consensus on the DAG state. If a node lags, it requests missing headers and blocks using standardized messages defined in the protocol. Once synced, nodes propagate new blocks using a two-step relay process.

When a new block arrives, the receiving node first verifies its validity and then propagates it to a subset of peers.

Once fully validated, it notifies the rest of the network by sending the block hash. Other nodes can request the block if needed, ensuring minimal redundancy and complete coverage.

Waterfall defines strict rules for block creation and propagation. A validator can only produce a block in the assigned slot. That block must reference tips from previous slots and must not include references to multiple blocks from the same creator or invalid ancestors.

Each transaction is included only once per slot, and its eligibility is determined by a modulo operation between the sender's address and the number of validators in the slot. This prevents duplication and balances transaction inclusion across the subnetwork.

When a transaction is submitted by a user, it enters a local transaction pool and is propagated across the network. Each node maintains a list of known transactions.

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When peers connect, they exchange transaction hashes and request any missing data. Once included in a block and finalized, a transaction triggers a state change, which is reflected in the Merkle root of the next finalized block.

Finality occurs at the Coordinating Network layer. At each slot, the network selects a set of spine blocks from the Shard network, applies the ordering algorithm, and communicates the finalized sequence back to the Shard Network.

Once finalized, the blocks in the Stream cannot be reordered, and all validators apply the resulting state transitions. Each finalized block includes the hash of the last finalized block and the Merkle root of the resulting state, thus ensuring consistency across the network.

A new version of the consensus protocol was presented in the Salto-Colores. The current version of the consensus protocol uses a BFT-based PoS scheme, in which the blockDAG network is responsible for distributing and executing transactions and blocks, and the Coordinating Network is responsible for ordering the blockDAG by determining the spine blocks (Table 2).

It is also worth noting that the Coordinating Network uses a modified Gasper protocol, which is also the consensus mechanism securing Ethereum's proof-of-stake. This protocol implements a fork choice rule, which is used, in particular, when nodes create an equivocation.

TABLE 2: COMPARISON OF SCALING STRATEGY ACROSS SPECIFIC L1S

Protocol	Scaling Model	Parallel Execution	Sharding	Rollups Required	Design Bottleneck
Waterfall	Horizontal DAG	Yes	No	No	Finality rate of the Coordinating Network under extreme DAG growth (theoretical at the moment)
Ethereum	Modular (L2 focus)	No (base layer)	Yes	Yes	L1 capacity
Solana	Monolithic	Limited	No	No	Validator throughput
Celestia	Modular DA	No (DA only)	Yes	Yes	Execution layer

Source: Waterfall, Ethereum, Solana, and Celestia Docs

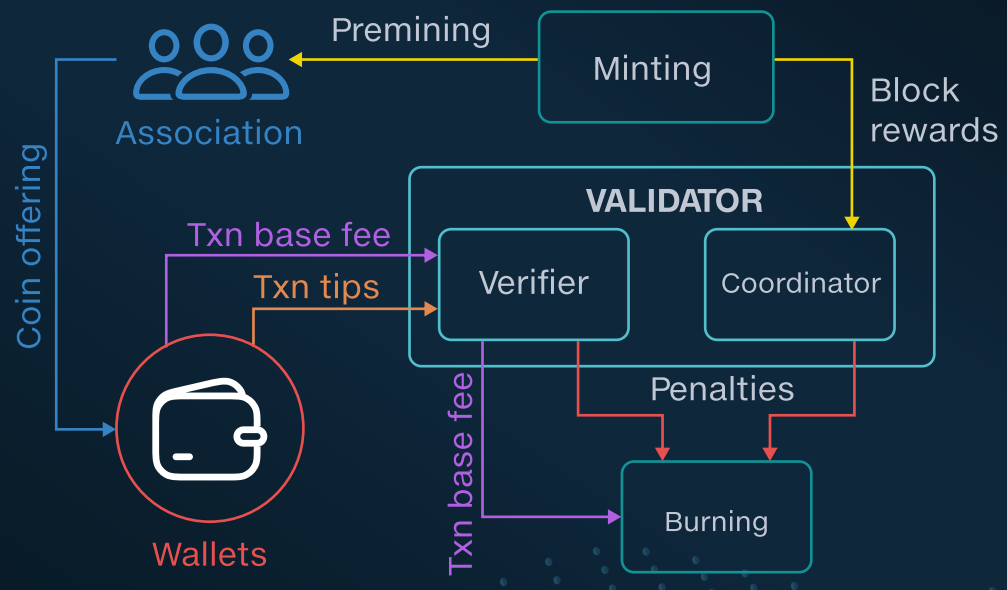
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2. Tokenomics and Economic Model of the Waterfall Network

Waterfall Network uses the native token, WATER, which has an initial supply of 25 billion tokens for all protocol operations, including transaction execution, smart contract deployment, validator staking, and governance voting.

The architecture of Waterfall depends on maintaining macroeconomic equilibrium (Figure 9). A sufficient number of validators is needed to secure the DAG-based parallel block production system. At the same time, enough tokens must remain in circulation to support user interaction. If it exceeds the required margin, additional validators are activated using reserve allocations.

FIGURE 9: TOKEN FLOW AND INCENTIVE MECHANICS IN THE WATERFALL NETWORK



Source: Waterfall Docs

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To join consensus, validators must stake a fixed amount of 32,000 WATER. These tokens are locked for the duration of the validator activity.

Block production occurs in the Coordinating Network, which finalizes the state across the DAG. Validators assigned to this layer receive new WATER tokens as a reward for each finalized block. The annual issuance of new tokens is not linear. It follows a curve in which the reward volume is calculated as the square root of the total stake multiplied by a constant baseline rate (Figure 10).

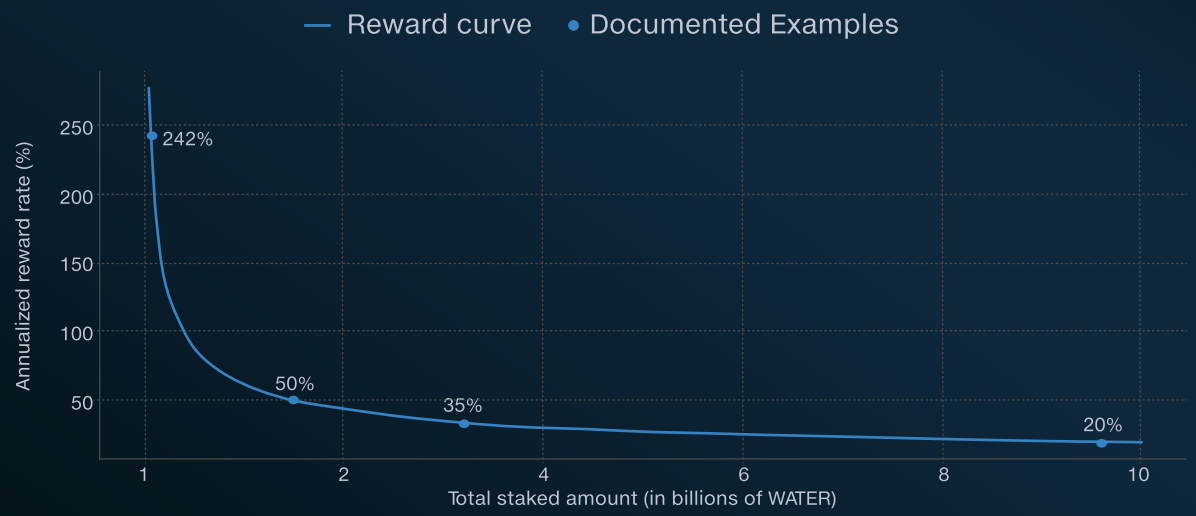
This ensures that when the network has a low staking ratio, rewards increase to attract more participants.

As staking approaches saturation, the issuance tapers and stabilizes.

The system is designed to reach a baseline annual reward rate of twenty percent when 9.6 billion WATER is staked, with much higher rates available during the early stages.

For example, when only 65.6 million tokens are staked, the model permits an annual return exceeding 200 percent. These returns decline progressively with stake increases to prevent overcompensation while maintaining strong validator incentives.

FIGURE 10: NON-LINEAR RELATIONSHIP BETWEEN TOTAL STAKED AMOUNT AND MAXIMUM ANNUALIZED REWARD RATE



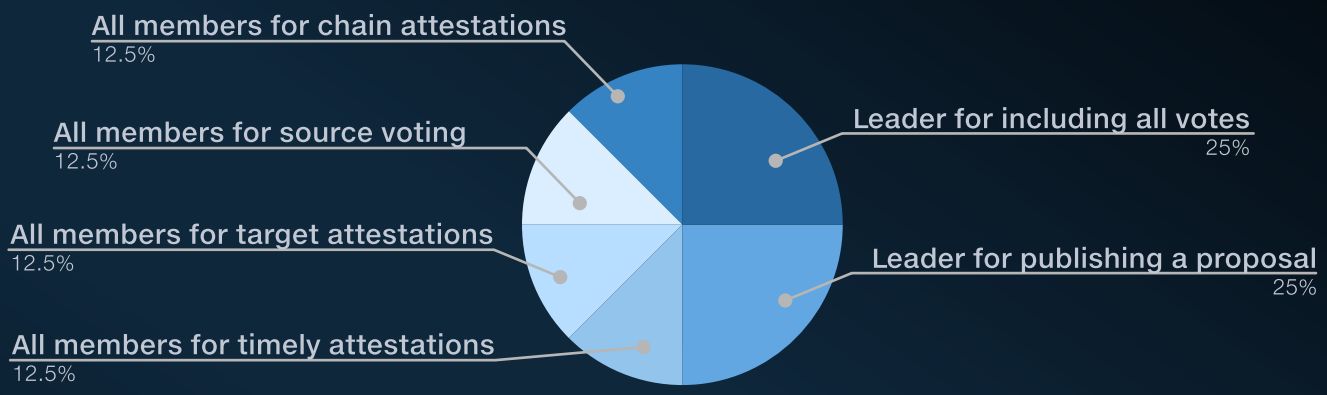
Source: Cointelegraph Research, Waterfall Docs

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To determine the reward per block, the protocol divides the annual reward pool by the number of slots in a calendar year. Each slot produces a block, and rewards are split among the validator who proposed the block and the committee members who validated it (Figure 11).

The split is meant to reflect both participation and timeliness. Committee members earn rewards in four parts: for correctly identifying the canonical chain, for referencing the correct source and target blocks, and for voting within the expected time window. Late submissions reduce the corresponding reward share, and failure to submit results in forfeiture.

FIGURE 11: DISTRIBUTION OF BLOCK REWARDS IN THE COORDINATING NETWORK.



Source: Waterfall Docs

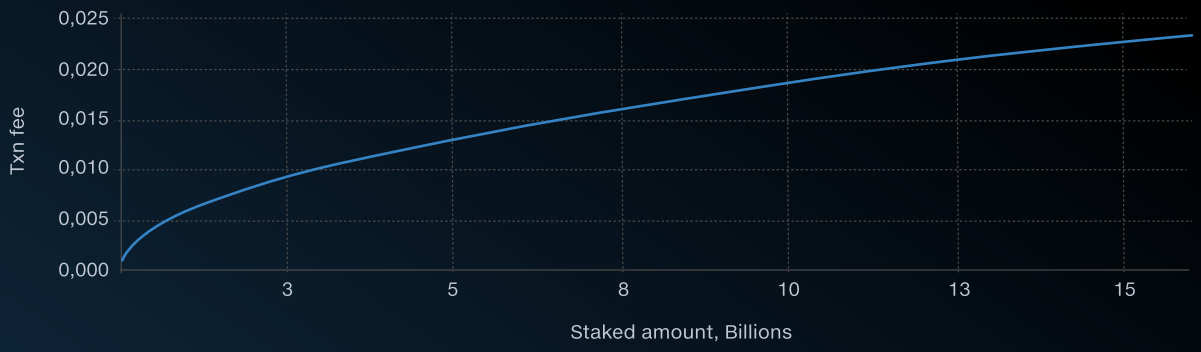
In the Shard Network, where blocks are produced in parallel to handle high transaction volumes, fees are calculated as a function of gas usage, maximum gas per block, and the reward issued in the current slot. The base transaction fee is scaled proportionally to the system load.

As more blocks are published within a slot, the marginal cost of inclusion falls. With four blocks per slot and 6.6 million tokens staked, the base fee for a standard transaction can fall to 0.0005 WATER (Figure 12).

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As the staked total rises, fees increase gradually, reflecting greater security overhead and broader validator coverage.

FIGURE 12: BASE TRANSACTION FEE AS A FUNCTION OF TOTAL STAKED AMOUNT IN THE SHARD NETWORK



Source: Waterfall Docs

Every transaction fee is split into two parts: one is burned, and the other is paid to the block producer. Burning permanently removes the token portion from circulation, while the validator earns the retained portion and any optional tips offered by users.

The default burn ratio is two-thirds, though this value can be modified by governance or adjusted based on validator behavior. This structure introduces a deflationary mechanism into the token economy and ensures that transaction fees contribute to long-term supply regulation.

The net effect of minting and burning determines whether the system is inflationary or deflationary. When the network is underutilized, inflation occurs as rewards are distributed without a counterbalancing volume of fees (Table 3). As transaction volume increases, more tokens are burned per block, and this deflation can offset issuance.

At 7,500 transactions per second with full validator participation, the protocol enters a deflationary phase, with a net supply reduction of nearly four percent annually. The ability to shift between inflation and deflation based on real-time activity enables the system to match monetary behavior to actual network demand.

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TABLE 3: COMPARISON OF ECONOMIC EFFICIENCY ACROSS SPECIFIC L1S

Protocol	Base Transaction Fee	Reward Model	Deflationary Mode Possible?
Waterfall	~0.0005 WATER (Low)	Dynamic (sqrt stake-based)	Yes
Ethereum	Variable (high)	Burn + Tips	Yes (EIP-1559 burn)
Solana	~0.000005 SOL (Low)	Fixed per epoch	No
Avalanche	Variable	Fixed + optional burn	Partial

Source: Cointelegraph, Waterfall Docs, Ethereum Docs, Solana Docs, Avalanche Docs

Penalties are enforced for misbehavior. These include vote omission, conflicting messages, failure to produce assigned blocks, double block creation in the same slot, and submission of invalid proofs. All penalties are determined algorithmically and require no external consensus. They are assessed based on evidence recorded in the Coordinating Network ledger.

If a validator's balance falls below fifty percent of the original stake as a result of cumulative penalties, they are permanently removed from the validator set. Temporary suspensions are also applied. A validator who commits an offense may be barred from participation during the current and next era, allowing time for system maintenance or recovery before risking permanent removal (Table 4).

TABLE 4: NETWORK UPGRADE FLEXIBILITY AND GOVERNANCE MODEL

Protocol	Governance Model	Upgrade Mechanism	Validator Role in Upgrades	External Dependency
Waterfall	Off-chain coordination	Hard forks (manual)	No	Social consensus
Ethereum	Off-chain coordination	Hard forks (manual)	No	Social consensus
Solana	Validator vote-based	On-chain activation	Yes	Social consensus
Avalanche	Fixed roadmap	State-sharded hard forks	No	Centralized org

Source: Cointelegraph, Waterfall Docs, Ethereum Docs, Solana Docs, Radix Docs

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3. The Waterfall Adoption Strategy and Ecosystem Overview

> Waterfall Network's adoption strategy is grounded in its ability to solve the historical trade-offs in Layer-1 design without introducing technical or usability complexity. Most general-purpose Layer-1s scale performance by sacrificing decentralization, or prioritizing decentralization at the cost of throughput.

Waterfall's architecture avoids that binary by embedding scalability and decentralization into the same protocol layer. Adoption is supported not by external layers or subsidies, but by a core design that enables horizontal performance, reduces entry requirements for validators, and simplifies integration for developers.

At the application level, Waterfall fosters adoption across decentralized finance, on-chain trading, Web3 tooling, entertainment, and AI-powered infrastructure.

Waterswap

The waterfall ecosystem already hosts a range of applications for end-users. Among these, WaterSwap, an institutional-grade decentralized exchange, is perhaps the most distinctive. It is planning to support seamless transactions involving digital assets RWAs and is designed with low latency and gas efficiency in mind to deliver nearinstant execution across the ecosystem. WaterSwap collaborates with Generative Mind, an AI-native company, on a new class of trading tools that leverage real-time sentiment analysis.

Generative Mind's proprietary language model processes millions of social media messages per hour to extract predictive signals without relying on historical data or intensive computation.

Converting social chatter into structured, asset-specific sentiment streams enables precise audience segmentation and actionable insight.

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Through this integration, WaterSwap offers sentiment-aware features that provide users with behavioral cues, asset momentum indicators, and performance-weighted data that is embedded directly into the DeFi interface.

These developments reflect a broader shift among layer 1 networks that are increasingly measured not just by technical performance but by their ability to create scalable, application-ready ecosystems.

Aquapark

On the infrastructure and staking side, AquaPark serves as Waterfall's native DeFi ecosystem. It offers users a unified platform to interact with a suite of decentralized financial protocols. By combining liquidity, staking, lending, and trading, AquaPark delivers a unified environment for asset management. Its first protocol, AquaStake, allows users to stake $WATER and receive $JWATER, a liquid staking token.

AquaSwap is AquaPark's decentralized exchange and facilitates efficient, low-slippage trading through automated market maker (AMM) strategies.

It also lets liquidity provi-ders earn rewards from trading acti-vity.

Complementing these tools, AquaLend introduces a transparent, algorithmic lending protocol where users can borrow and lend assets

via smart contracts managing collateral, interest rates, and liquidation thresholds. Together, these protocols form a dynamic, composable DeFi layer built natively on Waterfall.

TheLamb.io and Cascadify

In the Web3 space, startups frequently encounter the significant challenge of progressing rapidly from concept to product development and fundraising if there is no support from a full in-house tech-nical team. Cascadify and The Lamb.io address this gap and support projects from MVP development through to community launch.

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The Lamb.io also brings accountability to OTC trading through vesting-aware analytics. Users can evaluate unlock schedules, team allocations, and vesting cliffs before entering a trade.

This helps to mitigate the information asymmetry that often disadvantages retail participants in private rounds and early token deals.

For developers and creators, Cascadify serves as Waterfall's modular no-code/low-code launchpad. Originally introduced as Gemunion, Cascadify now offers ready-made templates, production-ready backends, and a streamlined MVP builder that allows non-technical teams to launch Web3 applications with ease. From NFT storefronts to DAO portals, Cascadify significantly lowers the barrier to entry and accelerates time-to-market for new projects.

Petami and LightningWorks

One of the most distinctive applications to emerge from Cascadify is Petami. Petami is a gamified staking experience where users care for NFT pets that evolve based on attention, consistency, and interaction.

Petami adds an emotional dimension to DeFi, as it rewards users not just for capital contribution, but for engagement and behavior, opening a new category of "emotional staking."

Waterfall also supports entertainment-focused applications such as LightningWorks, which blends storytelling, NFTs, and interactive game mechanics into a single, onchain experience.

Their debut release, Starblind #1, is an NFT-powered comic with forgeable editions that allow readers to influence and participate in the story's progression. It demonstrates how high-throughput blockchain infrastructure can power immersive digital media.

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Quex

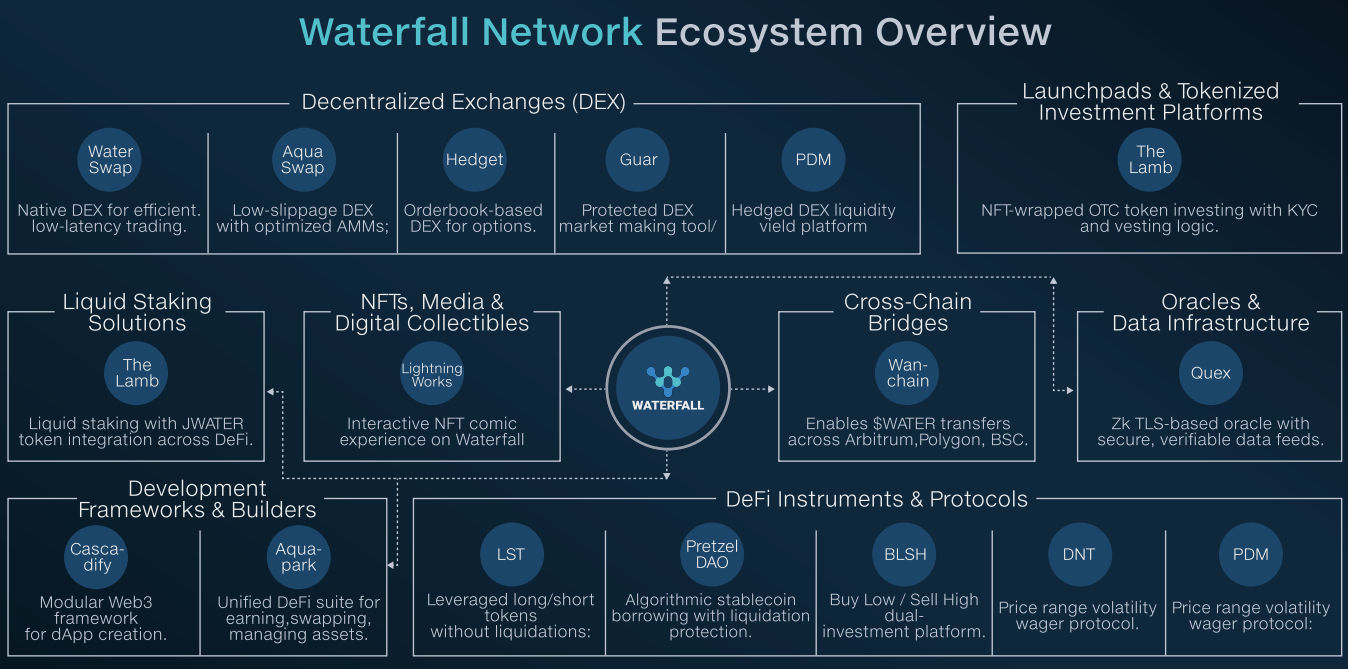
Quex introduces professional-grade trading tools to the ecosystem through a real-time, onchain terminal tailored for high-frequency and algorithmic strategies.

With customizable execution logic and deep integration into Waterfall's low-latency consensus layer, Quex delivers CEX-level performance in a fully decentralized and transparent environment.

Together, these applications form a tightly integrated ecosystem built on Waterfall's core strengths: speed, scalability, decentralization, and simplicity.

From AI-native analytics and composable DeFi to creator tools and intelligent trading, Water-fall is not only solving the limitations of prior layer-1 designs but also creating a foundation for a thriving application ecosystem (Figure 13).

FIGURE 13: MORE EXAMPLES OF PROJECTS BUILDING ON WATERFALL



Source: Waterfall Docs

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4. Waterfall's Security Validation

> The security and operational reliability of Waterfall have been externally validated. Hacken audited Waterfall's core protocol to assess its resistance to attack vectors and logic failures.

In a technical AMA with Hacken auditor Nino Lipartia, it was mentioned that Waterfall presented a novel challenge due to its blockDAG architecture and dual-layer finality system. The auditors evaluated both the optimistic and final consensus paths, examining how the DAG ledger is linearized and finalized.

LIPARTIA STATED,

> "We had to do some research to understand how blockDAG blocks are finalized in Waterfall's implementation [...] the project provides new ideas we don't often see in the sphere."

While minor logic issues and redundancies were identified, these were promptly addressed, and the audit team concluded that the core implementation was secure. Hacken's audit found that Waterfall's architecture offered robust protection against common vulnerabilities such as signature validation errors, poor finality logic, and synchronization issues.

The protocol's safe-guards against double-spending and its secure block propagation logic were approved. Auditors emphasized the importance of continued code maintenance to guard against future threats but found Waterfall to be "difficult to hack," even under stress.

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5. Positioning Within LFDT and the Broader DAG Ecosystem

> In April 2025, Waterfall Network joined the Linux Foundation's Decentralized Trust Labs (LFDT), a technical working group focused on building inte-roperable, scalable, and secure decentralized infrastructure.

LFDT hosts a cohort of layer-1 protocols that use non-linear consensus architectures, such as DAGs or hybrid DAG-chain structures, in their attempts to solve blockchain's core limitations around performance and decentralization.

What sets Waterfall apart within this group is its focus on validator inclusion, deterministic finality, and native EVM compatibility, all implemented at the base layer.

Other LFDT protocols have made significant advances but have sacrificed some of these features.

IOTA's Tangle eliminates fees through a coordinatorless DAG but lacks smart contract support. Radix and Aleph Zero both focus on novel VMs, but neither supports Solidity or full compatibility with Ethereum tooling.

Fantom's Lachesis and its successor Sonic provide high throughput but rely on probabilistic finality and heavier validator requirements. Waterfall unites the desirable features of these DAG projects by providing a horizontally scalable DAG architecture with deterministic block ordering, accessible validator requirements, and seamless integration with existing Ethereum development tools (Table 5).

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The following comparison outlines how Waterfall differs from other prominent DAG-based or LFDT-aligned protocols:

TABLE 5: COMPARATIVE ANALYSIS OF DAG-BASED PROTOCOLS

Protocol	Execution Layer	Consensus Model	TPS	Finality Type	Validator Hardware
Waterfall	EVM	DAG + Coordinating PoS	~12,778	Deterministic	2-core CPU 8GB RAM
Sonic	SonicVM (EVM)	Proof-of-Stake + DAG-based ABFT	~10,000	Probabilistic	4-core CPU, 32GB RAM
Radix	Scrypto VM	Cerberus DAG	Unmea-sured	Deterministic	8-core CPU, 32GB RAM
Taraxa	EVM-compatible	PoS blockDAG	~4,906	Deterministic	4-core CPU, 8GB RAM
Hedera	HSCS 2.0	Hashgraph	~3,302	Deterministic	4-core CPU, 16GB RAM

Source: Cointelegraph, Waterfall Docs, Ethereum Docs, Solana Docs, Avalanche Docs

Waterfall's role in this emerging cohort is to bridge the expressiveness of Ethereum with the performance characteristics of DAG-based protocols without sacrificing trust assumptions or validator accessibility.

Its participation in LFDT places it at the intersection of open infrastructure standards and high-throughput consensus research, which positions it as a credible base layer for performance-driven decentralized systems.

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6. Developer Tools and Onboarding

To simplify access and participation, Waterfall offers clear documentation, node deployment guides, and wallet integrations:

- **Wallet Support:** Users can interact with the network via MetaMask and Rabby, both of which are integrated for seamless onboarding.
  - MetaMask Guide
  - Rabby Guide
  - Enkrypt Guide
  - Coinbase Guide
  - Trust Guide
- **Tutorials and Node Deployment:** Step-by-step instructions are available for validators, developers, and users:
  - Waterfall Tutorials
  - Using Hardhat
  - Using Remix
  - Using Truffle

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Conclusion

Waterfall offers a rare combination of scale, validator accessibility, and EVM compatibility, all at the base layer. The ecosystem must now prove that this level of technical coordination can translate into lasting adoption.

Waterfall has a bright future if it can build sticky applications, deepen liquidity, and attract developers who are not just looking for speed but for credible neutrality and long-term alignment. If it succeeds, Waterfall could reset expectations for what should be possible at the protocol layer without having to reach for external scaling solutions.



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AUTHORS:



Kyrian Alex
Research Analyst