DingoSwap: An Omni-Chain AMM Built on LayerZero

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Abstract. DingoSwap is a new protocol built on LayerZero that enables cross-chain atomic swaps of native assets. It uses an omni-chain intermediate token, DINGO, to support fast transfers between LayerZero chains. DingoSwap plans to create deep omni-chain liquidity by bootstrapping an unparalleled amount of capital via a token launch best described as a capital-efficient lockdrop. DingoSwap also intends to perpetually sustain this deep liquidity by employing "protocol blended liquidity," a novel approach to attracting lasting LPs and managing liquidity.

1. Introduction

The success of most tokens and projects currently depends too much on the blockchain where they are deployed. While applications, liquidity, and user interest can shift quickly between chains, most projects cannot take advantage of these cycles and remain tied to the mast of their sinking host network during high gas and network outages. Dingo, named after the speedy Australian canine, plans to become the dominant omni-chain token by enabling atomic cross-chain swaps and transfers.

Dingo tokens live on LayerZero and can be natively transferred to or exchanged for native tokens on any LayerZero supported chain. In the future, DingoSwap plans to support every viable cross-chain messaging framework and the chains they integrate. To provide the deepest omni-chain liquidity, DingoSwap uses Protocol Blended Liquidity (PBL), a new primitive that allows LPs to time-lock approved collateral in fee-generating positions in exchange for upfront DINGO.

PBL represents a fundamentally different approach to incentivizing long-term, stable token liquidity than Tokemak and Curve, and stands to change how projects incentivize liquidity. To bootstrap the system, DingoSwap will distribute DINGO to people that lock collateral as system liquidity for a fixed duration. To support continued growth, DingoSwap will introduce limited-supply PBL shortly after the token launch.

DingoSwap will deploy PBL in two ways: 1) 50% will be *blended* with protocol-owned DINGO in Uniswap v2 pools on LayerZero chains and 2) 50% will provide *asymmetric liquidity* via Uniswap v3 on Mainnet Ethereum. At the end of the lock period, the LP receives the non-Dingo half of the v2 LP token back along with their v3 LP token plus generated fees.

The Dingo token launch seeks to attract all kinds of collateral and will use carefully tuned reward-multipliers to appeal many distinct investor types within crypto. LPs that need short-term liquidity can lock for 1-month at a time, while those seeking an illiquidity premium can lock for up to a year. In addition, LPs who lock blue-chip assets or lock earlier in the launch process collect slight reward multipliers. These incentives, expanded in the token launch section, aim to proportionately and sufficiently compensate all believers in the DingoSwap mission.

2. Protocol Blended Liquidity

Olympus DAO pioneered the concept of Protocol Controlled Liquidity (PCL), where investors would "bond" or sell assets to the Olympus treasury in exchange for OHM at a discounted price. While this mechanism proved an effective way to increase treasury assets–Olympus accumulated nine figures of assets in under a year–purchasing liquidity incurs high upfront costs that lead to the severe cyclical overextensions and corrections exhibited by many PCL-driven protocols.

Protocol *controlled* liquidity has advantages, but protocols can control liquidity without owning it. Dingo's Protocol Blended Liquidity keeps these advantages and avoids high upfront costs by *perpetually blending* locked assets with protocol-owned Dingo. Essentially, users lock supported tokens, which earn LP fees when blended with protocol-owned Dingo in LP vaults. In return they receive both a competitive amount of upfront Dingo tokens and their LP tokens back at the end of the lock period.

PBL reliably secures asymmetric liquidity with greater capital efficiency than all previous bonding mechanisms. It ensures stable upward price movement without the inherent variance of Olympus and stands to change how protocols incentivize liquidity.

3. Asymmetric Liquidity

When Uniswap launched the first automated market maker (AMM), LPs could only provide 50/50 paired liquidity spread evenly across all possible prices. With Uniswap v3, LPs could concentrate their liquidity in specific parts of the price range. While many LPs concentrated 50/50 liquidity around the current price, this strategy was not required. If desired, LPs could deploy more sell-side liquidity than buy-side, providing *asymmetric liquidity.* However, this strategy did not make much sense for v3 LPs, as single LPs usually cannot change the shape of a liquidity distribution.

ICHI, however, showed that when v3 LPs share a strategy, they can influence market dynamics. While the project unfortunately used excessive leverage, they discovered an important concept: greater sell-side than buy-side liquidity creates upward price pressure. DingoSwap seeks to prove that providing a healthy amount of asymmetric liquidity creates significant value for long-term projects that don't want intense price drawdowns to distract from their goals. For details, see LP Strategy Specifics.

4. Token Launch

DingoSwap will use a new token launch design where participants provide liquidity for a fixed period in return for Dingo. The specific amount of Dingo received depends on:

1) the USD value of the collateral
2) that asset's "collateral multiplier"
3) the locking period duration
4) how early the asset was locked

Blue-chip assets locked on the first day for one year will receive the most Dingo per USD provided, but the optimal provided asset, locking period, and lock time for a particular investor depends on their desired risk profile. The incentives are meant to balance the risk/return for each option, so participants can select one based on their market beliefs or desired payoff.

Collateral will be valued based on the geometric time-weighted average price over the week prior to launch. Because the market prices during the launch will likely deviate from this price,

arbitrageurs can lock favorably priced capital to benefit from price discrepancies. To correct for this arbitrage, however, participants who lock earlier get a time-based multiplier on their collateral value. This multiplier will start at 1.15x and logarithmically decrease to 1.0x on the last day.

The launch will also value collateral types slightly differently to reflect the stability of their on-chain liquidity. Tokens will be valued for Dingo emissions at their USD value times their collateral multiplier. The launch categorizes collateral as follows (ordered by market cap):

- Blue-chip (1.07x): ETH, USDT, USDC, WBNB, BUSD, WBTC, STETH, DAI, WAVAX, SHIB, WMATIC, FTT, LINK, UNI, APE, AAVE, MKR, WFTM
- Gray-chip (1x): LEO, CRO, OKB, SAND, AXS, MANA, FRAX, TUSD, BTT, GRT, USDP, USDN, HNT, BIT, NEXO, LRC, CVX, AMP, SNX, BAT, GALA, FEI, STG, CRV, LDO, COMP, GOHM, SUSHI, YFI, SYN, MPL, LOOKS, SPELL, BAL, ALCX
- Brown-chip (0.93x): DOG, QOM, LEASH, BONE, KISHU, SAITAMA, BOBA, FLOKI, BABYDOGE, ELON, HEX

Participants can choose between 1-month, 6-month, and 12-month locking times that earn 8%, 10%, and 12% APR, respectively. At the end of each lock period, participants have the option to continue bonding for the same number of Dingo tokens for up to a year after launch. When the locked token underperforms Dingo, the collateral will earn significantly higher APY, as the Dingo payment sizes won't change. When the collateral outperforms Dingo, participants can withdraw and relock it at the current PBL 1-month interest rate, thus earning more Dingo for their collateral.

The launch will auction 1 billion Dingo over the 21-day locking period, representing 12.5% of the supply. Because 1-month and 6-month purchasers have an option to continue locking their collateral at the same Dingo emissions rate until 12 months after launch, these unearned tokens will be allocated from this 12.5%. Allocations for users that choose to discontinue locking will be sent to the zero address and burned.

This token launch design enables price discovery for the Dingo received per USD of locked collateral. Additionally, because participants receive their yield-generating LP tokens back after their lock period, it has the potential to raise far more capital than traditional token sales.

5. DingoSwap Specifics

DingoSwap seeks to enable seamless atomic swaps of any native token on any LayerZero supported chain to any other native token on a different chain. For example, if a user has ETH on Mainnet and wants to receive AVAX on Avalanche, they would specify their desired output currency and chain in the DingoSwap UI, send ETH to DingoSwap on Mainnet and immediately and trustlessly receive AVAX on Avalanche.

A DingoSwap cross-chain exchange works as follows:

1) User specifies origin chain input token, desired output token, and the destination chain
2) User's input token is swapped for Dingo on the origin chain's UNI
3) DingoSwap sends Dingo to the other chain using LayerZero
4) Dingo is swapped for the desired output token on destination chain and sent to user

Thus, users will eventually be able to efficiently get any native asset on any chain in exchange for any native asset on any chain. Starting day one after the token launch, steps 1-3 will be fully functional. Shortly after, DingoSwap plans to lock PBL on all LayerZero chains to complete step 4 for supported assets. DingoSwap does not plan to take any fees, but every time Dingo goes cross

chain in any transaction, 5 basis points will be burned, creating deflationary pressure that benefits long term Dingo holders as the exchange gains adoption, powering larger DeFi applications.

6. LP Strategy Specifics

After the token launch, DingoSwap will have locked liquidity and Dingo will have an expected market price. That price can be estimated by considering the 1) amount of Dingo issued and 2) the opportunity cost of the capital locked to receive it. For example, if participants lock assets worth $500M for 1B Dingo, we can assume that (given a 10% rate of return in crypto), that the issued Dingo is worth $50M or $0.05/Dingo.

Each LP pool asset's starting price (quoted in Dingo) will be calculated based on the amount of assets locked and the percentage of locked USD value those assets represent. For example, in the case where the auction raises 1B STG, tied to about 20% of locked USD value, the initial STG - DINGO AMM price will be $\frac{20\% * 1B\ DINGO * 10\%}{1B\ STG}$ or 0.02 Dingo per STG.

Using this pricing information, DingoSwap's PBL will be blended with protocol-owned Dingo and deployed in two parts: half on Mainnet UNI v3 and half on Mainnet UNI v2. While DingoSwap plans to lock PBL on all LayerZero chains soon after launch, the initial liquidity just aims to sufficiently collateralize the Mainnet leg of the omni-chain token transfer system. The DINGO provided to each UNI v2 pool will equal the pool asset's initial Dingo price (from the previous formula) multiplied by the amount of the asset supplied. In the previous example, DingoSwap would deploy half the Stargate (500M STG) paired with 10M DINGO.

The PBL deployed on Mainnet UNI v3 will provide asymmetric liquidity. 25% of this liquidity will be paired with protocol-provided Dingo (amount calculated the same as on v2) and deployed as near-full-range liquidity and 75% will initially be deployed as concentrated liquidity with a lower and upper tick just below the calculated starting price. During high market volatility, Dingo's price will remain most correlated with the coins that best weather that turbulence.

Because the protocol-locked Dingo buying power exceeds the initial liquid Dingo supply by around 10x, and the amount deployed in the v3 buy wall exceeds it by 3.75x, at most 27% of the buy wall can be broken through. The buy wall's maximum upper tick before selling 100% of the released supply would break below the lower tick price is about 14x the original Dingo price.

This value equals the maximum price the buy wall could pay for 100% of liquid supply divided by the initial price and squared. When the buy wall is 37.5% (= 50% * 75%) of locked liquidity and the initial price is 10% of locked liquidity, the buy wall can pay on average 3.75x the initial price. Thus, if the lower tick remains the initial price, the upper tick can go up to 3.75^2 (~14x) the initial price before the v3 average execution price (geometric mean of range ticks) moves above 3.75x original price. This estimation is extremely conservative, however, as a large part of the auctioned supply (Dingo tied to 1-month locks) will slowly be released over the year.

Every 24 hours a rebalance occurs where if the Uniswap v3 1-hour twap price for a particular pool is above the current v3 concentrated range upper tick, the upper tick increases to the tick just below the current twap price. The upper tick cannot decrease and will only stop increasing once it hits the global maximum multiple of the lower tick price. As DingoSwap increases the asymmetric liquidity by locking more PBL, however, DingoDAO can vote to raise the upper tick maximum to more accurately reflect the current PBL vs float ratio. DingoDAO can also vote to temporarily *decrease* the maximum upper tick if it would like to pace growth.

This aggregate LP strategy enables relatively low-risk position-leveraging for initial Dingo holders. When DingoSwap first launches, the optimal leverage long strategy should be to borrow a proportional amount of each Dingo-supplied asset and sell those assets for Dingo. Such a portfolio's risk of liquidation at the original price is near-zero.

7. Calculating Token Launch Payoffs

While the general payoff for Token launch participants and early PBL lockers remains heavily tied to the appreciation of the Dingo token, the exact payoff after the launch locking period ends also depends on the asset locked. Assume that Dingo appreciates 20x, and the participant locked 1 million Stargate (STG) for one year on the first day of the token launch. Consider the cases where STG decreases 50% and increases 25x.

When STG decreases 50% in USD terms, the participant will receive: 1) 375,000 STG from the UNI v3 concentrated position, 2) ~3.95 million STG from the UNI v2 position, 3) ~200,000 STG in estimated collected UNI v2 fees. In total, they'll receive ~4.5 million STG for a 350% STG gain and 125% USD gain. Holding the original Dingo, their total USD return would be 401%.

When STG increases by 25x in USD terms, the participant will receive back, 1) a 20x USD gain from their v3 position (returned in Dingo), 2) about 559,000 STG from the v2 position, 3) about 30,000 STG in v2 fees. Holding the original Dingo, their total USD return would be 2,499% or 25x ($0.625 * \frac{559{,}000 + 30{,}000}{625{,}000} * 25 + .375 * 20 + 0.12 * 1.15 * 20$).

Note that even though the participant only receives STG back from the UNI v2 positions, the value of the STG half still relates to Dingo's price appreciation. Dingo goes relatively up, STG half will include more STG. The exact payoff can be calculated using a Uniswap v2 IL calculator.

In addition, the UNI v3 position acts like a continuous limit sell order for STG, where whenever Dingo outperforms STG, the position sells into Dingo (and vice versa). Thus, if Dingo outperforms STG, the participant gets STG back, if it underperforms, they get Dingo back, and if it performs about the same (final price within active LP range), they get a mix of Dingo and STG.

8. Token Distribution

- Community 65%
- Team 20%
- Token Launch 12.5%
- Dingo Pre-Sale 2.5%

The total Dingo supply will be 8 billion with no potential for inflation. The community Dingo (65%) can be directed by DingoDAO and will be vested linearly over 4 years, aside from the initial ~8% unlocked immediately to provide the launch's protocol-owned Dingo liquidity. The allocation is meant for community grants, protocol-owned liquidity, liquidity incentives, community airdrops, and DingoDAO-directed efforts to support Dingo's mission.

The team allocation (20%) will compensate all those who have worked on DingoSwap to date and ensure sufficient incentives for future innovation. These tokens will be vested linearly over durations that differ between team members depending on their roles. Vests are maximum 4 years. Additionally, the Dingo pre-sale tokens will be vested linearly over 18 months.

9. Roadmap

Q2:

- Complete Audit (Late June)

Q3:

- Run Token Launch (Early July)
- Deploy DingoSwap
- Establish DingoDAO
- Launch DingoSwap PBL Bonding

Q4:

- Release DingoUSD Stablecoin
- Start DingoDAO development grants program
- Create roadmap for developing Dingo-powered DAPPs