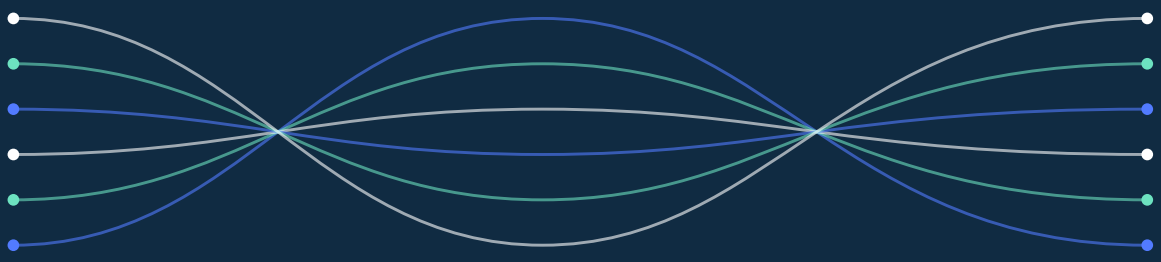
ENSEMBLE

WHITEPAPER

Market exposure in one token

Tokenized perpetual strategies with explicit accounting and execution rules.



1 The thesis

Ensemble is a composition engine for onchain market views. It turns a defined basket, direction, leverage, and cash target into a transferable vault share. Users deposit USDC; the vault manages collateral and perpetual positions on HyperCore. Contracts on HyperEVM calculate share value, enforce transaction limits, and determine when maintenance can proceed.

Holding leveraged exposure usually requires repeated sizing, collateral transfers, and margin management. Ensemble packages that work into a position with explicit rules. Users choose the strategy and when to enter or leave. Applications can integrate the same share interface, and researchers can evaluate a common accounting and execution model across different portfolios.

Thematic ETFs offer a useful precedent: a portfolio can express an investment idea across assets connected to a common theme.[9] Ensemble applies that product-design principle to crypto market views. Basket selection defines the view; direction and leverage define how the vault expresses it. One share gives users access to the resulting strategy.

Hyperliquid makes this architecture possible. Its native order books and general-purpose EVM put trading and programmable ownership on the same blockchain. Ensemble builds on that foundation: a portfolio becomes an asset that users can hold, transfer, and integrate without maintaining each underlying position.[2]

1.1 Six market views

Three portfolios are paired with their inverse directions:

Vault	Direction	Target basket	Leverage	Cash target
BULL	Long	BTC 50%, HYPE 50%	3x	15%
iBULL	Short	BTC 50%, HYPE 50%	3x	15%
BEAR	Short	BTC / ETH / SOL, near equal	2x	15%
iBEAR	Long	BTC / ETH / SOL, near equal	2x	15%
VOL	Short	BTC	6x	45%
iVOL	Long	BTC	6x	45%

BEAR and iBEAR use weights of 3,333, 3,333, and 3,334 basis points. Profiles specify a four-hour routine rebalance interval and a 10% drift threshold. Mutable parameters remain subject to contract bounds and current configuration.

BULL expresses a constructive view on BTC and HYPE. BEAR provides short exposure across major assets; its usefulness as a hedge depends on the holder's other positions. VOL concentrates that short view in BTC at higher leverage. The inverse products let users choose the opposite direction within each portfolio design.

Leveraged and inverse ETFs illustrate why a target multiple for one period does not promise that multiple over a longer holding period.[11] Ensemble uses its own time, drift, and margin triggers. An inverse vault reverses target direction, not cumulative returns. Compounding, funding, fees, and execution affect each portfolio separately. VOL is a concentrated short BTC strategy, not a volatility derivative or an option. The bluepaper derives a simple price path on which both sides of an inverse pair lose value.

1.2 Exposure and cash placement

Leverage determines the size of the market position. The cash target determines where collateral sits so the vault can support withdrawals and trading.

For shareholder net asset value (NAV) A, leverage L, direction $d \in \{-1, +1\}$, and weights w_i, the starting target is

$$N_i^* = d\, w_i L A, \qquad \sum_i w_i = 1. \tag{1}$$

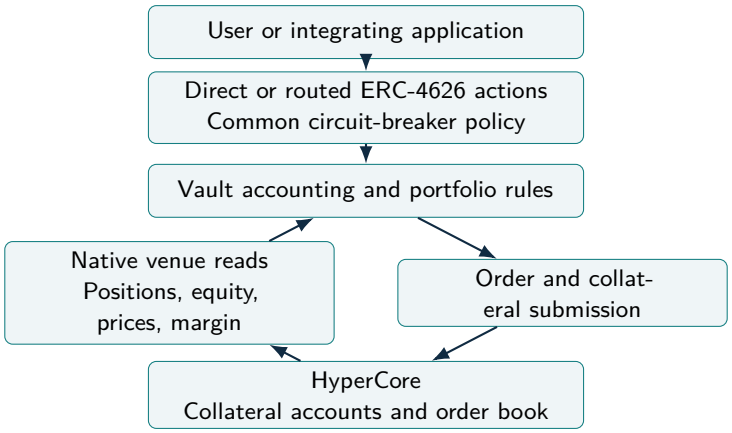
Execution costs and margin admission can reduce the actionable target. The cash target controls collateral location: 3x leverage with a 15% cash target starts from $3A$ notional. More cash on HyperEVM supports redemptions but leaves less venue margin backing the same exposure.

2 Architecture and integrations

Ensemble combines a place to trade with rules for owning and managing the resulting portfolio. Hyperliquid provides both parts; external applications connect through the vault share.

Hyperliquid combines a fully on-chain trading engine with Ethereum-compatible applications under shared consensus. HyperCore supplies collateral accounts and the perpetual order book; HyperEVM records ownership and runs the vault rules. This gives Ensemble native access to trading infrastructure while preserving a familiar token interface for applications.[3]

Native reads expose venue state at EVM block construction; submitted orders and transfers execute afterward.[4] Ensemble makes that boundary explicit, recording pending work and confirming results from later observations.



2.1 A standard share interface

The idea is familiar from exchange-traded funds: one share represents an interest in a managed portfolio. ETF market prices can differ from NAV, with creation and redemption providing an economic link to the underlying assets.[10] Ensemble brings that portfolio-share structure to Hyperliquid through contract-based issuance and redemption. The analogy concerns the economics, without implying the same legal protections or an ETF listing.

Shares implement ERC-4626 deposit, mint, withdraw, and redeem operations with USDC as the asset.[1] Direct and routed actions use the same circuit-breaker checks. A read interface exposes configuration, capacity, and maintenance previews. Applications and indexers present this state; they do not set NAV.

Share issuance and burning follow investor participation. Each share claims assets of its own vault; it does not inherently grant company equity, governance votes, or protocol-wide revenue rights. Transfers are normally available, with a freeze during permanent emergency settlement. Secondary-market prices can differ from NAV. Arbitrage requires executable vault actions and sufficient market liquidity after fees and trading costs.

2.2 Cross-chain access

Optional Chainlink CCIP routes authenticate the source chain and sender, then settle against the canonical HyperEVM vault under the same transaction policy.[6] Lock/release and remote burn/mint mechanisms represent shares on configured chains. Messages can arrive before the destination can complete an action. The protocol retains authenticated pending claims for later settlement or recovery rather than treating message delivery as a completed deposit or redemption. Each lane needs separate activation. Cross-chain messaging is distinct from native collateral movement between HyperEVM and HyperCore.

3 Lens, keepers, and protocol authority

The Lens shows what the vault holds and which actions are available. Keepers submit maintenance transactions, while contracts decide whether those actions are allowed.

3.1 Trustless maintenance through the Lens and keepers

The Lens exposes contract-derived NAV, capacity, portfolio state, and maintenance previews. Users, applications, and independent keepers can inspect the same rules. Keepers supply transactions; they do not set share prices or choose arbitrary portfolios. Vault contracts recheck eligibility, construct bounded orders, and record the outcome of each step.

Eligible collateral movement, rebalance, confirmation, stale cancellation, and emergency close are permissionless. Another caller can perform the same maintenance if a keeper stops. Execution therefore does not require a particular keeper's permission or custody of user funds. Timely maintenance still needs an available caller, gas, and venue processing.

Parameter and recovery administration remains separate from upgrade authority. Those powers can change configuration or future behavior; the trustless maintenance path does not remove them.

3.2 A shared view of the protocol

The Lens brings that state together for people and applications. This supports interfaces that explain what the vault can do now, independent monitoring, and research based on observable state.

A preview is an estimate under the state it reads. It does not reserve liquidity or replace execution checks. The keeper's task is to observe, submit an eligible call, and confirm its result. The vault determines admissible sizes and destinations. Successful submission creates a pending operation where required; subsequent reads establish completion.

3.3 Bounded administration

Authorized administrators configure economic and risk parameters within contract limits, including fees, deposit caps, execution bounds, and portfolio settings. Recovery powers handle exceptional states.

Upgrade authority is a separate power that can change implementation behavior. A keeper gains none of those privileges merely by maintaining the vault.

The result is verifiable automation: users can inspect both the economic rules and the authority that can change them. Open maintenance reduces dependence on one operator without assuming that every operational dependency disappears.

4 Accounting and economics

A share represents part of the vault after its costs and obligations. The accounting rules determine that value, and the fee rules explain how operating the strategy affects it.

NAV combines accounted HyperEVM capital and venue equity, then deducts funded reserves and fees. The formulas here use USDC and whole shares; the bluepaper specifies integer scales and rounding.

Let E be accounted HyperEVM capital, C Core spot USDC, P signed perpetual account equity, and R the configured Core recovery reserve. With confirmed Standard separate-ledger account mode:

$$R_f = \min\{R, C + \max(P, 0)\}, \qquad G = E + C + \max(P, 0) - R_f. \tag{2}$$

Only available Core capital funds the reserve. Without the account-mode attestation, observed gross NAV is $\max\{E + C + P - R_f, 0\}$; deposits and redemptions require the attestation.

4.1 Reserving the cost of exit

Closing positions costs money. The vault sets aside a modeled exit cost before valuing the assets available to shareholders.

For aggregate notional $N > 0$, normal price band b bps, and execution-fee estimate e bps:

$$u = b + \left\lceil \frac{(10^4 + b)e}{10^4} \right\rceil + 1, \qquad U = Nu/10^4. \tag{3}$$

The amount rounds up in asset units and, in Standard mode, is capped by positive perpetual account equity. It is zero without positive notional, or without positive perpetual account equity in Standard mode. A 100-bps band and 5-bps fee produce a 107-bps reserve rate, including higher-price buy-close fees and a rounding allowance. The execution-fee estimate is configured separately from the builder rate. The reserve covers its normal execution model, not arbitrary gaps or liquidation.

After unwind reserve U and accrued plus pending fees F, shareholder NAV and idealized share price are

$$A = \max\{G - U - F, 0\}, \qquad q = \frac{A + 1}{S + 1}, \tag{4}$$

where S is whole-share supply. The offsets are one USDC and one share. A deposit x receives approximately $x(1 - f_d)/q$ shares; redeeming s returns approximately $sq(1 - f_w)$ USDC. Exact mints and withdrawals solve these conversions in reverse, rounding against the requester.

4.2 Fees and returns

Fees pay for operating the strategy and reduce the value left to holders. Their charging bases differ: time, deposits, withdrawals, and observed rebalance activity.

All six vaults share the published schedule. Management accrues on an assets under management (AUM) checkpoint:

Fee	Rate and basis
Management	2.0% annually on checkpoint AUM
Deposit	0.1% of deposited assets
Withdrawal	0.3% of gross redeemed assets
Builder	0.1% of observed rebalance notional

Management fees carry integer remainders between accruals. Management, deposit, and withdrawal rates are configurable within a 10% cap. Builder fees require a configured recipient and rate, with a 0.1% cap. Their basis is attributable rebalance position movement valued at the settlement mark, capped by the submitted size. They accrue as USDC liabilities, separate from exchange trading fees; recipient changes preserve unpaid claims. A cycle that ends in cancellation can still owe a fee on observed partial progress. An optional fixed keeper reward can also be paid from spendable vault cash after settled maintenance.

Without external investor cash flows, economic change can be organized as

$$\Delta V = \Pi_{\text{price}} + \Pi_{\text{funding}} - C_{\text{trading}} - F_{\text{protocol}}. \tag{5}$$

Funding can credit or debit a position.[5] Collateral timing and accounting reserves affect reported NAV, so this decomposition does not replace the vault's valuation rules. Fee revenue depends on assets, activity, configured rates, and collectible funds. Trading also imposes costs on holders. The operating objective is to maintain the defined exposure within its rules, rather than maximize turnover.

5 Portfolio operation and controls

Users choose when to enter or leave a strategy. The vault maintains the portfolio between those decisions, subject to limits on user flows, order prices, and available margin.

5.1 Entry and exit

An accepted deposit issues shares immediately after the entry fee. It requires confirmed account mode, nonnegative perpetual account equity, and applicable state and capacity checks. The first deposit at zero supply must be at least ten USDC. An optional epoch cap limits intake without creating a settlement queue. Total deposit caps separately bound product scale, serving an exposure-limiting purpose comparable to Aave's supply and borrow caps.[14]

Deposit and redeem specify what the user puts in; mint and withdraw specify the shares or net assets the user wants to receive. Exact-output actions solve the fee and share conversions in reverse. All four operations apply the same underlying valuation and transaction policy.

A normal redemption burns shares and pays available HyperEVM USDC after the withdrawal fee. Insufficient liquidity, pending maintenance, or emergency margin stress blocks the action. Separate collateral withdrawals refill the cash buffer within the venue margin floor.

5.2 Circuit breaker and controlled capital flows

The circuit breaker gives every vault a common layer of entry and exit controls. Direct and routed actions share authorization, pause, minimum-size, and capacity checks. Operators can bound covered flows across the protocol, a vault, an account, or a vault-account pair; applications can read remaining capacity before submission.

Enabled withdrawal caps can slow rapid outflows through these paths, giving operators time to investigate and respond. This is the rationale behind the ERC-7265 circuit-breaker proposal and Flying Tulip's documented withdrawal controls.[7, 8] Ensemble applies separate deposit and redemption policies, rejecting actions that exceed capacity without creating a withdrawal queue.

For bucket duration τ, each scope sums current and preceding bucket usage:

$$k = \lfloor t/\tau \rfloor, \qquad U_j = u_{j,k} + u_{j,k-1}. \tag{6}$$

The preceding term is absent at the first bucket. A nonzero cap C_j leaves $\max\{C_j - U_j, 0\}$ capacity; zero disables that dimension. The most restrictive applicable limit governs. Chainlink CCIP uses continuously refilling token buckets for individual lanes; Ensemble instead sums full time buckets across its applicable user-flow scopes.[12] These controls do not bound trading losses or provide Sybil resistance.

5.3 Rebalancing and confirmation

Eligible deviations produce immediate-or-cancel limit orders. Reductions precede expansions. Price bands, lot sizes, a ten-USDC minimum order, margin checks, optional caps, and failure backoff constrain placement. Expansion buys size down at the greater of mark and limit price; reductions size upward and cannot cross through flat into fresh exposure.

The window opens at the routine interval, at twice the drift threshold, for a placeable reduction meeting normal drift, or at 30% free margin or below. Each expansion must leave at least 30% free margin assuming all increases fill independently and pay the configured execution-fee estimate. Unfilled reductions cannot supply that margin.

Confirmation measures directional position movement against submitted sizes. A cycle completes when every asset reaches its expected size or its residual is no longer placeable. Otherwise, stale cancellation and retry apply. Submission alone does not prove execution.

6 Recovery and protocol limits

When normal operation cannot continue, the protocol keeps track of open positions and unsettled claims. Recovery rules determine how exposure is reduced and recovered funds reach shareholders.

6.1 Emergency recovery

Emergency margin stress defaults to free margin at or below 20% of positive perpetual account equity. Negative equity is stressed; zero equity is stressed when margin remains used. When a rebalance is pending, emergency close first cancels its orders and waits for readiness. It then submits reduce-only closes using later reads. Failed per-asset closes remain recorded. Emergency controls can also give human operators time to respond: Lido's circuit-breaker design lets designated committees temporarily pause selected contracts.[13] Ensemble combines its pause policy with margin-triggered, permissionless closing rules; these are distinct mechanisms.

Permanent withdrawals distribute recovered funds against a fixed share snapshot. Cross-chain recovery reconciles locked shares and remote claims. After emergency share settlement, late authenticated deposit USDC is refunded instead of purchasing shares.

6.2 Portfolio transitions

A portfolio change stages a new basket while retaining the information needed to finish the old one. Rebalancing closes removed exposures and resizes retained or added assets under the same execution controls. Nonzero removed positions remain visible; residual dust carries zero target weight after the new basket is applied. Applying or canceling a transition depends on its current blockers, so configuration cannot erase an outstanding position.

6.3 Protocol characteristics

A vault share is a composable portfolio. The trading strategy stays inside the vault, while ownership moves through a standard token interface. Applications can integrate the position without rebuilding its margin and execution logic.

Ensemble separates decisions that are often combined. Portfolio direction sets the market view; leverage sets target exposure; cash placement supports liquidity; the circuit breaker bounds user flows. Each is observable and governed by its own rules. Inverse pairs reuse this system with independent assets and liabilities.

The Lens and permissionless maintenance make those rules inspectable and actionable by independent participants. Reserve-aware valuation recognizes modeled exit costs before allocating shareholder value. These features connect product simplicity to explicit accounting rather than hiding portfolio mechanics behind a quoted token price.

Obligations remain tracked until settlement. Unpaid builder claims retain their recipients, and failed cross-chain settlement retains pending claims. Applications can reason about recoverable assets through intermediate states.

A transferable share also gives independent developers a common integration point for portfolio interfaces, secondary markets, and other financial applications. Those applications must evaluate their own liquidity and risk requirements. A standard interface makes integration possible; it does not establish that a particular market or listing exists.

Leverage magnifies adverse moves, and rebalancing makes returns path-dependent. Funding, execution costs, partial fills, and collateral timing affect tracking. Cash reserves and emergency controls cannot guarantee principal, fills, or continuous redemption liquidity.

Operation depends on correct contracts, venue state, account mode, USDC, and available maintenance callers. Cross-chain routes add messaging dependencies. Upgrade authority can change future rules. Researchers evaluating tracking or hedge behavior need observed fills and consistent cash-flow, cost, and valuation assumptions.

References

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