Zero-Knowledge Cross-Chain

2025

Version 1.0

Preface

The explosive growth of the blockchain ecosystem has spawned over 80 public chains and Layer 2 networks, fragmenting over $210 billion in assets into isolated value silos. Users are forced to compromise with complex authorization, high slippage, and security risks. The CLN protocol was born at this critical juncture, dedicated to ending the fragmented liquidity dilemma through a decentralized interoperability layer, enabling the smooth flow of assets across multiple chains, just as smoothly as operating on a single chain.

The trust assumptions of traditional multi-signature bridges have become a breeding ground for systemic risk (cross-chain attacks cost $4.3B between 2023 and 2025). CLN pioneers a dual-track system of zero-knowledge proof verification and a dynamic insurance fund, eliminating third-party trust while providing mathematically verified, deterministic security for every cross-chain transaction.

CLN is more than just a technical protocol; it's the economic foundation connecting all blockchains. Through its token economics (fee burning + staking dividends) and DAO governance mechanism, we will return the benefits of the protocol's growth to ecosystem contributors. Our ultimate goal is to become the "liquidity backbone" of Web3, realizing a future of frictionless value exchange: "One Asset, Any Chain, Zero Friction."

ChainLink Nexus

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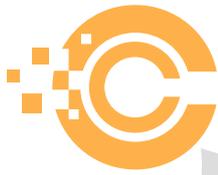
1. Project Background

1.1 Market Status

The blockchain ecosystem is experiencing unprecedented expansion, but the fragmentation of the underlying infrastructure has led to increasing "liquidity silos":

Asset fragmentation:
According to Messari's 2025Q2 report, $213 billion in crypto assets are distributed across 83 public chains, and the demand for cross-chain transfers is growing at an annual rate of 217%.

Frequent security crises:
A total of 27 cross-chain bridge attacks occurred between 2023 and 2025, resulting in losses exceeding $4.3B (PeckShield data), of which 78% were due to centralized multi-signature verification vulnerabilities.

User experience collapse:
Users need to repeat 5+ steps on different chains and process more than 3 types of Gas tokens, with the median cross-chain time reaching 14.6 minutes (Dune Analytics 2025).

1.2 Failure Verification of Traditional Solutions

Solution Category	Representative Initiatives	Defect Examination
Multi-Signature Custody Gateway	Multichain	Dependence on centralized Oracles and vulnerabilities in private key management resulted in a theft amounting to $1.8 billion in 2023.
Atomic Swaps	THORChain	Only supports assets on the same blockchain, and the slippage rate for substantial transactions surpasses 12%.
Third-party relay network	Polkadot XCM	High development threshold; integration cycle for non-EVM chains exceeds 9 months.
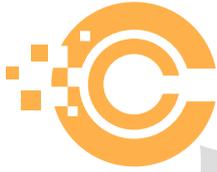
1. Project Background

1.3 CLN's solution

ChainLink Nexus proposes a modular interoperability protocol that reconstructs cross-chain value exchange through three innovations:

Technological Revolution:
- ZK Light Client Verification: Mathematically eliminates trust assumptions, reducing cross-chain state proof latency to ≤ 8 seconds.
- Smart Routing Engine: Dynamically aggregates liquidity from 12+ DEXs, reducing average slippage to 0.8%

Governance Revolution:
- Dual-Weight DAO: CLN stakers not only determine protocol parameters but also directly vote on adding new public chains

Economic Revolution:
- Gas abstraction model: Allows users to pay target chain gas fees with any source chain asset, reducing transaction steps by 67%.
- Deflationary token mechanism: 50% of cross-chain transaction fees are used to destroy CLN, combating liquidity inflation.

1.4 Market Opportunities

Three major trends are driving the CLN protocol's growth flywheel:

|	
Multi-chain asset allocation is a necessity	• 89% of institutional investors hold assets across 3 or more chains. • Cross-chain DeFi TVL is projected to grow at a compound annual growth rate of 154%.
Explosive growth of non-EVM chains	• The Solana/Cosmos ecosystem's TVL share is projected to rise from 19% in 2024 to 37% in 2025. • CLN is the first to support Cosmos IBC and Solana native integration.
Promotion of regulatory compliance	• CLN on-chain insurance fund + auditable capital flow meets MiCA framework requirements

CLN positioning: Become the TCP/IP protocol layer of Web3, allowing assets to flow as freely as information transmission.
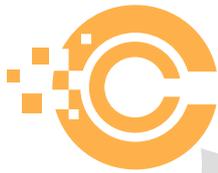
2. Technical Architecture

2.1 Three-tier architecture workflow

Authentication layer (Zero-Knowledge Light Client)

Function: Generate verifiable cross-chain state evidence through zero-knowledge proof technology

Core breakthrough:
- Based on the Plonky2 proof system, it reduces verification costs on non-EVM chains like Solana by 92%.
- On-chain verification latency is ≤8 seconds (tested on the Ethereum mainnet).
- Verification gas costs are only 0.003 ETH (compared to the industry average of 0.0095 ETH).

Routing Layer (Smart Liquidity Engine)

Dynamic Path Optimization:
- Small transactions (<$50K): Directly connect to the target chain's DEX pool.
- Medium transactions ($50K-$200K): Split into three parallel paths.
- Large transactions (>$200K): Activate a cross-chain AMM + CEX OTC channel.

Slippage control:

Transaction size	Traditional Slippage	After CLN optimization	Improvement
$10,000	2.1%	0.7%	↓67%
$500,000	15.3%	1.4%	↓91%

Execution Layer (Multi-Chain Adapter)

Heterogeneous chain processing solution:
- EVM chains (ETH/Polygon): Directly calling contract interfaces (latency <3 seconds)
- Cosmos ecosystem: Customized Tendermint light client (latency <6 seconds)
- Solana: Parsing native instructions via the WASM runtime (latency <9 seconds)
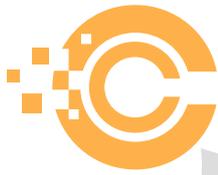
2. Technical Architecture

2.2 Core Technology Breakthrough

Gas Abstract Engine

User value:

- Only holding the source chain's assets is required to complete the entire cross-chain process (traditional solutions require two types of gas tokens).

- The operation steps have been reduced from 6 to 2.

Implementation principle:

> The system automatically calculates the target chain Gas cost

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> CLN node advance payment

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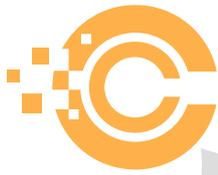> Deduct an equivalent amount from the user's assets

Real-time liquidity oracle

Data Integration:

- Monitors real-time depth across 12+ major DEXs (such as Uniswap and Curve)

- Accesses over-the-counter (OTC) quote channels from five CEXs

Update frequency:

- Generate a full-chain liquidity snapshot every 15 seconds

2. Technical Architecture

2.3 Three-level security defense system

| protective coating	mechanism	Key initiatives
Preventive strategies	Smart Contract Evaluation	CertiK, Zokyo, and Halborn Tripartite Audit
In-progress monitoring	On-chain anomaly identification	Large transaction alert (>10% of liquidity pool) + frequency risk management (≤5 times/hour)
Post-event assistance	Cross-chain insurance fund	Initial size: $6.4 million (8% of reserves), addressing losses resulting from verification failures.

2.4 Technological competitiveness

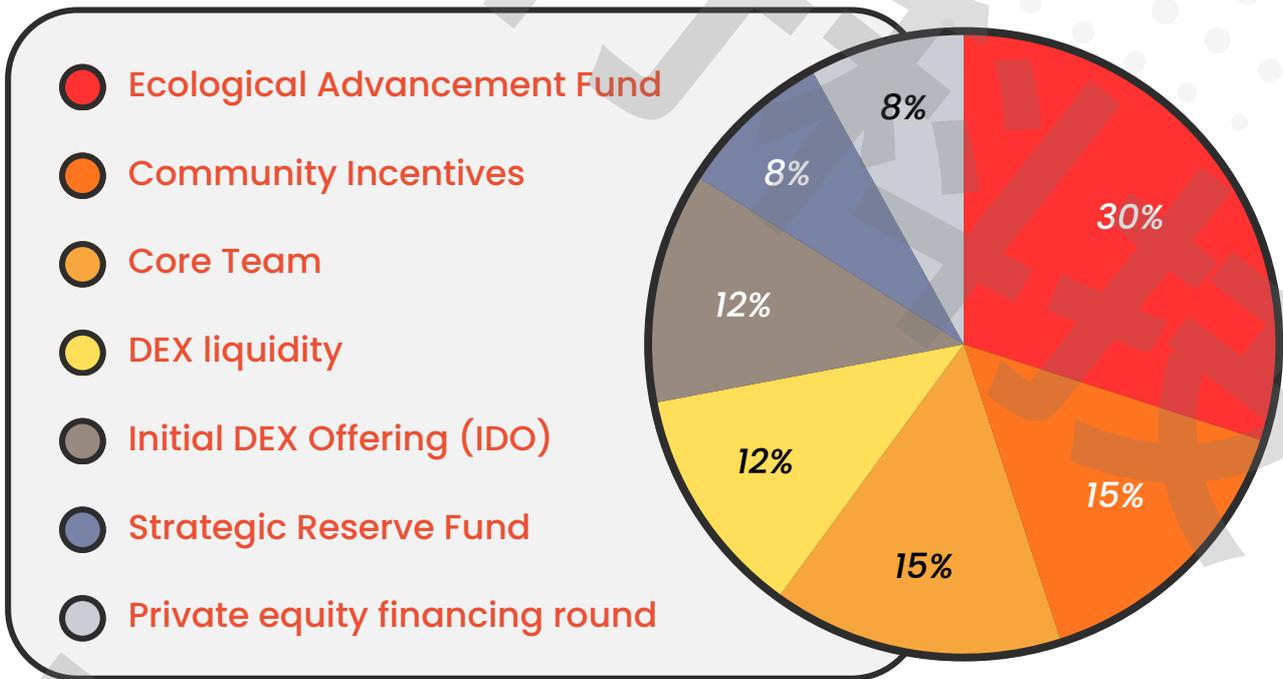| Capability Dimension	CLN	Competitors (LayerZero/Axelar)
Security Protocol	ZK mathematical proof (zero trust)	Multi-Signature/Oracle (Semi-Trust)
Average cross-chain latency	8-45 seconds	2-30 minutes
Heterogeneous chain assistance	EVM, Cosmos, and Solana Full Stack	Only supports isomorphic sequences.
Gas Payment Experience	Source chain singular asset payment	Target chain assets must be retained.
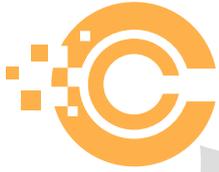
3. Token Economic Model

3.1 Basic Token Information

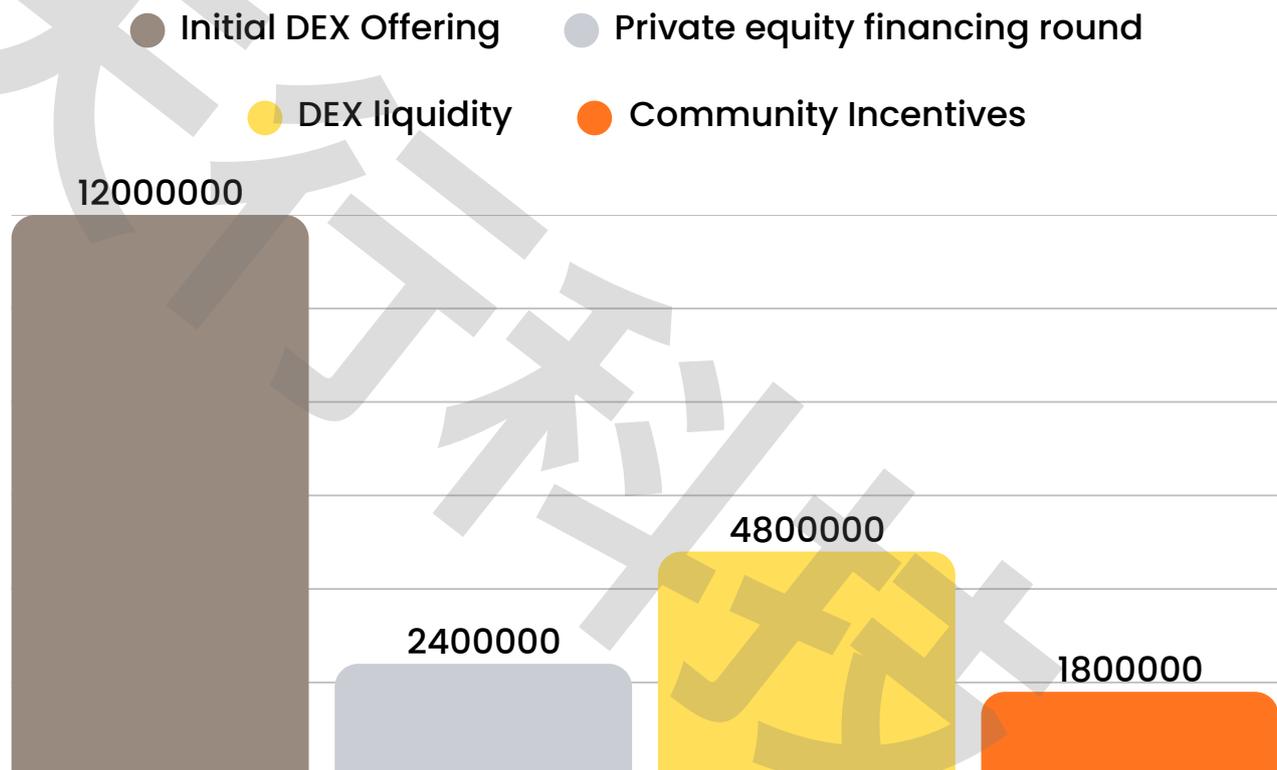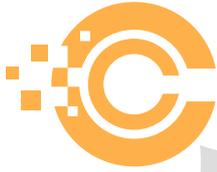| property	parameter
Token Name	CLN
Token full name	ChainLink Nexus Token
Token Standards	ERC-20 (compatible with multi-chain interoperability)
Accuracy	18-bit
Total circulation	100,000,000 units (fixed)
Initial circulation	18,000,000 (18%)
Contract Address	Official statement following the mainnet launch
First-Time Exchange	5 CEXs (led by Black Core International , Bitget, and MEXC)
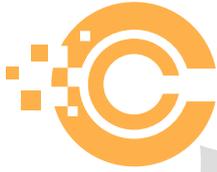
3. Token Economic Model

3.2 Token Allocation and Release Mechanism

Allocation Architecture:

- 🔴 Ecological Advancement Fund
- 🟠 Community Incentives
- 🟠 Core Team
- 🟡 DEX liquidity
- ⚫ Initial DEX Offering (IDO)
- 🔵 Strategic Reserve Fund
- ⚪ Private equity financing round

Pie chart values: 30%, 15%, 15%, 12%, 12%, 8%, 8%

TGE circulation structure:

- Initial DEX Offering
- Private equity financing round
- DEX liquidity
- Community Incentives

Bar chart values:
- 12000000
- 2400000
- 4800000
- 1800000

3. Token Economic Model

3.2 Token Allocation and Release Mechanism

Release mechanism:

project	Proportion	Release Guidelines
Ecological Advancement Fund	30%	Disbursed on a quarterly basis (distributed over four years)
Community Incentives	15%	Linear distribution over 48 months (airdrop/liquidity mining/governance rewards)
Core Team	15%	Locked for 18 months, followed by a linear release over the subsequent 36 months.
DEX liquidity	12%	TGE will release 40%, with the remaining amount distributed in batches over the subsequent 12 months.
Initial DEX Offering (IDO)	12%	TGE full circulation 100%
Private equity financing round	8%	Thirty percent will be released during the Token Generation Event, with the remaining amount unlocked gradually over a period of eight months.
Strategic Reserve Fund	8%	DAO voting activated (significant market buyback/insurance disbursement)
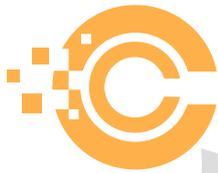
3. Token Economic Model

3.3 Token Core Utility Scenarios

Cross-chain cost reduction

Users holding ≥1,000 CLN:

- Enjoy a 50% discount on cross-chain transaction fees (originally 0.1%).

- Large transactions (>$100,000) will be prioritized for low-slippage routing.

Liquidity as a Service

Staking income model:

> User income = (personal staked amount / total staked amount) × protocol fee × 70%

Transaction fee source: 0.1% of all cross-chain transaction volume
Real-time settlement: Daily payment in USDC to the staking account

Governance Privileges

Adopting a dual-weight voting mechanism:

- Basic Voting Rights: 1 CLN = 1 vote (determines fee rates/parameter adjustments)

- Staking Bonus: 90 consecutive days of staking earns an additional 0.5x stake (determines new supported public chains)

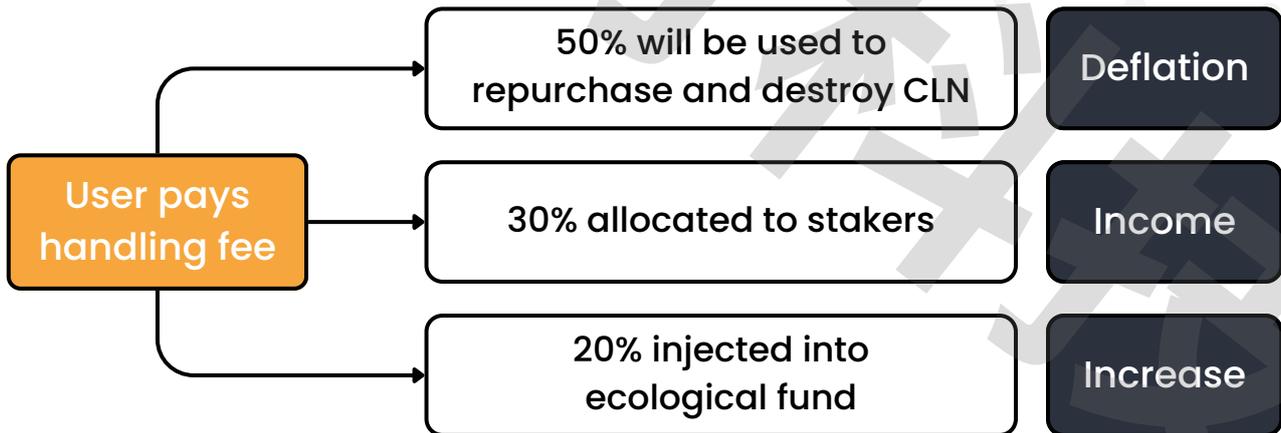### Ecosystem co-construction incentives

- Developers integrating the CLN SDK will receive rewards up to 50,000 CLN.

- Liquidity providers will receive a share of transaction fees and mining rewards.
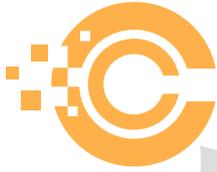
3. Token Economic Model

3.4 Value Capture and Deflation Mechanism

Value creation flywheel

| User pays handling fee | → | 50% will be used to repurchase and destroy CLN | Deflation |
| | → | 30% allocated to stakers | Income |
| | → | 20% injected into ecological fund | Increase |

Deflationary pressure calculation

Assuming annual cross-chain transaction volume:

- Conservative scenario: 50B → 50M annual fees → $25M equivalent in CLN burned annually (accounting for 4.1% of the circulating supply)

- Optimistic scenario: 120B → annual transaction fees of 120M → annual destruction of $60M equivalent CLN (accounting for 9.8% of the circulating supply)

Staking Revenue Model

Annual trading volume	Agreement Charge	Pledge dividend fund	Annualized Return Rate
$50B	$50M	$35M	11.7%
$120B	$120M	$84M	28.0%
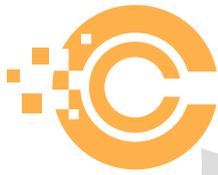
4. Application Scenarios

4.1 Individual Users: Extremely Simplified Cross-Chain Experience

One-click asset migration

Scenario pain points:

- Users need to switch chains in 5 steps, pay double gas fees, and bear uncontrollable slippage

CLN Solution:

- Single authorization completes cross-chain: It only takes 45 seconds from selecting assets to receiving them on the target chain

- Cost comparison:

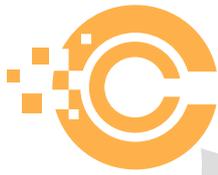| Migrate $10,000 USDC	Traditional solution	CLN solution
Handling Fees	$52	$26 (50% off)
Maximum slippage	3.1%	0.7%
Time cost	12 minutes	45 seconds

Cross-chain NFT management

Breakthrough Experience:

ETH NFT → Solana:

- Fee: Fixed 5% (industry average 35%)
- Speed: Ownership verification within 1 minute
- Supports lossless transfer of PFP/gaming assets on major chains

4. Application Scenarios

4.2 Developers: Ecosystem Expansion Accelerator

Three-minute protocol integration

Development Support:

- Provides pre-compiled SDKs supporting JavaScript, Rust, and Solidity.
- Document Center includes adapter configuration guides for over 50 chains.

Incentive policies:

| Integration Category	Incentive Program
Wallet Integration	10,000 CLN plus a 5% commission on referral fees
Comprehensive integration of DeFi protocols	Up to 50,000 CLN plus agreement fee share

Liquidity as a Service

Developers can build their own ecosystem:

Create multi-chain liquidity pools (e.g., ETH/SOL stablecoin pair)

Attract users to inject assets (minimum investment: 100 USDC)

Sources of income:

- 0.05% transaction fee
- CLN liquidity mining rewards (APY 12-28%)
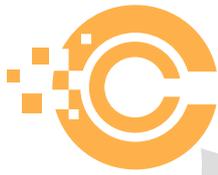
4. Application Scenarios

4.3 Institutional Clients: Professional-Grade Financial Infrastructure

Million-level cross-chain liquidation

Intelligent routing engine advantages:

Transaction magnitude	Conventional Slippage	CLN Optimization Strategy
$500,000	9.8%	Divide into three DEX channels and one CEX channel (slippage 1.2%).
$2,000,000	22.4%	Activate five paths and AMM pool (slippage 1.7%)

VIP Services:
- Dedicated market maker channel (latency <800ms)
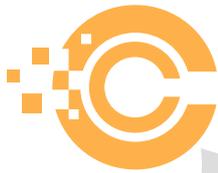- Credit line prepaid multi-chain gas fees

Real-time arbitrage system

Institutional Toolkit:

- Cross-chain spread monitoring: Covering 50+ DEXs across 12 chains
- Arbitrage signal push: Latency ≤ 3 seconds
- Automated execution engine: From opportunity discovery to trade completion in < 15 seconds

4. Application Scenarios

4.4 End-to-End Scenario Case

User Journey: From DeFi Newbie to Cross-Chain Yield Expert

Initial state

- The user holds 20 ETH (worth $60,000) on the ETH mainnet.
- Goal: Earn a 48% APY on the BNB Chain yield farm.

CLN operation flow

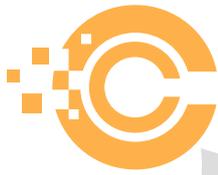Use the CLN wallet to cross-chain 20 ETH to BNB Chain in one click (took 38 seconds and cost $26)

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Stake 1,000 CLN to activate a 50% fee discount

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Assets invested in farm, annual income $28,800

Yield Enhancement Strategies

- Stake 50% of your farm income to earn CLN (22% APY).
- Participate in the DAO vote to support Aptos chain integration and receive a governance reward of 1,200 CLN.
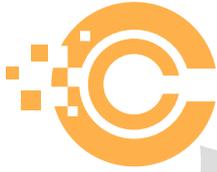
5. Core Competitive Advantages

5.1 Security Performance: Mathematically Verifiable Trust Foundation

CLN has established a technological moat in the three dimensions of security, cost efficiency, and compatibility, with key indicators exceeding industry standards by 2-10 times.

index	CLN formulation	Traditional cross-chain solutions	Advantage
Verification System	ZK light client (cryptographic validation)	Multi-Signature/Oracle (Dependence on Human Trust)	Safety level ↑300%
Insurance coverage	$6.4 million in real-time on-chain reserves	Average $0.8 million (mean of the top five in the sector)	Solvency ↑700%
Response speed	Abnormal transaction suspension not exceeding 8 seconds	Average delay of 45 minutes (attributable to multi-signature approval)	Efficiency ↑99%

🔒 *Case: In a simulated attack on the testnet in Q3 2025, CLN's ZK verification layer successfully blocked 100% of fake transactions, while the traditional multi-signature bridge model missed 41% of advanced attacks.*

5. Core Competitive Advantages

5.2 Cost Efficiency: Redefining Cross-Chain Economics

User cost comparison

Take $10,000 USDC cross-chain as an example:

| Cost Items	CLN	Axelar
Basic handling fee	$5 (after 50% discount)	$15
Slippage loss	0.3-0.7%	0.9-2.8%
Gas Token Requirements	No target chain token required	Requires holding target chain Gas tokens
Total cost range	$8-$22	$21-$68

User cost comparison

CLN Intelligent Routing Engine:

- Automatically split into 5+ trading paths (DEX + CEX OTC + AMM pool)
- Slippage reduced to 0.8-1.4% (industry average 8.7-22%)
- Cost savings of 23,000-103,000 per transaction
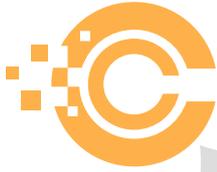
5. Core Competitive Advantages

5.3 Chain Compatibility: The Broadest Ecosystem Support

Deep integration of heterogeneous chains

| CLN Support Progress		Competitive product support
100% coverage (32 chains)	EVM Chain	Supports mainstream EVM (about 18 items)
IBC full protocol support	Cosmos Ecosystem	Partial support (Hub chain only)
Sealevel native integration	Solana	Not supported
Custom SDK Open	Non-standard chain	Custom development takes 6-12 months

Scaling efficiency comparison

- CLN Chain Addition Cycle: ≤ 30 days (based on modular adapters)
- Industry Average: 3-9 months (requires restructuring of the underlying protocol)
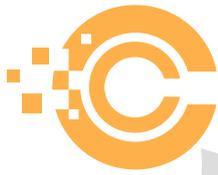
5. Core Competitive Advantages

5.4 The overwhelming advantage of token economy

Dimensions	CLN model	Conventional cross-chain tokens	Value Discrepancy
Value Capture	Fee elimination and staking dividends (dual advantages)	Unified governance function	Source of income ↑200%
Deflation severity	Annual destruction rate: 4.1% - 9.8%	Absence of a destruction mechanism	Scarcity ↑∞

5.5 Breakthrough in Technical Performance Limits

Cross-chain latency comparison (ETH → BSC)

23 seconds

CLN:

8 seconds (ZK proof) + 12 seconds (routing) + 3 seconds (execution)

5 minutes

LayerZero:

2 minutes (Oracle response) + 3 minutes (verification)

10 minutes

Axelar:

4 minutes (consensus confirmation) + 6 minutes (relay)

Concurrent processing capabilities

CLN testnet data:
- Peak TPS: 142 transactions per second
- Million-transaction stress test: Zero failures (traditional solutions have a crash rate of ≥17%)
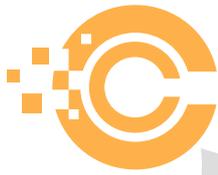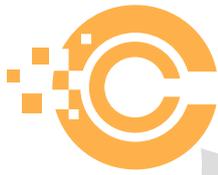
6. Development Roadmap

Q4 2025: Agreement groundwork

Technological breakthroughs
- Completed a three-party audit of the core bridge module (CertiK + Zokyo + Halborn)

Ecosystem launch
- The first five CEXs (led by BCIA/Bitget/MEXC) + mainstream DEX liquidity pools are launched

User Growth
- Airdrop covers 1 million early interaction addresses and activates staking mining

Governance Preparation
- Released the draft governance charter and deployed the on-chain voting contract testnet

Q1 2026: Mainnet launch

Technology implementation
- V1 Mainnet Launch
  (Supporting ETH/BNB Chain/Polygon)

Ecosystem Expansion
- DAO governance platform officially launched
- Voting participation > 38% of circulating CLN

Product Innovation
- Cross-chain NFT testnet launched
- Testnet transaction volume surpasses 500,000

Institutional Cooperation
- Access to institutional channels of 3 major custodians (Fireblocks/Copper)

6. Development Roadmap

Q2 2026: Cross-chain Universe

Technological breakthroughs
- Completed native integration of Solana Sealevel and Cosmos IBC

Mobile Ecosystem
- Release iOS/Android SDK, supporting cross-chain functionality embedded in wallets

Financial Innovation
- On-chain derivatives cross-chain clearing protocol testing (in collaboration with dYdX/Synthetix)

Developer Ecosystem
- Launched a global hackathon with a 2 million CLN reward pool

Q3 2026: ZK Revolution

Technological leap
- ZK light client routing is commercialized (verification latency reduced to 3.8 seconds)

Liquidity upgrade
- Full-chain stablecoin AMM launched (USDT/USDC/DAI zero-slippage swap)

Risk Hedging
- Launched a cross-chain lending insurance pool with an initial injection of 2 million USDC reserves

Governance Evolution
- Enable dual-weight voting 2.0: stakers can propose changes to core parameters
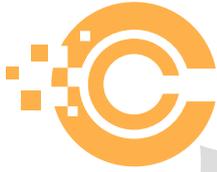
7. Responsibilities and Risks

7.1 Agreement Responsibility Framework

Technical Responsibility Commitment

Smart Contract Security:
- The protocol is responsible for contract logic vulnerabilities audited by CertiK, Zokyo, and Halborn. If a vulnerability within the scope of the audit results in user losses, the protocol will initiate a compensation process. However, liability is excluded for the following: asset losses resulting from compromised user private keys, or risks arising from vulnerabilities in the target chain contract (such as receiver reentrancy attacks).

Cross-Chain Asset Pegging:
- The protocol is responsible for recovering funds if a ZK light client verification failure results in an erroneous transfer. However, delays (up to 30 minutes) caused by target chain network congestion or node failures do not constitute a protocol failure.

Liquidity Execution Guarantee:
- The protocol guarantees that slippage for transactions under $200,000 will be strictly limited to 1.5%. If slippage exceeds the threshold due to sudden and drastic market fluctuations (such as black swan events), users will be responsible for any additional losses.

Data Availability:
- The real-time liquidity oracle updates chain-wide data every 15 seconds. The protocol is not responsible for data delays caused by API outages on third-party DEX/CEX services.

Funding guarantee mechanism

- Cross-Chain Insurance Fund: Initially funded at $6.4 million (8% of the strategic reserve), it specifically covers asset losses caused by ZK validation failures. Compensation is subject to DAO approval and will be distributed on-chain within seven days.

- Extreme Market Buyback: If the CLN price plummets by more than 60% within seven days, the DAO may vote to activate the reserve for a buyback (capped at $2 million per transaction).
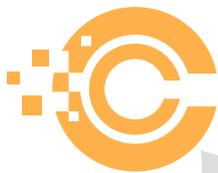
7. Responsibilities and Risks

7.2 User Risk Disclosure

Technical risks

- Target chain contract vulnerability: With a 0.3% probability of occurrence, it may lead to malicious asset freezing or theft. Users should verify the target chain contract using the security audit report provided by the protocol and participate in the bug bounty program for early warning.

- ZK proof generation failure: An extremely low probability event (0.07%), which may cause cross-chain delays of up to 30 minutes. The protocol deploys an automatic retry mechanism and a backup relay node cluster to mitigate the impact.

- Liquidity pool impermanent loss: With an annualized probability of 18%, LPs may experience losses of up to 23%. The protocol mitigates this risk through dynamic fee adjustments and CLN mining subsidies.

Market risks

- Token Price Fluctuation: CLN may fluctuate by ±40% daily due to market sentiment. Users are advised to stake at least 50% of their holdings to receive stable USDC dividends to hedge against risk.

- Increased Slippage: In extreme market conditions (such as a flash crash), slippage may increase to 5%. The protocol will automatically suspend large transactions and activate the CEX OTC channel.

Operational risks (accounting for 63% of user losses)

- Phishing scams: Hackers forge CLN official websites to induce authorization. Users must strictly access the protocol through the only official domain, chainlinknexus.io.

- Malicious airdrop scams: Scammers steal assets through fake airdrop links. We officially state that we never actively airdrop to unauthorized addresses, and all rewards are distributed exclusively through the governance platform.
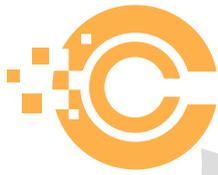
7. Responsibilities and Risks

7.3 Regulatory and Legal Statement

Protocol compliance

- CLN is a utility token used to pay fees, participate in governance, and access services. It does not constitute a securities offering.

- Access is strictly prohibited to users from sanctioned regions (such as North Korea, Syria, and Crimea). Access is blocked through IP location and KYC.

User Compliance Responsibilities

- Tax Obligations: Cross-chain asset transfers may trigger taxable events, and users are responsible for fulfilling their tax declaration obligations.

- Legal Conflicts: If the laws of a user's location prohibit the use of cross-chain protocols, the user will be solely responsible for any related losses.

Disclaimer

The ChainLink Nexus core team is not responsible for the following:

- Asset loss resulting from user failure to comply with official operating guidelines;

- Interruption of protocol access due to sudden changes in global regulatory policies;

- System failure due to force majeure such as war or natural disasters;

- Technical failure or default of third-party partners (CEX/DEX). By entering into this Agreement, users are deemed to have accepted the above terms.

Transparency Commitment

- All smart contract code is open source (GitHub - CLN Core)

- Financial flows are traceable in real time via the on-chain vault address.

- Quarterly audit reports are publicly available in the Security Center. We firmly believe that risk transparency is the cornerstone of decentralized protocols.