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2024  
**Year-end** Report



# Overview

The Nervos Foundation's work demands navigating the intense and unpredictable narrative currents of one of the most dynamic industries on the planet—one that changes so drastically that it is almost unrecognizable at the beginning of each new year.

Our mission is to help bootstrap a thriving ecosystem around CKB, the most flexible blockchain in the space. Thus, our work presents a unique set of joys and challenges. Keeping a steady course and resisting the temptations to flow with the latest narrative current is complex. What makes it possible, however, is witnessing the industry consensus slowly converging on the theses CKB was built on.

The broad acceptance of the modular approach to scaling, the appreciation for protocol-level account abstraction, the acknowledgment of the state bloat problem, and the slow but rising endorsement of the UTXO model have served as a continuous stream of validations that give us the confidence and vigilance to stay the course.

CKB's 2024 journey can be succinctly encapsulated in one word: interoperability. This year we saw the successful launch of RGB++, an RGB-inspired extension protocol which leverages single-use seals and client-side validation to turn CKB into one of the most sophisticated Bitcoin Layer 2s on the market. It allows the issuance of Bitcoin assets on CKB's Turing-complete smart contract platform without any bridges or trusted third party intermediaries.

Beyond RGB++, significant progress was also made in developing the Fiber Network—a payment channel network that will be interoperable with Bitcoin's Lightning Network with support for RGB++ assets.

This year, we expect to see transformative growth of Fiber, including Bitcoin-native stablecoins running on Lightning, as well as RGB++, which can be extended to other UTXO-based chains including Ergo, Cardano, and Litecoin.

We see these developments as the first inning of the CKB-led "Web5" revolution—a movement seeking to create a thriving ecosystem of decentralized applications built upon a mesh of UTXO and PoW-based peer-to-peer networks.

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# The Elevator Pitch

For some of you, this may be your first introduction to the **Nervos Network** and **CKB**, we're glad you made it!

## First, what is the Nervos Network?

From [Wikipedia](#):

*Nervos Network is a blockchain platform consisting of multiple layers designed for different functions. The foundational layer is known as the “Common Knowledge Base,” and its native cryptocurrency is called CKB.*

While almost all smart contract platforms have been designed to be all-in-one application platforms, the Nervos Network represents a markedly different approach.

Inspired by Bitcoin's layered scaling approach, the network has been designed to separate concerns, enabling the customization of blockchain-based systems in ways no other platform can compare.

In 2024, this power was used to create RGB++, a novel scaling solution that provides Bitcoin with Turing-complete programmability without compromise, and the Fiber Network, an advanced, multi-asset payment channel network interoperable with Bitcoin's Lightning Network.

It has also been used to quickly implement support for Bitcoin's [Taproot](#) & [quantum-resistant cryptography](#).

The opportunities are limitless, and we know that developers have only started to explore the possibilities unlocked by the unique blockchain underlying the Nervos Network: [CKB](#).

## Now, what is CKB?

CKB is a Layer 1 blockchain secured by Proof-of-Work and crafted for enduring robustness and versatility.

It is built from the ground up, charting its own course in alignment with the foundational principles that have enabled Bitcoin's resilience, while striving to take a step further.

To do so, CKB employs a [RISC-V](#) virtual machine, capable of supporting any cryptography, as well as any programming language. Like Bitcoin, CKB is a [UTXO](#)-based blockchain, enabling parallel transaction verification, [intents](#), and [native account abstraction](#).

Like Bitcoin, CKB prioritizes the blockchain's sustainability and the ability for end users to run nodes. One \$CKB entitles a holder to one byte of on-chain storage. [State rent](#) as users store data on-chain, and an in-protocol DAO is implemented for eventual on-chain [protocol treasury](#) management.

[CKB](#) stands on the shoulders of giants, pursuing a goal of security, decentralization, and verifiability comparable to Bitcoin, while surpassing Ethereum, Solana, and other smart contract platforms in terms of flexibility.





# Ecosystem

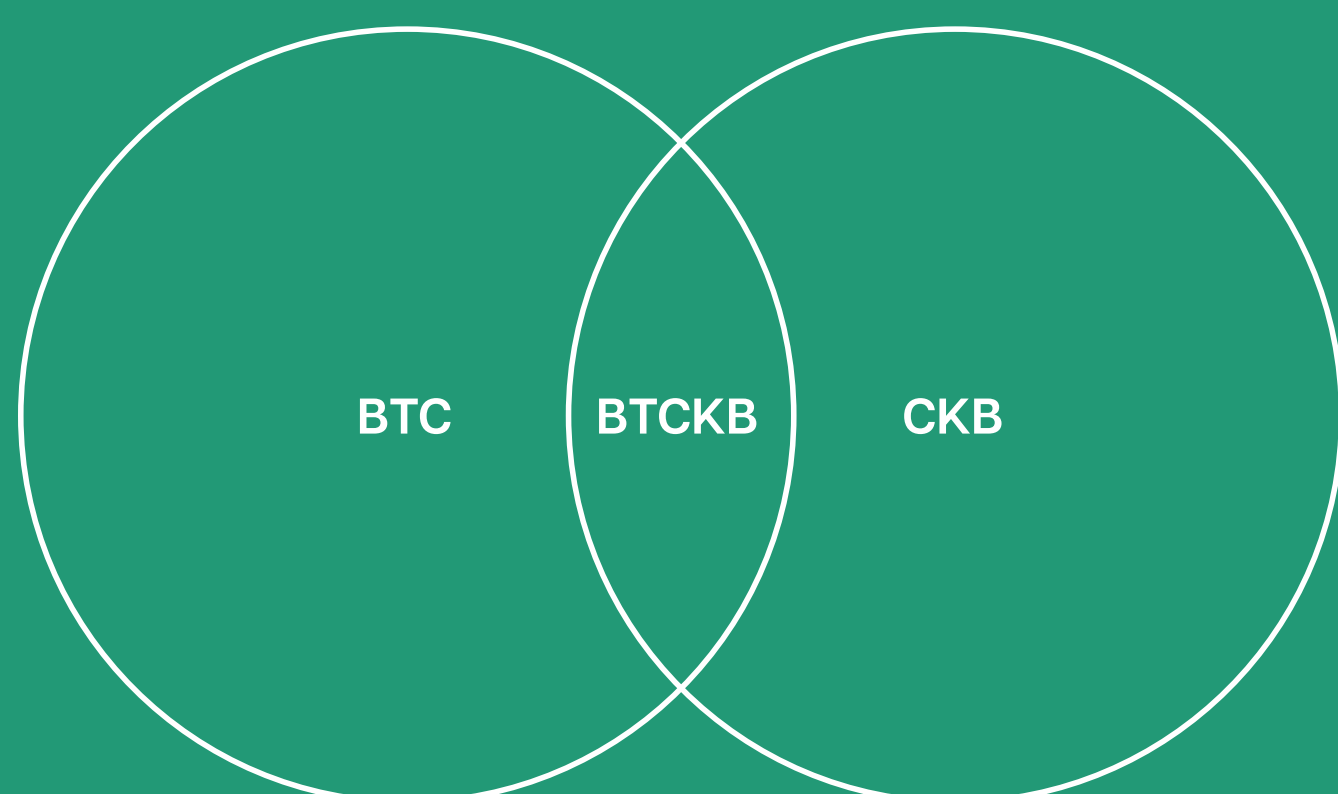


## Key Initiatives in 2024

### BTCKB Initiative

The [BTCKB Initiative](#) served as a pivotal bridge between the Bitcoin and CKB ecosystems, supporting cross-chain interoperability and Bitcoin-native applications:

- The establishment of [CELL Studio](#), an innovation hub fostering Bitcoin Layer 2 adoption and UTXO-based financial solutions.
- Seamless integration of BTC-native assets with CKB, unlocking new cross-chain financial opportunities.



### Fiber Network

The Fiber Network is a next-generation payment channel network built on the CKB blockchain and adjacent off-chain networks. It enables fast and low-cost multi-asset, peer-to-peer transactions and is interoperable with Bitcoin's Lightning Network, unlocking seamless cross-chain asset transfers.

- The whitepaper was released in August, with the testnet and official [website](#) both going live in September.
- At launch, support will be implemented for four key RGB++ assets: \$CKB, \$USDI, \$ccBTC, and \$Seal, enabling Lightning-based BTCFi applications such as decentralized liquidity lending. Support for more RGB++ assets, including various stablecoins and real-world assets is coming soon.
- The development roadmap includes integrations with [UTXO Stack](#) and [JoyID](#) to reduce onboarding barriers and introduce decentralized staking and advanced liquidity management.

[Website](#), [Lightpaper](#), [GitHub](#)

### RGB++ Layer Evolution

RGB++ Layer achieved critical milestones in its journey to becoming a comprehensive Bitcoin ecosystem solution:

- February: RGB++ launched as a Bitcoin asset issuance protocol featuring bridgeless cross-chain functionality and Turing-complete smart contracts.
- July: Upgraded to RGB++ Layer, expanding to multiple UTXO chains.
- August: Released the [RGB++ Explorer](#), providing developers with enhanced transparency and development tools.
- Ecosystem support through integrations with projects including [Wizz Wallet](#), [Gate Web3 Wallet](#), [Element Trading Platform](#), and a SDK by [GameBuild](#), enabling diverse Bitcoin-native applications.



# CKB Eco Fund: Progress and Achievements in 2024

The [CKB Eco Fund](#) was established in early 2024 to accelerate the adoption of CKB and drive the growth of the ecosystem. In its first year, the team focused on implementing transformative initiatives, such as the [BTCKB](#) Initiative, evolving the RGB++ Layer into a robust Bitcoin Layer 2 solution, and promoting the Fiber Network to address Bitcoin's scalability challenges.

These efforts, coupled with ecosystem integrations, strategic partnerships, and global community outreach, have laid a solid foundation for long-term innovation and adoption.

## Ecosystem Development

The CKB Eco Fund has actively supported a growing ecosystem by onboarding projects, integrating essential tools, and nurturing community engagement.

## Exchange Listings and Partnerships

- **Exchange Listings:** CKB accessibility was expanded due to multiple exchanges, including [Upbit](#), [ZKE](#), [KoinBX](#), [Bitvavo](#), and more. Notably, [Binance Pool](#) introduced a dedicated CKB mining pool in April, bolstering the network's miner community.
- **CKB Eco Fund 2024 Strategic Partnerships:**
  - Partnered with [Cactus Custody](#) and [Meson Finance](#) to launch ccBTC on CKB. This initiative brings Bitcoin liquidity to the CKB ecosystem, with Matrixport's subsidiary, Cactus Custody, acting as the official custodian for Bitcoin reserves, and Meson facilitating seamless asset bridging.
  - Partnered with [Bool Network](#) to launch bi-directional cross-chain bridges for BRC20 and Runes assets between CKB and other UTXO-based chains, with plans to expand interoperability to Ethereum, Solana, and TON.
  - Partnered with [Element](#) NFT marketplace to enable RGB++ protocol support, allowing users to trade DOBs (Digital Objects) on Element's RGB++ marketplace, improving the liquidity of the [DOB](#) ecosystem.
  - Partnered with [APRO Oracle](#) to develop an oracle and deliver accurate, real-time price data for CKB and BTC, supporting the Stable++ algorithmic stablecoin and other advanced BTCFi projects.
  - Partnered with [Alchemy Pay](#) to enable fiat-based CKB purchases, making CKB more accessible to global users.
  - Co-branded a hardware wallet with [OneKey](#).
  - Collaborated with [GameBuild](#) to create a groundbreaking SDK in the GameFi space, supporting Bitcoin-native assets and the RGB++ Layer.
  - In a strategic partnership with [NFTGo](#), CKB Eco Fund incubated [Dobhub](#) to redefine the [DOB](#) (Digital Object) creation experience and further enhance the ecosystem's capabilities.



## Industry Recognition

- Received recognition from authoritative institutions: Top global blockchain research firm [Messari](#) published an in-depth overview [report](#) on CKB and subsequent quarterly update [reports](#).
- Joined the [Blockchain for Good Alliance](#), reaffirming our commitment to leveraging blockchain technology to drive positive social impact and sustainability initiatives.

## Developer Tools

- [CCC](#): The “Common Chains Connector” library supports [BTC and EVM wallet operations](#) with CKB, streamlining user interactions.
- [NervDAO Staking Tool](#): A staking platform providing liquidity solutions for long-term holders using the [Nervos DAO](#).
- [Nostr Binding Protocol](#): Proposed as a solution for the [Nostr Social Network](#) to support native asset circulation.

## Ecosystem Projects

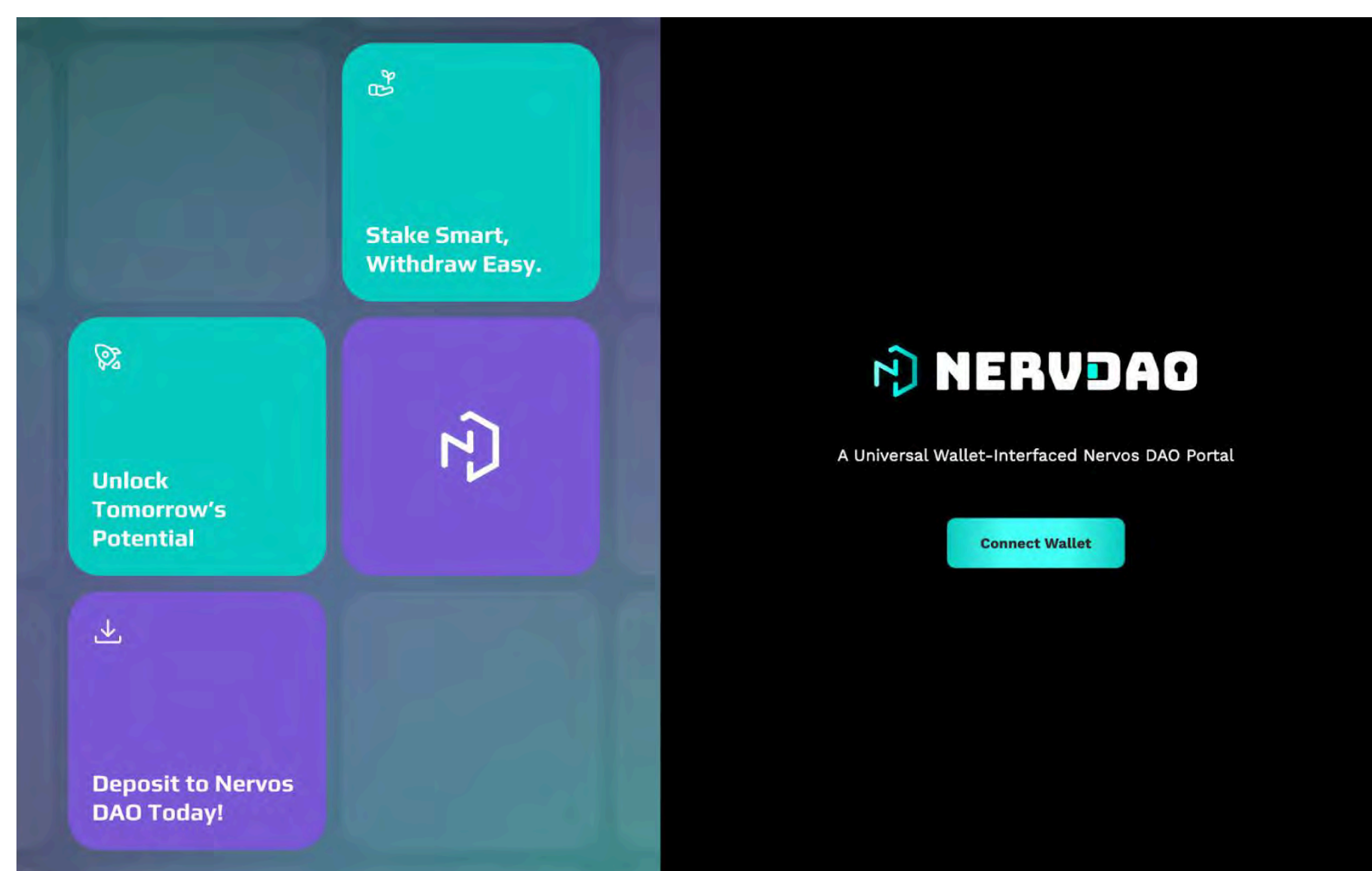
In 2024, the Nervos ecosystem witnessed significant progress across multiple projects, each contributing to its expansion and diversification:



On September 26th, the [CKB Devrel](#) team launched [NervDAO](#), a staking tool based on CKB's native infrastructure [Nervos DAO](#). It aims to provide CKB holders with a more convenient and user-friendly staking experience.

With NervDAO, users can easily deposit CKB into the Nervos DAO using various mainstream wallets, including [JoyID Passkey](#) and [OKX Wallet](#), allowing them to access to the Nervos DAO without running a node.

[Tutorial](#)







## UTXO Stack

As the liquidity staking layer for the Lightning Network, [UTXO Stack](#) has introduced a comprehensive infrastructure designed to enhance network liquidity and support ecosystem development. In 2024, the project closed two funding rounds, including a [Series A at a \\$50 million valuation](#), co-led by [UTXO Management](#), [CMS](#), and [PAKA](#).



## UTXO Stack :

The Decentralized Liquidity Staking Layer for **Lightning Network**

<https://www.utxostack.network/>

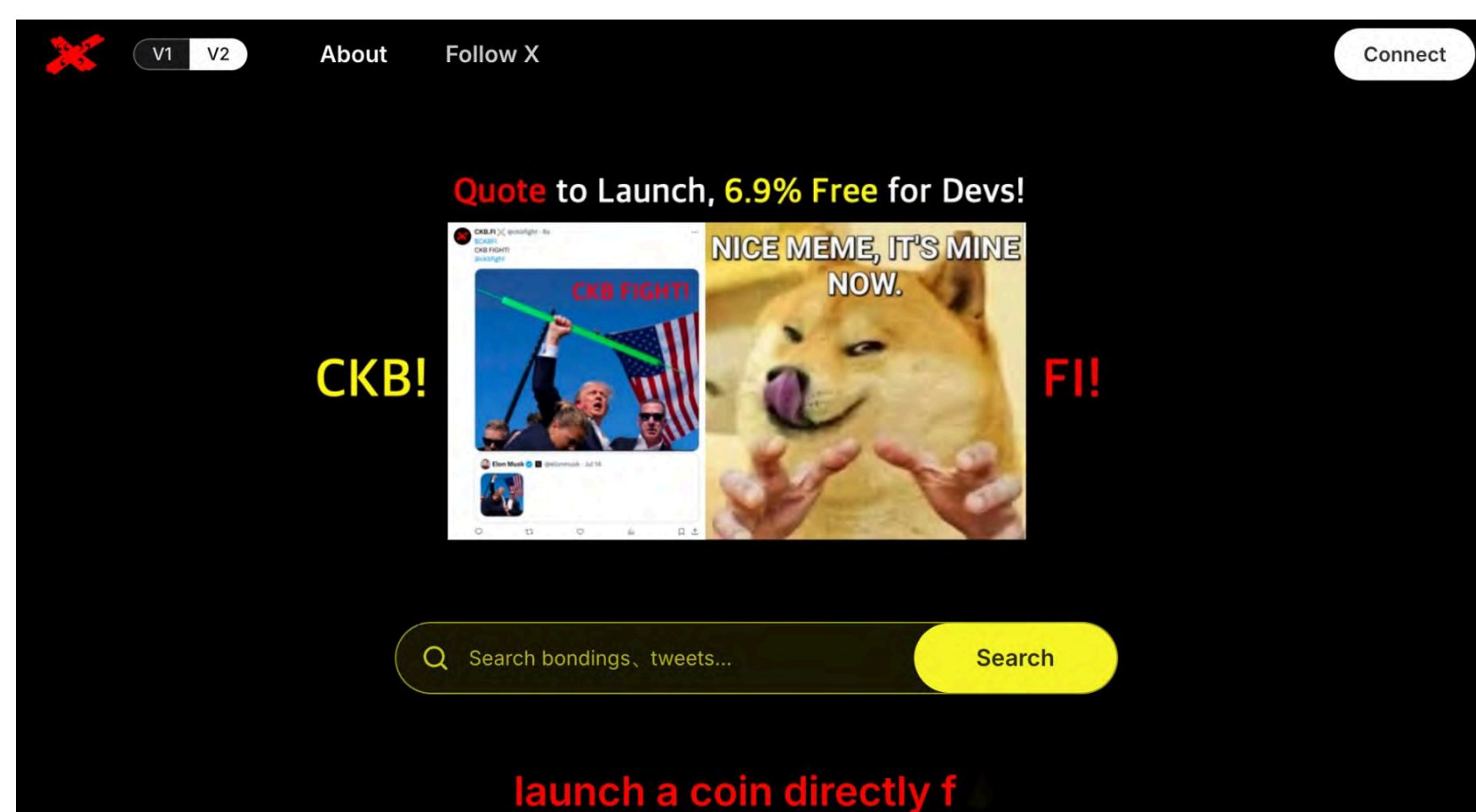


The UTXO Stack infrastructure includes:

- Hybrid Lightning Network combining Bitcoin’s Lightning Network with the Fiber Network on Nervos CKB
- Decentralized Liquidity Staking Pool (DLSP) for automated liquidity management
- Decentralized Swapping Nodes to empower decentralized asset exchange
- [JoyID](#) wallet support, enabling stablecoin payments and seamless liquidity staking
- P2P Payment SDK for seamless Web2 application integration

With native stablecoin support via [RGB++](#) and zero-cost channel opening, UTXO Stack is revolutionizing Bitcoin as a payments network. In 2025, the team plans to launch its TGE, its first Lightning Network airdrop, and hybrid solutions like a decentralized lending pool, an RGB++ DEX, and an AI-focused SDK.

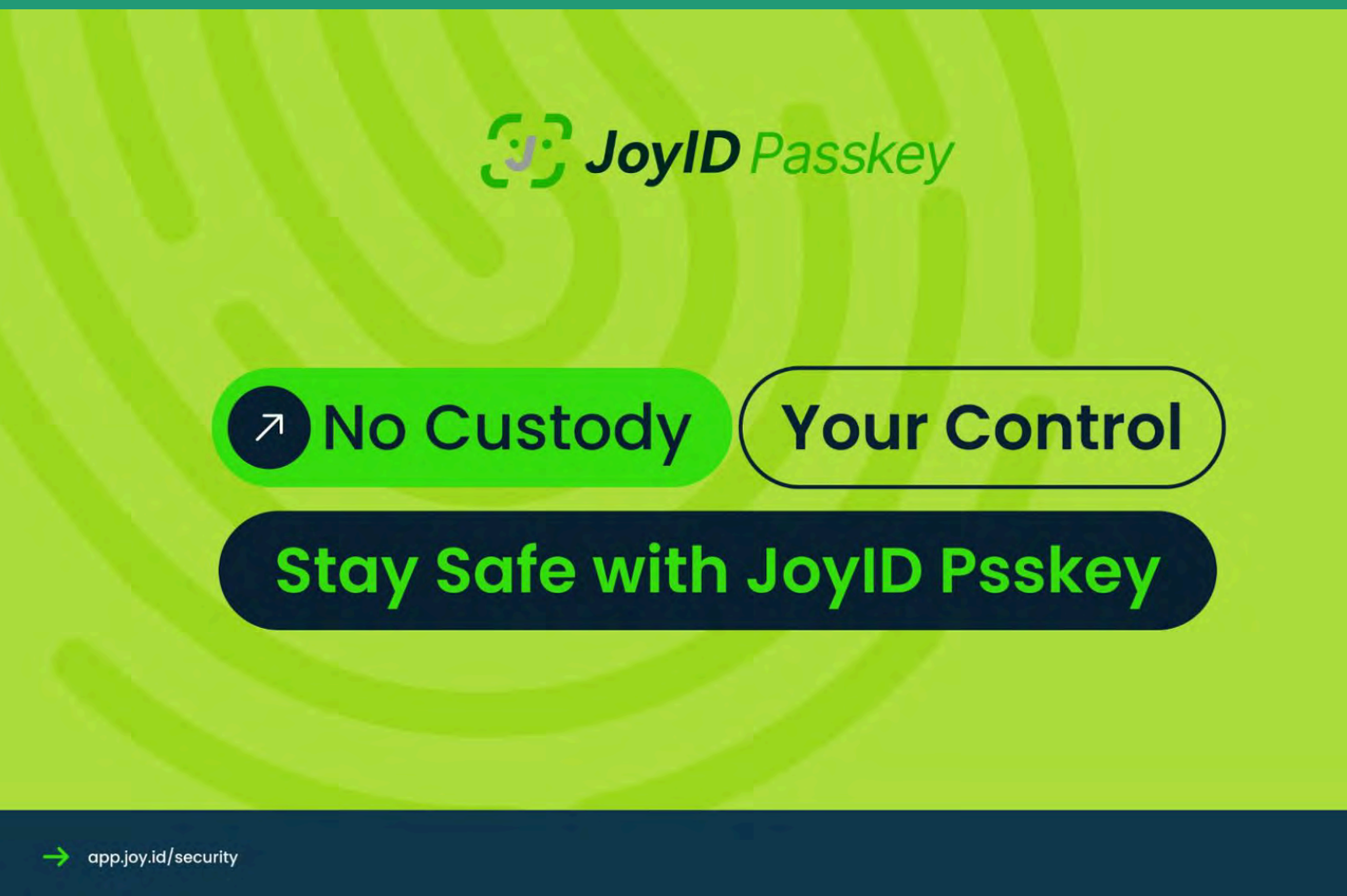
[Website](#), [Whitepaper](#), [Roadmap](#), [GitHub](#), [X](#)



## CKB.Fi

[CKB.Fi](#) is a Bitcoin ecosystem-based “Tweet-to-Launch” memecoin platform. It leverages RGB++ technology to enable the launch and distribution of creative digital assets, fostering engagement and experimentation within the Bitcoin community.





JoyID is a non-custodial, multi-chain wallet that utilizes [Passkey](#) and [account abstraction](#) technologies. It provides a passwordless and seed phrase-free experience, along with social recovery features.

Since its launch in November 2023, JoyID has experienced rapid growth. The platform's total user base has exceeded 783,000, with a peak monthly growth rate of 190%. Monthly active users reached a high of 366,360, while daily active users peaked at 103,173, averaging around 32,726. Additionally, JoyID recorded an average of 44,952 monthly transactions.

Looking ahead, JoyID aims to support the Bitcoin Lightning Network and the CKB Fiber Network, as well as stablecoin payments. It's on track to expand its user base to 1 million and double its daily active users to 60,000.



Launched in July 2024, [UTXOSwap](#) is the first intent-based AMM DEX built on the RGB++ Layer. It provides liquidity for all UTXO-based chain assets through a bridgeless cross-chain mechanism, smart contract support, and enhanced trading efficiency.

UTXOSwap currently supports 49 liquidity pools, enabling diverse trading and staking opportunities for UTXO ecosystem users. With multi-chain wallet compatibility and looming support for BTCFi assets like Runes, UTXOSwap is establishing itself as a cornerstone of Bitcoin finance (BTCFi).







## Nervape

[Nervape](#) continued to expand its multi-chain, combinable digital object ([DOB](#)) ecosystem in 2024, achieving several key milestones. In April, the team minted 2,777 NFTs, followed by accessory asset distributions in May and the launch of the “Nervape Bundle” combinability feature in December. The community was further engaged through events such as the [Color Vibes](#) offline gathering in November, which highlighted the creative potential of DOBs.

On the technical front, Nervape [open-sourced](#) seven repositories to advance DOB issuance protocols and foster development within the CKB ecosystem. In August, Nervape was [selected for the Google Cloud Startup Program](#), underscoring the project’s growing recognition. Collaborations with both the OKX community (where over 200 BTC—valued at approximately \$13 million—were staked in six days) and the CKB community (with top participants staking more than 620 million CKB, valued at around \$6 million) showcased strong community support.

Nervape’s [public mint sold out](#) within six minutes, with the all-time high floor price reaching \$2,500 on the secondary market. A single Gear Forge item recorded a top sale of \$900, while Nervape Studio’s first auction saw five co-branded skateboard tables sell for a total of \$23,900. Reflecting its growing influence, Nervape’s auction and pop-up store were also [featured in Vogue China](#), highlighting the project’s innovative blend of technology, art, and community engagement.





[Interstellar Payment Network \(IPN\)](#) is a global payment platform that aims to provide secure, low-cost financial services worldwide through advanced blockchain protocols.



In collaboration with [Matrixdock](#)—a Matrixport subsidiary specializing in real-world asset (RWA) tokenization—IPN [launched USDI](#) as the first programmable stablecoin in the Bitcoin ecosystem.

Powered by the RGB++ protocol and backed by highly liquid reserve assets, including Matrixdock's [STBT](#) (Short-term Treasury Bill Token), USDI enables near-instant, low-cost cross-border payments while supporting advanced programmable features for Bitcoin-native financial applications, all under a regulatory-compliant framework.



[Seal](#), the first token deployed on the RGB++ Layer, completed its free minting phase and is now in full circulation within the Bitcoin ecosystem. As the platform token for [seal2earn.xyz](#), Seal completed its first Initial Bonding Offering (IBO), achieving over \$15 million in over-collateralization.

The Seal community has also developed and deployed an [AI agent](#), showcasing its commitment to technological advancements. Seal is actively traded on prominent exchanges, including [Gate.io](#), [CoinEx](#), and [LBank](#).







## Stable++

Launched in October 2024, Stable++ is an over-collateralized stablecoin protocol built on the RGB++ Layer. It allows users to collateralize BTC, CKB, and RGB++ assets to mint RUSD, which is the first decentralized stablecoin in the RGB++ ecosystem.

Strategically backed by the [CKB Eco Fund](#), [Stable++](#) represents a significant step forward in advancing decentralized financial solutions within the Bitcoin-native ecosystem. The protocol utilizes RGB++’s [Leap](#) functionality to facilitate the seamless circulation of RUSD throughout the Bitcoin ecosystem.

By December 2024, Stable++ had achieved a TVL of \$1.17 million, with a total of 413,369 RUSD minted. These figures highlight its growing importance in bridging Bitcoin and decentralized finance.



Stable Money,  
Built On RGB++.  
Powered By Nervos,  
For The Bitcoin Ecosystem.



## UTXO Global

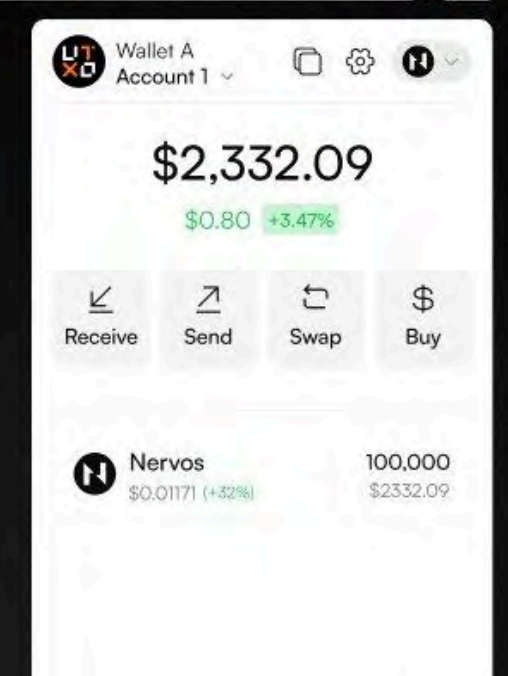
Backed by the CKB Eco Fund and developed by [Nexum Labs](#), UTXO Global offers secure, user-friendly tools for managing digital assets on CKB and other UTXO-based chains such as Bitcoin and Dogecoin. The company’s flagship product, the [Telegram Wallet](#)—the first in the CKB ecosystem—along with the [Chrome Extension Wallet](#), makes asset management seamless.

UTXO Global also features a [Multi-Signature](#) wallet that ensures secure, collaborative transaction approvals for teams. For developers, its [CKB Advanced Indexer APIs](#) provide streamlined access to blockchain data, simplifying the development of decentralized applications. With partners like [UTXOSwap](#), [Seal](#), [d.id](#), and [Stable++](#), UTXO Global is driving innovation and scalability across UTXO-based chains.

[One Pager](#), [Recap Video](#)

## UTXO Global Wallet

Where UTXO Technology Meets  
Global Innovation





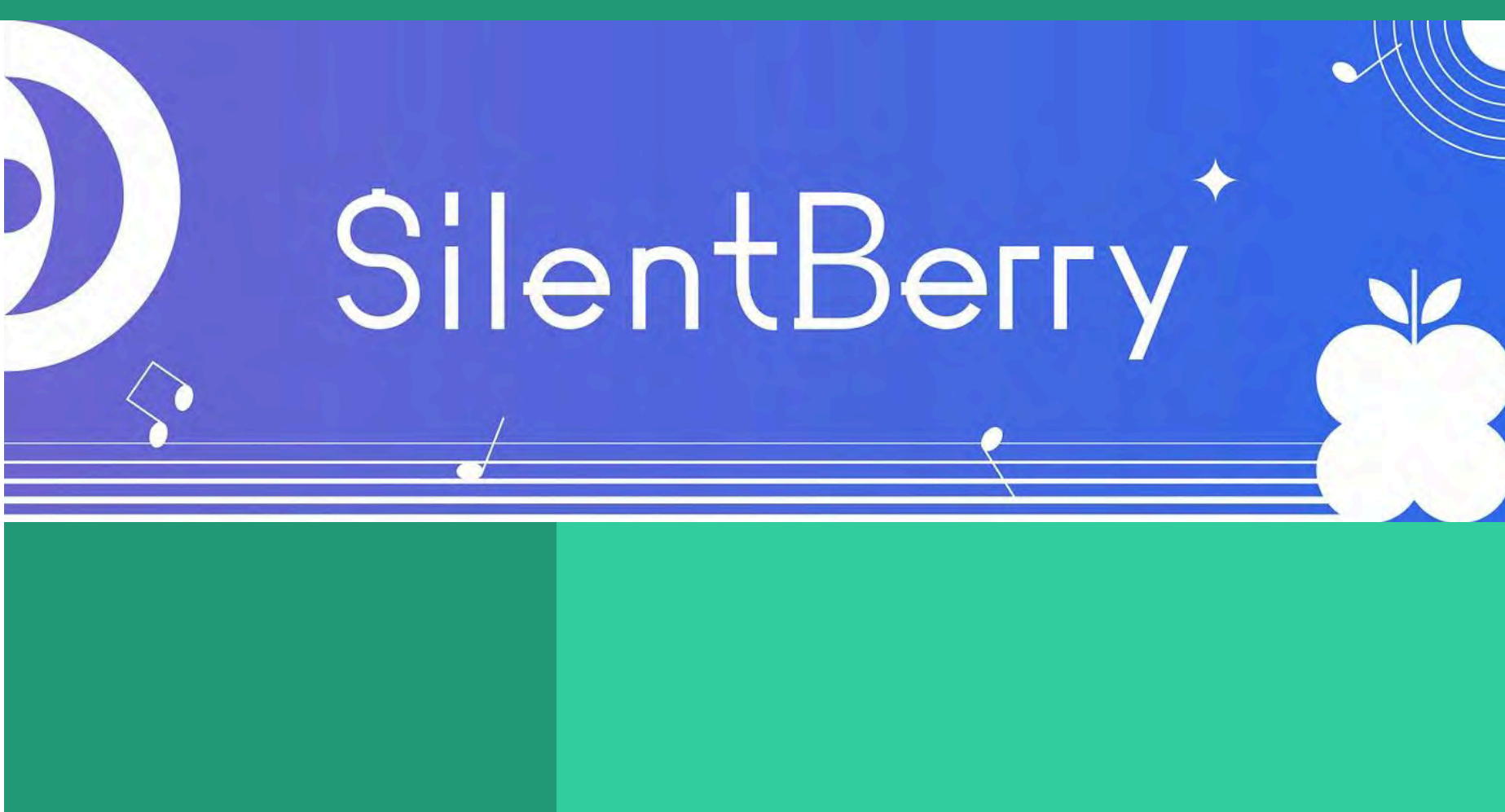


## Silent Berry NFT

[SilentBerry](#) is pioneering decentralized publishing on the Bitcoin blockchain through the RGB++ protocol. As the first decentralized publishing platform utilizing RGB++, SilentBerry introduces an innovative four-tier NFT model that transforms traditional book publishing.

The platform's unique "[Berry](#)" system divides book ownership and revenue rights into four categories: Gold, Silver, Copper, and Blueberry NFTs. Users can purchase these digital assets using BTC, ETH, and CKB to acquire various rights, including printing permissions, e-book access, and ongoing royalty benefits.

On January 3, 2025 SilentBerry celebrated a significant milestone with the global launch of renowned historian Professor [Qin Hui](#)'s new book, "[Saving Democracy](#)," on the Bitcoin blockchain. This groundbreaking initiative, supported by strategic investment from the CKB Eco Fund, not only signifies a technological breakthrough in publishing but also represents a fundamental shift in how ideas and cultural content are disseminated in the digital age.



## HueHub

In April 2024, [HueHub](#) launched a decentralized exchange and RGB++ asset issuance platform featuring a fair launch mechanism to ensure transparent asset distribution. Its notable milestones include the launch of the first RGB++ asset, [Seal](#), which achieved a trading volume exceeding 50 BTC within 66 hours, highlighting its impact on the growing RGB++ ecosystem.

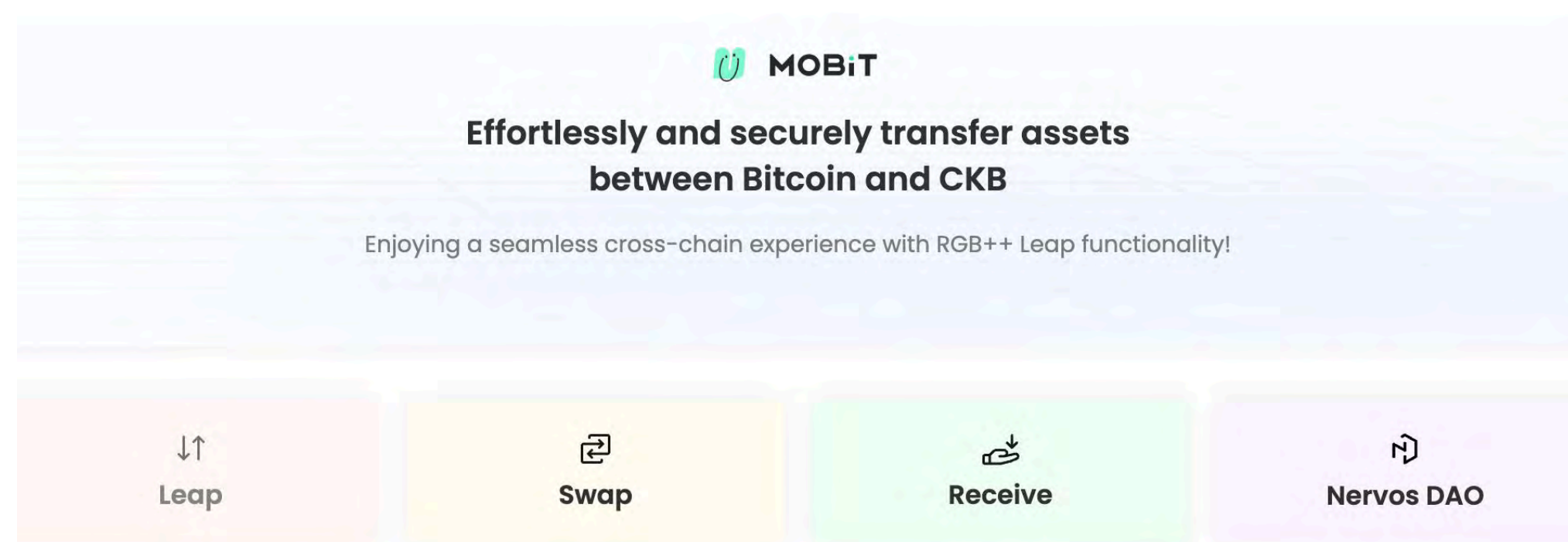




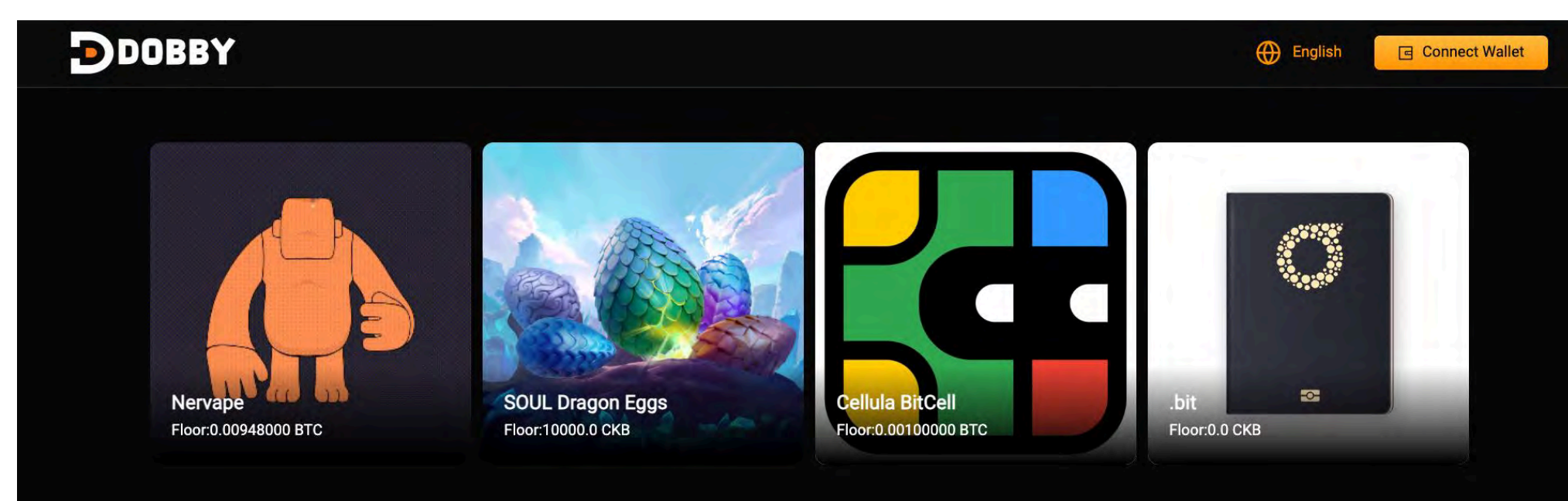
[Mobit](#), launched in June 2024 with support from the [CKB Eco Fund](#), is a comprehensive asset management platform that facilitates seamless and secure transfers between the Bitcoin and CKB ecosystems.

The platform is integrated with popular wallets such as [JoyID](#), MetaMask, and [OKX](#), offering a range of advanced features, including asset swapping, transfers, [Nervos DAO](#) integration, and real-time market insights for BTC, CKB, and RGB++ assets. Additionally, the “[Leap](#)” feature is currently under development, which aims to enhance bridgeless cross-chain operations.

Looking ahead, Mobit plans to support additional Layer 1 Bitcoin protocols, further establishing its position as a leading multi-chain asset management platform.



Launched in April 2024, [Dobby Market](#) is the first digital object (DOB) marketplace leveraging the RGB++ protocol on Bitcoin and other UTXO-based chains, including CKB. It enables users to create, buy, sell, manage, and discover exclusive DOBs globally.







## Omiga

Launched in January 2024, [Omiga](#) is a decentralized exchange designed to support the broadest range of assets on CKB. It gained attention with the first CKB inscription, [\\$MEMES](#), providing users with a robust platform for trading and exploring blockchain-based assets.

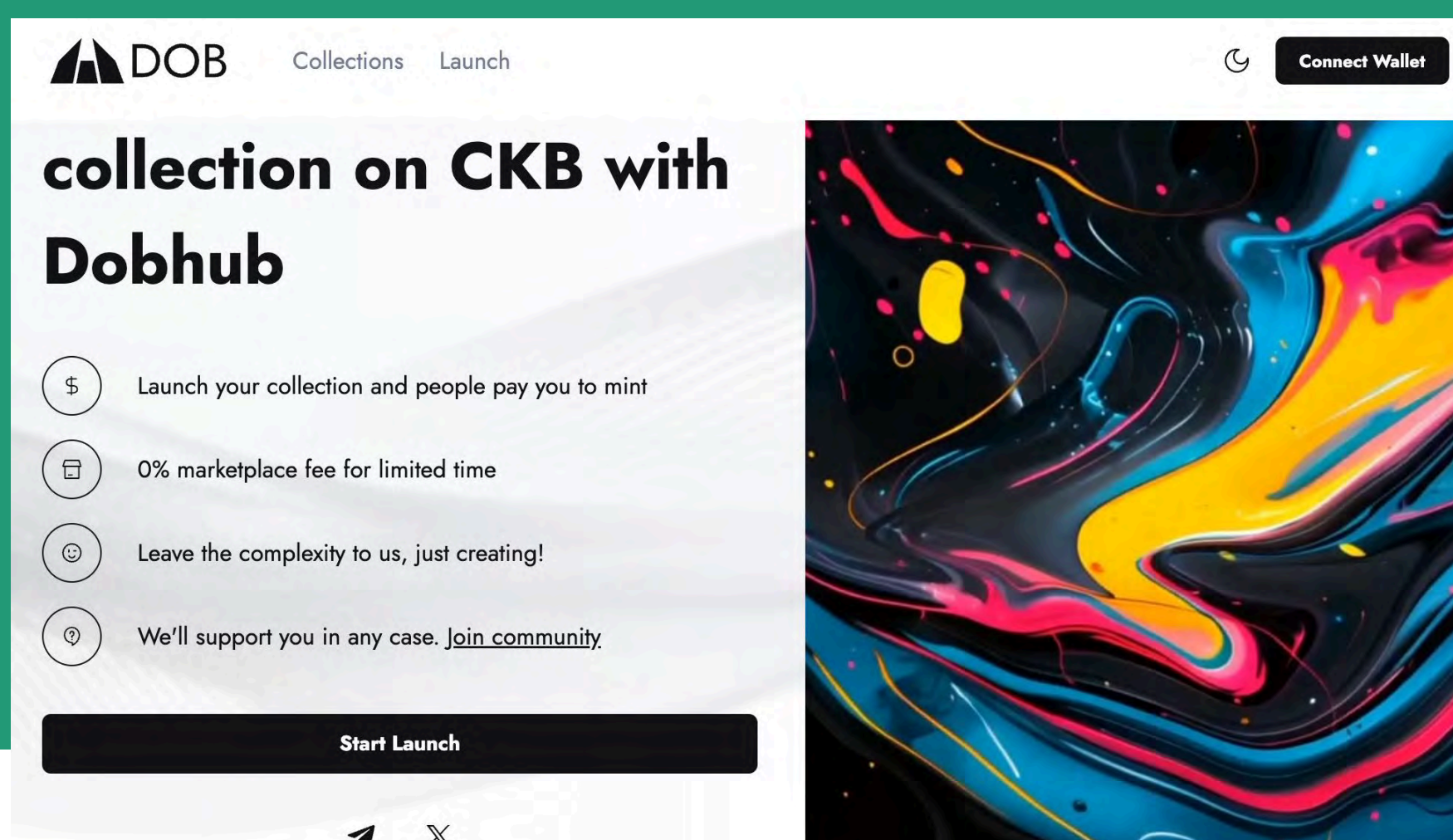
Currently, Omiga v0.15.0 is live, introducing the ability to list multiple assets simultaneously. Supported assets include [DOB](#), [.bit](#), [mNFT](#), and more, further enhancing the platform's versatility.

Inscribe the future  
on the Extended UTXO & PoW  
Layer1 Blockchain –  
Nervos CKB



## Dobhub

[Dobhub](#), supported by [NFTgo](#), became the first DOB launchpad on CKB. It enables easy creation, minting, and trading of DOBs while providing real-time updates on collections, fostering innovation within the ecosystem.



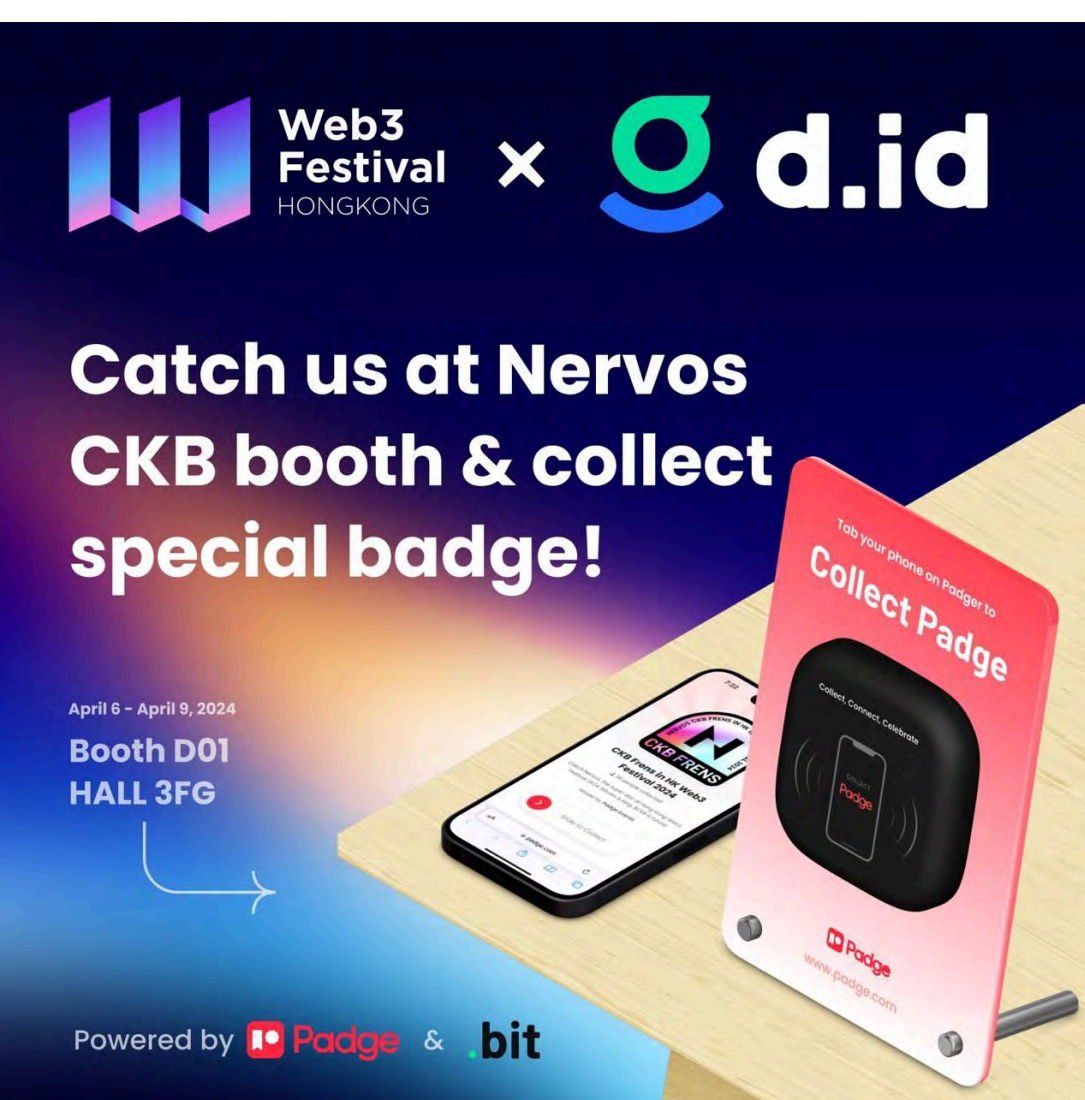




## d.id: 2024 Milestones

[d.id](#) is architecting protocols to address two critical challenges of the digital era: proof of humanity and the universal recognition of individual achievements. By leveraging blockchain technology, d.id empowers users to own, control, and showcase their digital identities and life accomplishments, preparing individuals and communities for the next wave of societal evolution.

In July 2024, [d.id](#) successfully executed its RGB++ Layer and [DOBs](#) (Digital Object Bindings) upgrade, marking a pivotal advancement in its infrastructure. This upgrade strengthens d.id's capacity to serve as a foundational protocol for decentralized identity ([DID](#)) solutions and achievement networks, positioning the project at the forefront of societal transformation in the age of artificial intelligence.



### Key Initiatives & Products

- .bit: Barrier-Free Decentralized Identity**  
 .bit redefines digital identity by offering tangible, user-centric DID solutions. Through partnerships with leading organizations such as [ShanghaiWoo](#) and [Invisible Garden](#), .bit enables users to craft personalized DID cards that serve as dynamic representations of their digital and physical journeys. These cards facilitate meaningful connections, document personal milestones, and enrich individual narratives, fostering a more interconnected and authentic digital ecosystem.
- Padge: The Achievement Protocol**  
[Padge](#) revolutionizes how achievements are created, collected, and immortalized on-chain. At the 2024 [Hong Kong Web3 Festival](#), d.id demonstrated Padge's utility as the event's official gift sponsor, enabling attendees to permanently record their participation through blockchain-verified digital collectibles. Beyond events, Padge supports the documentation of diverse accomplishments, such as pioneering milestones in international competitions (e.g., China's inaugural all-girls Jiu-Jitsu tournament), ensuring lifelong recognition of individual and collective triumphs.
- Strategic Collaborations**  
 d.id's partnerships with entities like ShanghaiWoo, Invisible Garden, and event organizers at the Hong Kong Web3 Festival underscore its commitment to fostering community-driven innovation. These collaborations amplify the practical applications of decentralized identity and achievement protocols, bridging Web3 technology with real-world experiences.



### Future Outlook

d.id remains steadfast in its mission to establish [.bit](#) as the most robust decentralized identity protocol globally. By scaling its infrastructure and expanding its ecosystem, d.id aims to onboard billions of users, empowering them to discover, validate, and showcase their unique value in an increasingly digital world.





## iCKB: 2024 Project Overview



**Purpose:** [iCKB](#) is a transformative protocol designed to address liquidity challenges associated with [NervosDAO](#) deposits by tokenizing them into an Extensible User Defined Token (xUDT) called iCKB.

This allows CKB locked in NervosDAO to remain liquid and easily convertible back to CKB, without waiting for maturity.

[Github](#) | [Logo](#) | [dApp](#)

### Key Features and Applications

- **Liquidity Solution:** Tokenization of NervosDAO deposits into iCKB enhances liquidity.
- **New Applications:** iCKB serves as a DeFi primitive that enables new applications, including enhanced utilization of NervosDAO, the potential for double yield through integrations with external protocols and the ability for users from other chains to enjoy NervosDAO's interests.

### Progress and Achievements in 2024

1. **Proposal:** Revised to enhance user experience from the Contracts up, optimized data structures and integrated novel tech like [xUDT](#) and RGB++.
2. **Core Development:**
  - **Lumos Utils:** Rewritten as a functional wrapper for [Lumos](#) Transaction Skeleton, making it extensible and stable. Published as an npm package. Fully switching from Lumos to [CCC](#) is a work in progress.
  - **Core Utils:** Rewritten to interact with iCKB contracts based on [Lumos](#) Utils. Published as an npm package. Fully switching from Lumos to [CCC](#) is a work in progress.
  - **Contracts:** Iteratively improved switching to the latest tech like xUDT until formal audit. Later deployed to mainnet in a non-upgradable manner. Additionally, Limit Orders have a novel feature allowing users to provide liquidity with dual exchange ratios for CKB to UDT and UDT to CKB, similar to AMM but at constant ratios.
3. **Internal and External Audit:** Addressed minor issues raised during the audits of contracts and proposal. No vulnerabilities were found.

### Milestones Achieved

- **Operational Status:** iCKB is running smoothly on both mainnet and testnet.
- **Liquidity Bootstrapping:** Achieved a TVL of 3 million iCKB with 22 holders.
- **DApp Support:** Dedicated [ickb.org](#) DApp and integration in nervosdao.com DApp.
- **Community Engagement:** Ongoing education and CKCON presentation to raise awareness about iCKB.
- **Integrations:** Positive discussions with UTXO Stack Team, UTXO Swap Team and Stable++ Team regarding future integrations.





## NFT Nation ImagiNation

[ImagiNation](#) has solidified its position as a pioneering platform for digital asset creation, trading, and innovation within the Nervos ecosystem.

### Strategic Rebranding

In 2024, NFT Nation transitioned to [ImagiNation](#), introducing a refreshed brand identity, including a modernized logo, updated graphics, and revised URIs.



### CKB Layer 1 Integrations & Technical Advancements

ImagiNation deepened its Layer 1 integration with CKB, delivering robust infrastructure improvements:

- **Wallet & Authentication**
  - Added MetaMask support via [Lumos](#) and integrated [JoyID](#) for seamless login, profile management, and challenge authentication.
- **Asset Creation & Management**
  - Enabled minting of Clusters and [Spores](#), where Spores are always attached to a Cluster with User Generated Collections, something that will be optional with an upcoming feature update.
  - Enabled minting of [CoTA](#) Collections/Items with advanced capabilities.
  - Introduced [CKBFS](#) support, allowing on-chain asset minting within Witness data.
- **Interoperability & Data Syncing**
  - Integrated [Nervape](#) via BTCFS and implemented multi-criteria syncing for nested DOB data.
  - Semi-integrated RGB++, enabling CKB cell syncing as a precursor to full protocol adoption.

### User Experience & Interface Innovations

- **Search & Discovery**
  - Added dynamic Sort + Filters on search pages and expanded Collection Analytics with market data insights.
- **Asset Interaction**
  - Introduced a Save Feature for items/collections.
  - Enhanced media support with video previews, playable content on item pages, and auto-generated trait-based DOB previews.
- **Creator Tools**
  - Streamlined minting with a dedicated “Mint” button and expanded the storage styles with CKBFS.
  - Launched [Auction Hub](#) for EVM-based auctions and redesigned Collection Grouping Templates (e.g., Nervape Gear as unified collections).

### The Road Ahead

- **New Mint Process** - A simplified, user-friendly minting flow is nearing completion, featuring optional Clusters, audio asset support (with on-site cover images), and transparent storage-style selection.
- **CoTA Expansion** - Advanced [CoTA](#) capabilities are under development; we’re temporarily utilizing the legacy UI until full integration.





The [Polycrypt](#) team has worked with the [Nervos Foundation](#), [Cryptape](#) and [Magickbase](#) on a grant-funded project since 2023.

Polycrypt develops the [Perun](#) framework, a blockchain-agnostic payment and state channel solution that currently supports 9 blockchains including Ethereum, Polkadot, Cardano, Cosmos, Dfinity, Stellar, Fabric, and of course [CKB](#).

The Polycrypt team has been diligently working since 2017 toward unifying blockchains through payment and state channel networks. As a blockchain scalability solution, these technologies reduce transaction costs and increase the system throughput by executing incremental transactions off-chain, they also present a powerful interoperability solution.

Polycrypt's technology is based on peer-reviewed research that has been published at top conferences and is being implemented in the form of the open-source [library](#) written in Go.

In 2023, the PolyCrypt team [adapted](#) their framework to CKB, enabling two-party single-asset payment channels between users to be created, processed, closed and disputed.

In 2024, in line with the development of the Fiber Network, the Polycrypt team adapted the Perun framework to be compatible with Bitcoin's Lightning Network through use of adaptor signatures and also implemented support for more advanced "virtual" channels.

[Virtual Channels](#) can be used to create a payment channel network, connecting users who share common counterparties in channels, but do not directly have a channel with each other. Additionally the team implemented a [proof of concept](#) of Perun channels in Neuron.

In a separate project in 2024, the Polycrypt team [connected channels](#) running on Ethereum with channels running on Stellar, displaying for the first time, interoperability across channels running on an EVM chain and a UTXO chain, check out the demo [here](#).

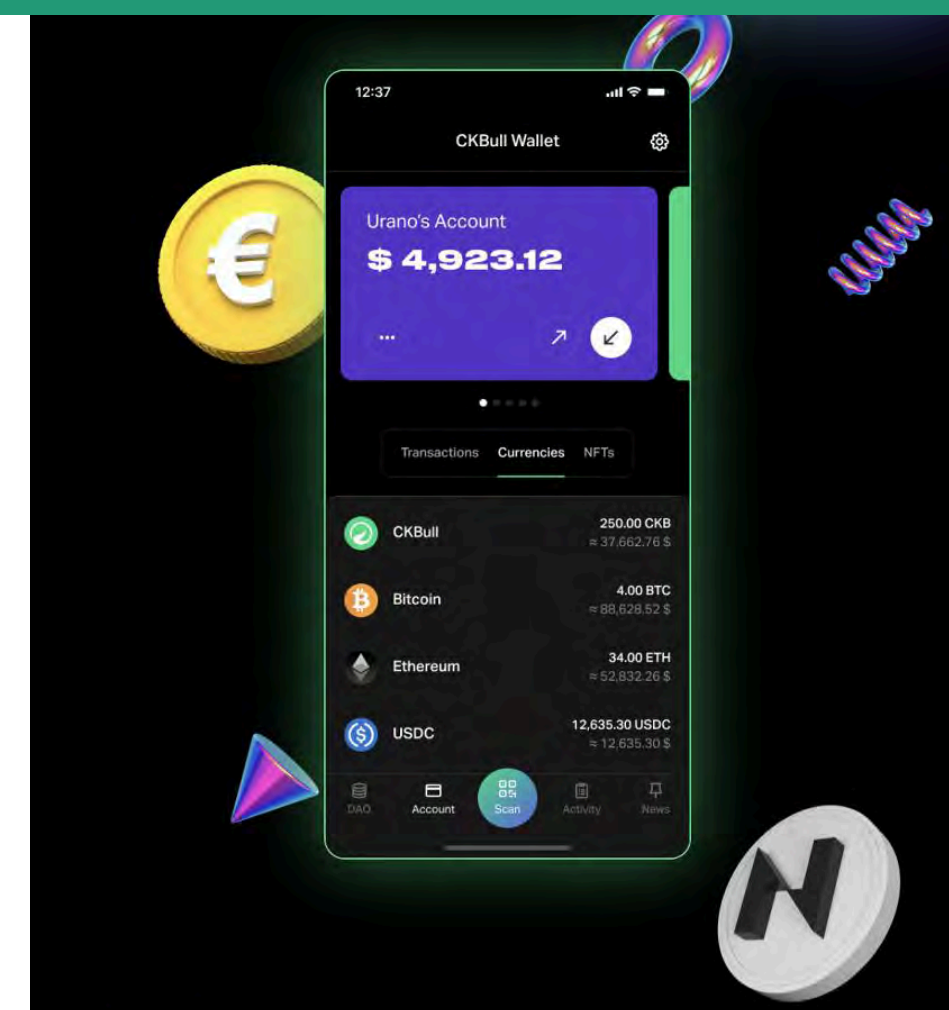
As we look toward 2025, the course has been charted for Neuron integration and connection of Perun channels to the Fiber Network. Stay tuned on [Nervos Talk](#) for updates!





## CKBull: 2024 Overview

CKBull, Peersyst's flagship mobile application, continued to drive the adoption and usability of the Nervos Network in 2024. Designed for Android and iOS, CKBull empowers users to seamlessly interact with the Nervos ecosystem—managing wallets, transacting CKB, engaging with decentralized applications, and earning yield via NervosDAO deposits. This year's updates have focused on expanding functionality, improving user experience, and fostering global accessibility, solidifying CKBull's role as a gateway to the Nervos ecosystem.



### 2024 Key Achievements

- **Global User Growth**

CKBull achieved significant traction in 2024, surpassing +5,000 new users across Android and iOS platforms. The app now serves a diverse global community spanning 140+ countries, with notable adoption in the United States, Brazil, the United Kingdom, Germany, France, and Nigeria.

- **Strategic Partnerships**

Partnered with [Transak](#) to enable fiat-to-crypto onramps, allowing users to purchase CKB directly within the app, lowering barriers to entry. Integrated support for [d.id](#) domains, enabling seamless address resolution for sending and receiving assets via human-readable decentralized identities.

### Feature Enhancements

CKBull introduced critical upgrades to streamline asset management and interoperability:

- Added compatibility with multiple address formats, enhancing flexibility for cross-chain and cross-protocol interactions.
- Added supported emerging token and NFT standards, ensuring compatibility with evolving ecosystem projects.
- Introduced the ability to “empty cells”—allowing users to send entire balances in one transaction, minimizing fragmentation and optimizing UTXO efficiency.
- Refined wallet creation and NervosDAO deposit processes to prioritize simplicity and accessibility for both new and experienced users.

### Strategic Vision & Future Roadmap

At CKCon 2024 in Thailand, Peersyst's CEO [outlined](#) a bold vision to position CKBull as a cornerstone of a multichain future by 2025. Key initiatives include:

- Developing support for the Bitcoin Lightning Network to enable fast, low-cost transactions.
- Enhancing interoperability with Fiber Network, CKB's multi-asset payment channels solution.
- Enabling seamless interaction with RGB++ assets, bridging Bitcoin and Nervos' ecosystems while maintaining user-friendly workflows.
- Advancing tools for frictionless asset transfers and dApp interactions across connected networks.

### Community Impact

CKBull's 2024 advancements underscore its commitment to democratizing access to blockchain technology. By simplifying complex processes like NervosDAO participation and cross-chain transactions, the app empowers users worldwide to engage confidently with decentralized finance (DeFi), digital identity, and asset management. For deeper insights, watch the CKCon 2024 keynote presentation [here](#).





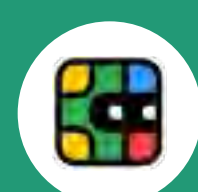
## Unicorn

Launched in March 2024, Unicorn introduced the first tradable DOB on CKB, advancing decentralized ownership models and driving innovation in financial products.



## WORLD3

WORLD3, an AI-powered autonomous world built on the RGB++ Layer and the DOB protocol, raised \$6 million in 2024. Its first collectible, [SOUL Dragon](#), launched in August, attracting over 100,000 users and demonstrating the potential of blockchain-powered AI experiences.



## Cellula

Cellula, an all-chain AI gaming ecosystem, completed a \$2 million pre-seed round led by SevenX Ventures and OKX Ventures. It utilizes the RGB++ protocol to issue 511\*6 [BitCell](#) NFT sets on Bitcoin.





# Content



# Events

## Community and Global Events

In 2024, the CKB Eco Fund made significant strides to foster a global presence and strengthen community engagement through strategic events. Through a range of key conferences, meetups, and hackathons worldwide, the blockchain community at large learned about CKB's unique technology and value proposition.

Explore more event details and posters on the CKB Eco Fund [Luma](#) page

## Q1-Q2 Highlights



### [Bitcoin Singapore 2024 Conferences](#)

Co-hosted with ABCDE Capital, bringing together industry leaders to discuss Bitcoin finance and ecosystem development. 🖱️ [Recap on X](#)



### [Bitcoin Spring Hacker House](#)

Sponsored a [Rebase](#)-organized event for developers to collaborate on innovative blockchain solutions.



### [HK Web3 Festival](#)

CKB Eco Fund co-hosted the Bitcoin Forum with WXBlockchain, Hashkey, and Bitcoin Magazine. The forum brought together blockchain pioneers to explore Bitcoin Layer 2 technologies, the Lightning Network, and Bitcoin asset issuance.

- Side Events: Hosted a [Meetup for CKB and our friends](#). 🖱️ [Recap on X](#)



### [Token2049 Dubai Week](#)

Participated in multiple events, including hosting the [Bitcoin POW Night](#), a premier gathering co-organized with BITMAIN, Matrix Labs, and SafePal. The event provided a platform for connecting with key players in the Bitcoin ecosystem, discussing advancements in Proof-of-Work technologies, and fostering collaboration. 🖱️ [Details](#)



### [Blockchain Life 2024](#)

Sponsored and actively participated in this premier blockchain event. Jan Xie, Architect of Nervos CKB, delivered keynote speeches, sharing insights on Bitcoin Layer 2 and decentralized finance. 🖱️ [Details](#)



### [Bitcoin Asia](#)

Participated and hosted a [RGB++ Meetup](#), bringing together key players from the blockchain ecosystem to explore the advancements of the RGB++ protocol. Discussions highlighted its rapid adoption, technical evolution, and emerging opportunities in the Bitcoin ecosystem. 🖱️ [Details](#)



### [BTC Summer in Hong Kong](#)

Co-hosted with Wizz Wallet, OpenStamp, and OKX Wallet, BTC Summer explored the thriving Bitcoin ecosystem while showcasing exceptional projects across Layer 1 and Layer 2. 🖱️ [Details](#)



# Events

## Q1-Q2 Highlights



### [Builders in Bitcoin Ecosystem: Seoul Edition](#)

This community-driven event, part of [Bitcoin Seoul Week](#), connected global Bitcoin builders with the local Korean community. Co-hosted by CKB Eco Fund, Solv Protocol, Unisat, Apro Oracle, and Followin, it featured discussions on Bitcoin infrastructure, ecosystem solutions, and networking opportunities for developers and innovators.



### [GM Vietnam](#)

Participated in Southeast Asia's flagship conference in early June, strengthening connections with local partners and communities. The CKB team engaged in discussions about building on CKB, showcasing recent developments and ecosystem opportunities. [👉 Details](#)

## Developer Hackathons

- [HK BitcoinDevCon](#): Co-hosted by UTXO Management and Satoshi Lab. This event focused on innovation within the Bitcoin ecosystem, including a hackathon that explored solutions in the UTXO model and Bitcoin Layer 2 technologies. [👉 Details](#)
- [Vietnam Rust Hackathon](#): Sponsored and supported the largest Web3 Rust developer gathering. CKB conducted workshops and offered on-site support, leading to six finalist teams in the CKB track, with three winning top prizes. [👉 Full Recap](#)
- [ErgoHack VIII](#): In collaboration with Ergo, we co-hosted the 8th ErgoHack event centered around pushing the boundaries of UTXO-based DeFi. [👉 Details](#).

## Q3-Q4 Highlights



### [Bitcoin 2024](#)

Attended the flagship Bitcoin conference, Bitcoin 2024, hosted a US Meetup, [RGB++: Bitcoin Summer Mint](#), & co-hosted [Friends of Bitcoin Nashville](#), engaging with the global Bitcoin community. [👉 Video](#)



### [Bitcoin Community Mixers I](#)

Co-hosted by CKB Eco Fund and HashKey Capital, this event brought together key players to promote collaboration, share insights, and drive innovation in the Bitcoin ecosystem.



### [BTC Community Mixer Singapore II: BTCfi](#)

Organized by CKB Eco Fund, UTXO Stack, and Herring Global, this event spotlighted Bitcoin-native financial solutions, fostering discussions around BTCfi advancements and future opportunities.



### [ABS Taipei](#)

Participated in this leading blockchain event in August, connecting with innovators and showcasing CKB ecosystem progress. [👉 Details](#)



# Events

## Q3-Q4 Highlights



### [Token2049 Singapore](#)

Demonstrated CKB's ecosystem innovations at this premier event, focusing on scaling Bitcoin Layer 2 and decentralized solutions. 🖱️ [Details1](#); [Details2](#)



### [Bitcoin Singapore: Lightning Returns](#)

Co-hosted with [UTXO Management](#), this event brought together enthusiasts and experts to explore the latest developments in Bitcoin and the Lightning Network.



### [Korea Blockchain Week](#)

CKB Eco Fund and Seouldinals.btc co-hosted the [Bitcoin Community Assembly](#) during KBW 2024, drawing over 200 members of the crypto community. This offline event strengthened CKB's presence and influence within the Korean Bitcoin communities.



### [Binance Blockchain Week](#)

Attended this premier blockchain event in October, fostering connections with global blockchain leaders and showcasing ecosystem updates. 🖱️ [Details1](#); [Details2](#)



### [CKWeek and CKCON](#)

Hosted in Chiang Mai, this event featured developer-focused workshops, ecosystem discussions, and collaborative insights for scaling decentralized technologies. 🖱️ [Details](#)



### [DevCon Bangkok](#)

Participated in this global developer conference, highlighting CKB's role in advancing Bitcoin Layer 2 technologies and fostering community engagement. 🖱️ [Details](#)



### [Bitcoin MENA](#)

Engaged with the Middle Eastern and North African Bitcoin communities at this event, discussing opportunities for Bitcoin-native financial solutions in the region. 🖱️ [Details](#)

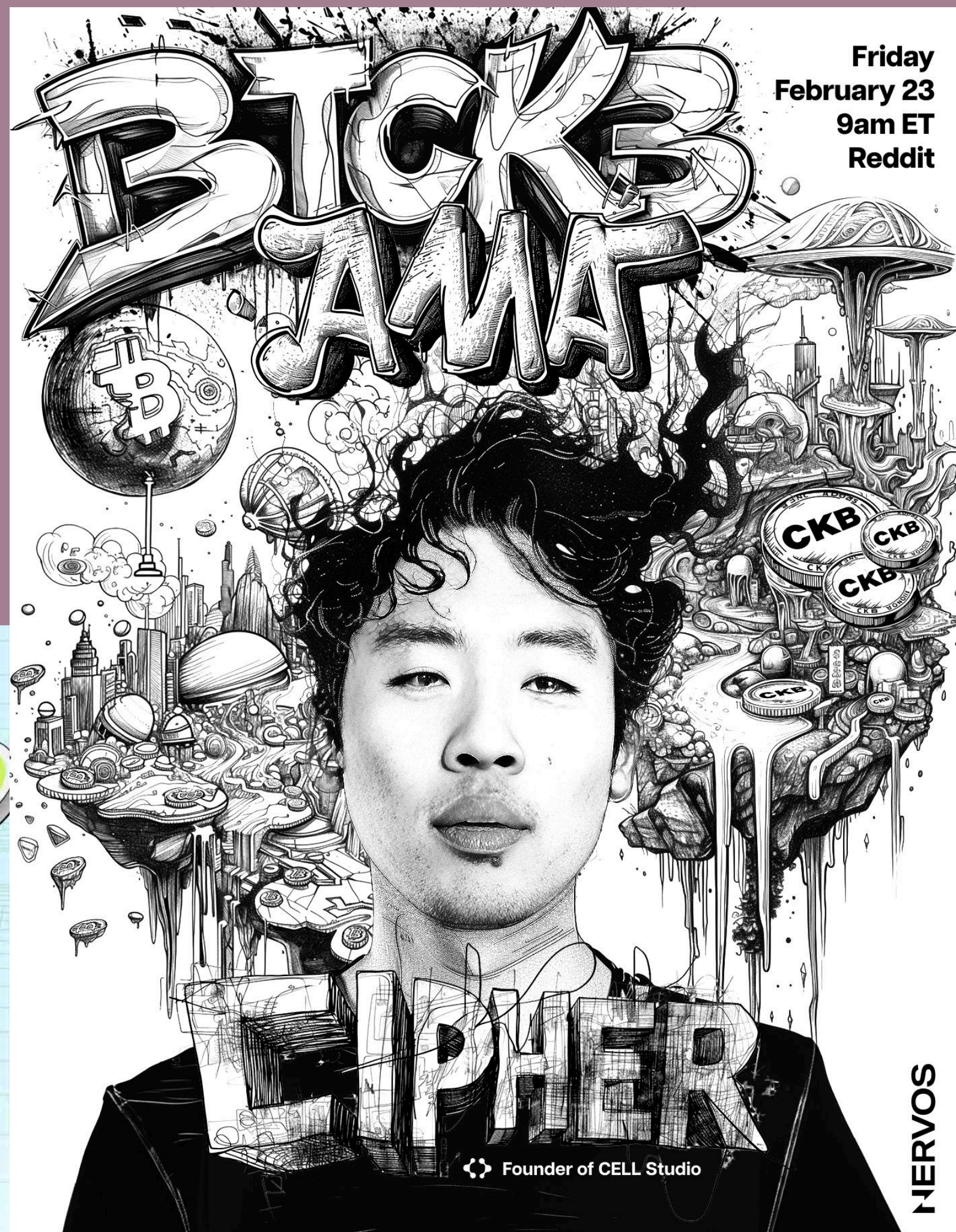
In addition to hosting global events, the CKB Eco Fund collaborated with partners like Binance Square, Matrixport, Meson Finance, and Alchemy Pay to organize trading contests, creation contests, and educational initiatives, fostering community engagement and adoption.



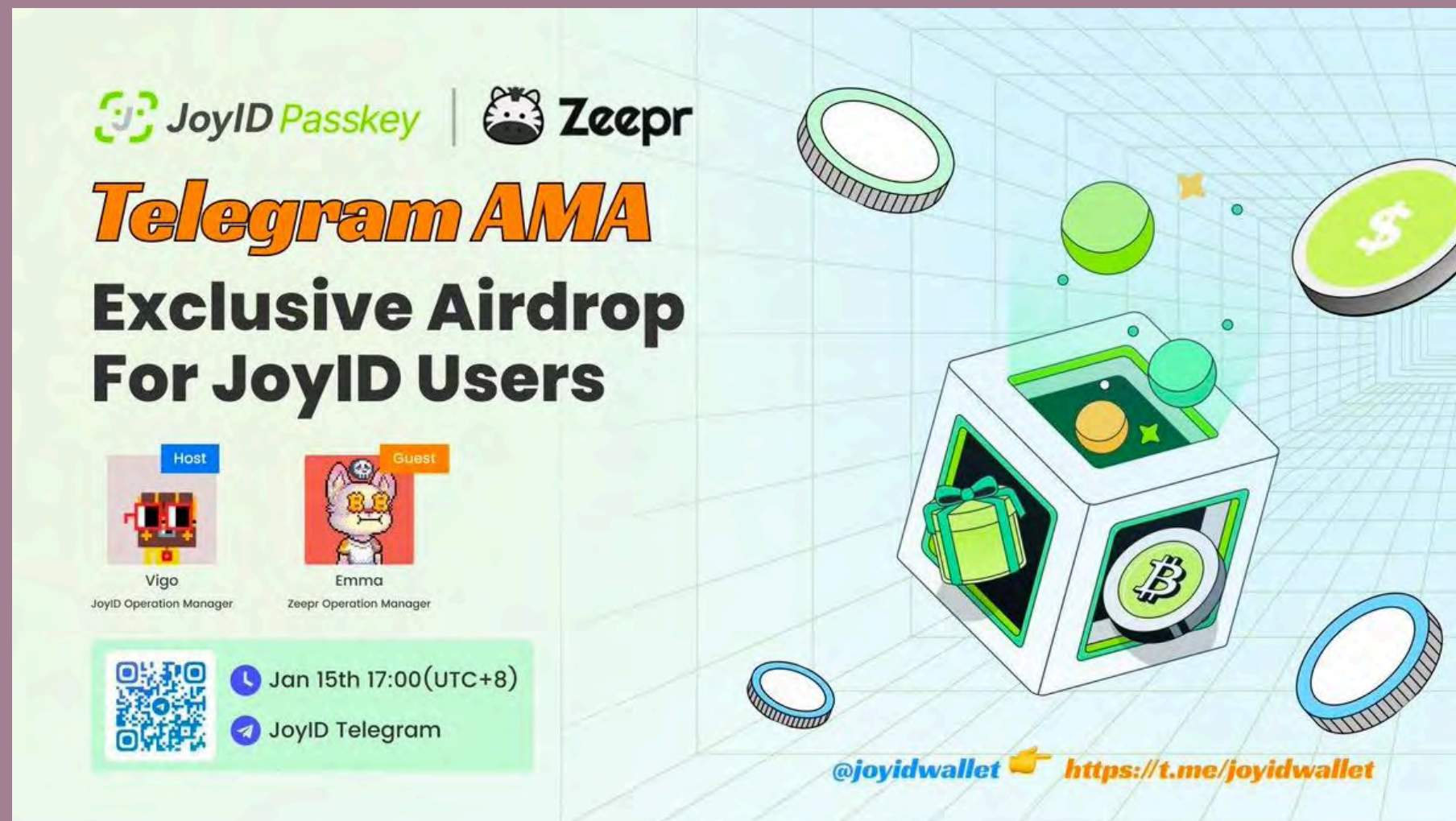
# AMA's 2024

To foster transparency & collaboration, the Nervos Foundation organizes AMAs with leading ecosystem builders to engage with the Nervos community. Through sharing of technical insights & goals, these events directly inform stakeholders, in line with the project's decentralized ethos.

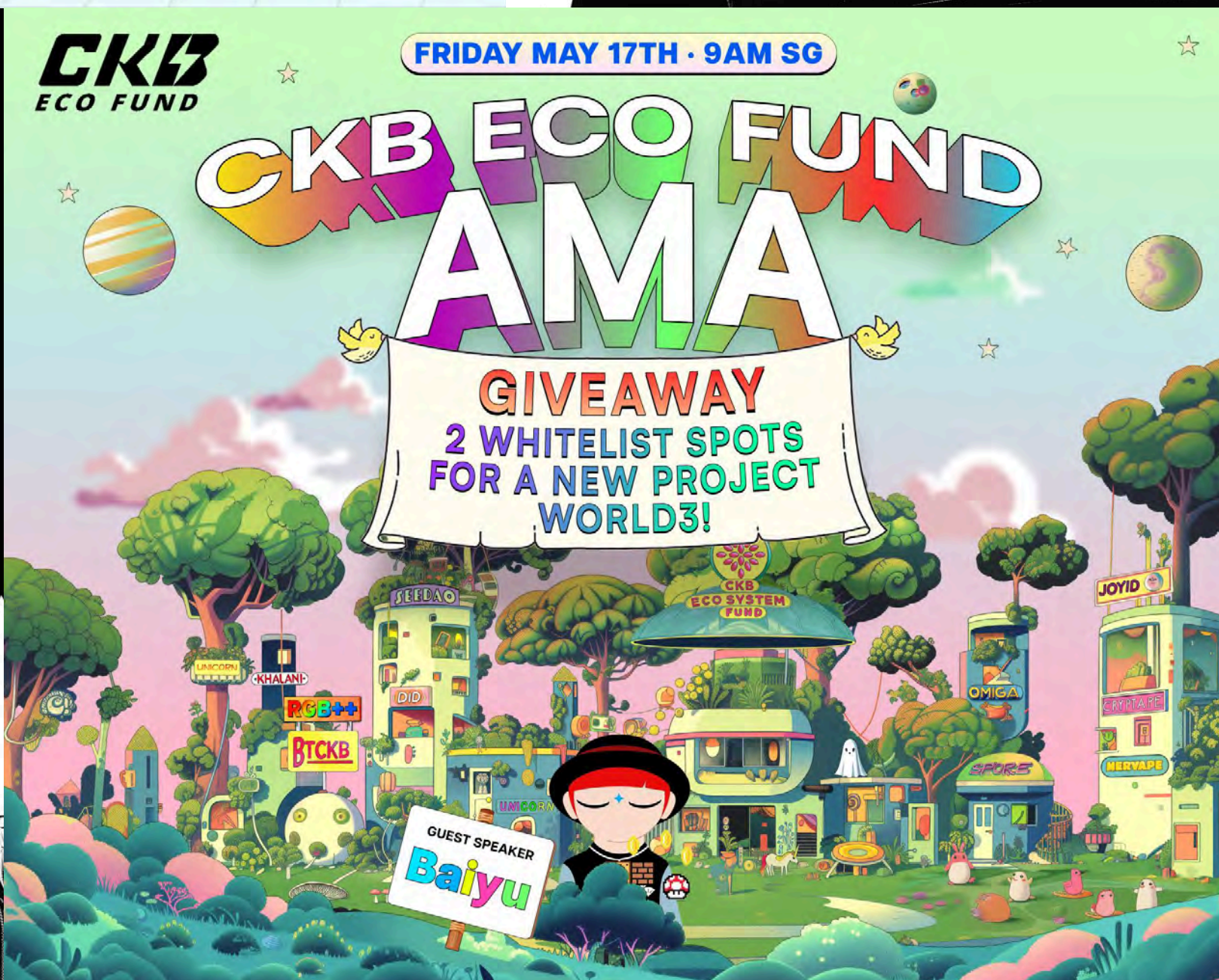
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3



4

- ① [JOYID AMA](#)
- ② [BTCKB AMA with Cipher Wang 2024](#)
- ③ [Spore AMA](#)
- ④ [The CKB ECO Fund AMA](#)



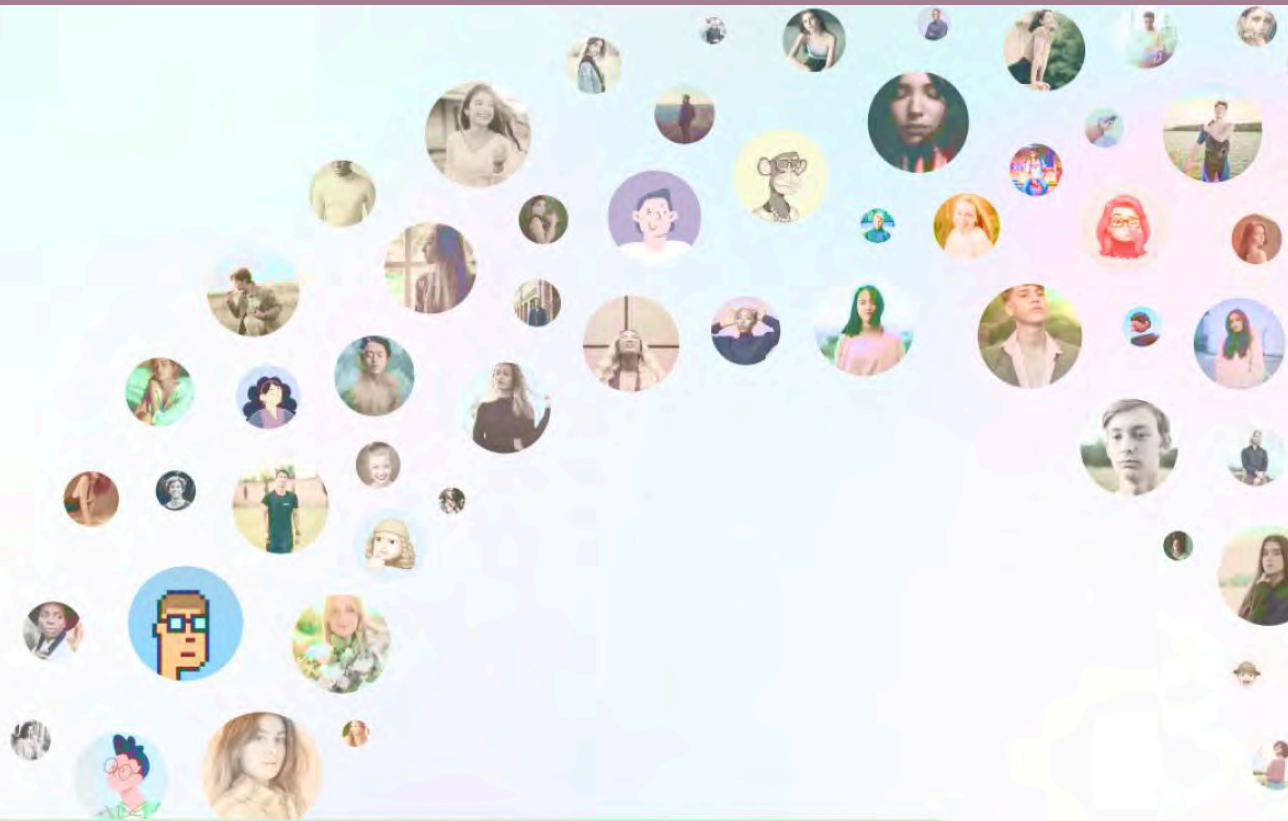
# AMA's 2024

- ① [d.id AMA](#)
- ② [Dr Ren Zhang CKB AMA](#)
- ③ [UTXO Swap AMA](#)
- ④ [PROJECT STABLE ++ AMA](#)

1

# d.id

Reddit AMA



🇺🇸 Friday June 7th  
11:00 AM UTC

🎁 Unlock 2 complimentary mint vouchers  
by posing the top two questions!



2

# REN ZHANG

CRYPTAPE RESEARCHER

TUESDAY  
JUNE 25TH  
9 AM ET

NERVOS  
REDDIT AMA  
WITH DR. REN  
ZHANG



4



# Stable++

# ama

Saturday  
July 6th  
7pm HK  
Hong Kong Time

# Reddit

Built on RGB++.  
Powered by Nervos.  
For the Bitcoin Ecosystem.

3

# utxo swap

a m a



monday  
july 22nd  
7pm et  
reddit





# AMA's 2024

1



## ZENGATE AMA



Sam Lambert  
Chief Operations Officer



Theodore Morisis  
Head of Operations

MONDAY • AUGUST 26 • 11AM GMT • REDDIT

1 [Zengate Palmyra AMA](#)

2 [iCKB AMA](#)

3 [Fiber Network AMA](#)

AMA  
iCKB  
with  
Phxoi  
the  
CREATOR

TUESDAY  
AUGUST 27

11 AM GMT  
REDDIT

ICKB

CKB FIBER NETWORK  
AMA

QUAKE WANG  
CORE DEVELOPER  
OF THE FIBER NETWORK

DON'T MISS OUT!

OCTOBER 1ST  
11:00 AM GMT

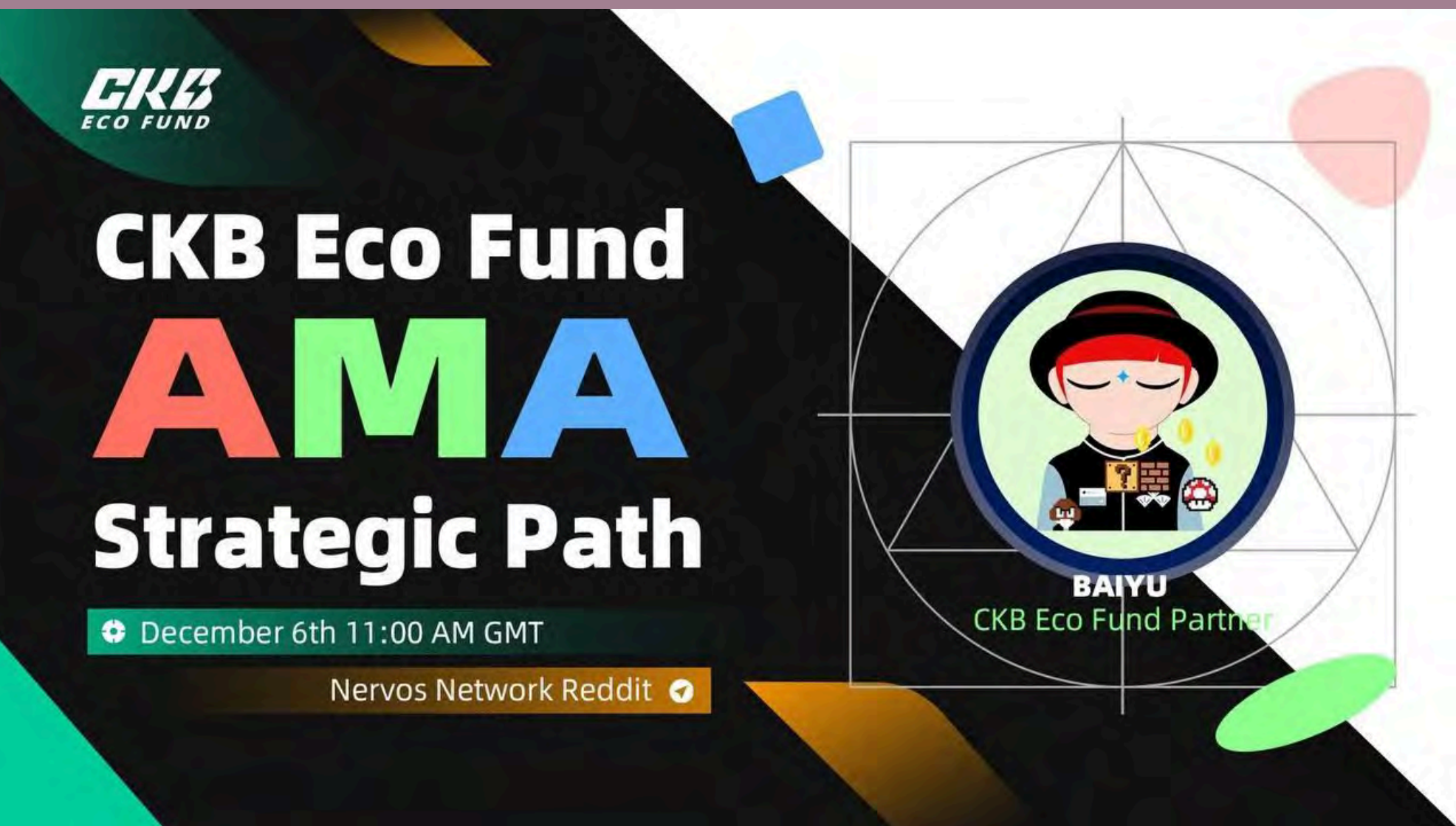
CKB  
ECO FUND

3



# AMA's 2024

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- ① [The Eco Fund AMA Q4 chapter: The Strategic Path](#)
- ② [UTXO Global AMA](#)
- ③ [UTXO Stack AMA](#)

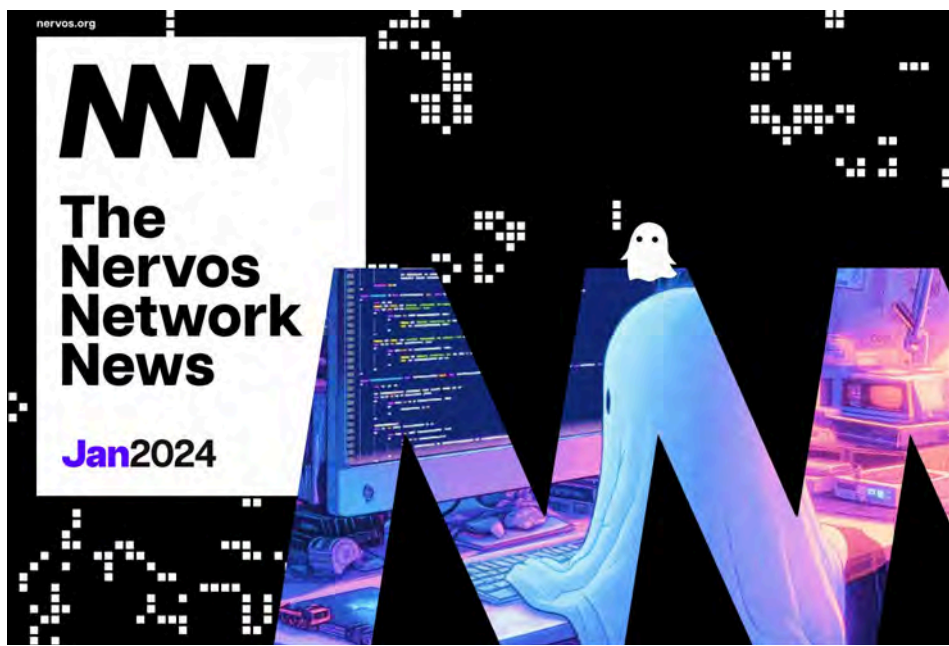
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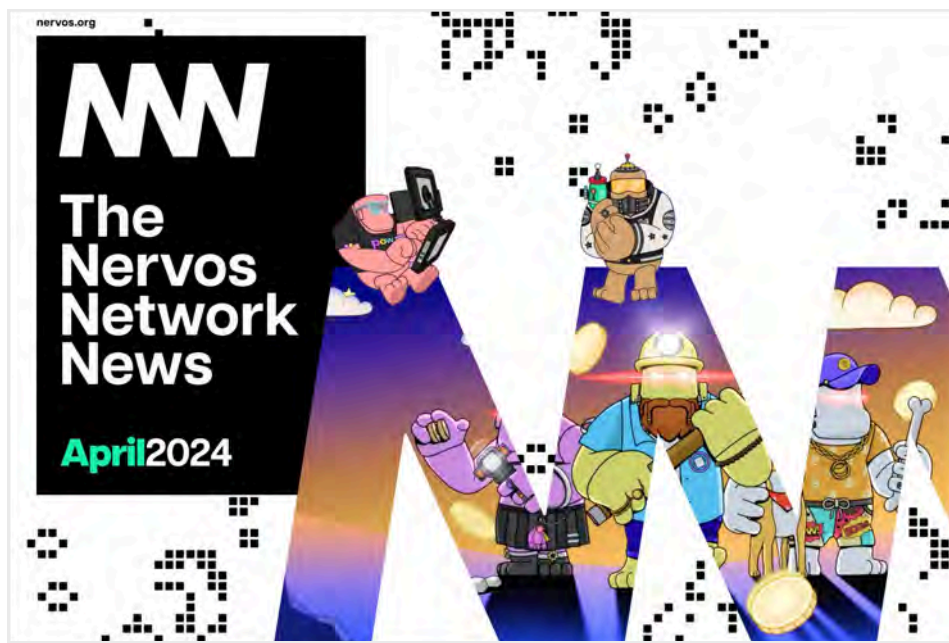
[January](#)



[February](#)



[March](#)



[April](#)



[May](#)



[June](#)



[July](#)



[August](#)



[September](#)



[October](#)



[November](#)



[December](#)

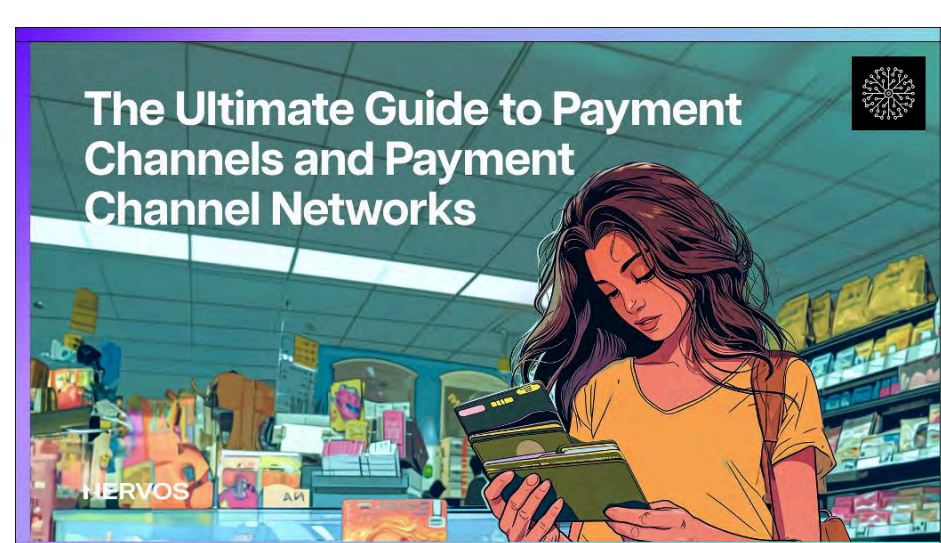


## Knowledge Base

Over the past year, the Nervos Foundation has made significant strides in educating the public and the blockchain community about the capabilities and advantages of the CKB blockchain, as well as the broader implications of its technology for the future of decentralized systems.

Our [Knowledge Base](#) has been a cornerstone of this educational effort, featuring a series of in-depth articles that collectively paint a comprehensive picture of our work and vision. Below is a summary of the key topics we've covered over the last year and how each article tells a key part of the much larger ongoing story that is the Nervos ecosystem.

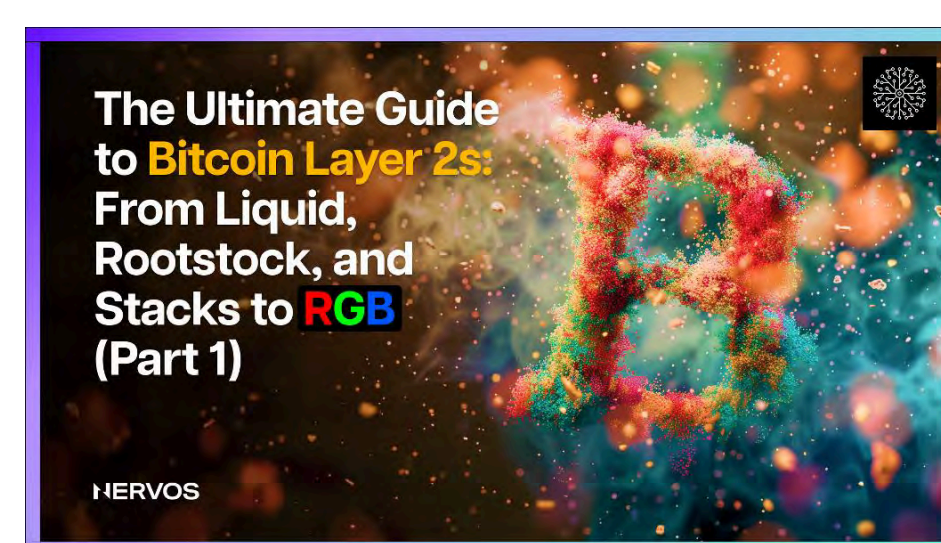
### Scaling Solutions



[The Ultimate Guide to Payment Channels and Payment Channel Networks](#)



[Understanding Bitcoin Layer 2 with RGB++ Protocol](#)



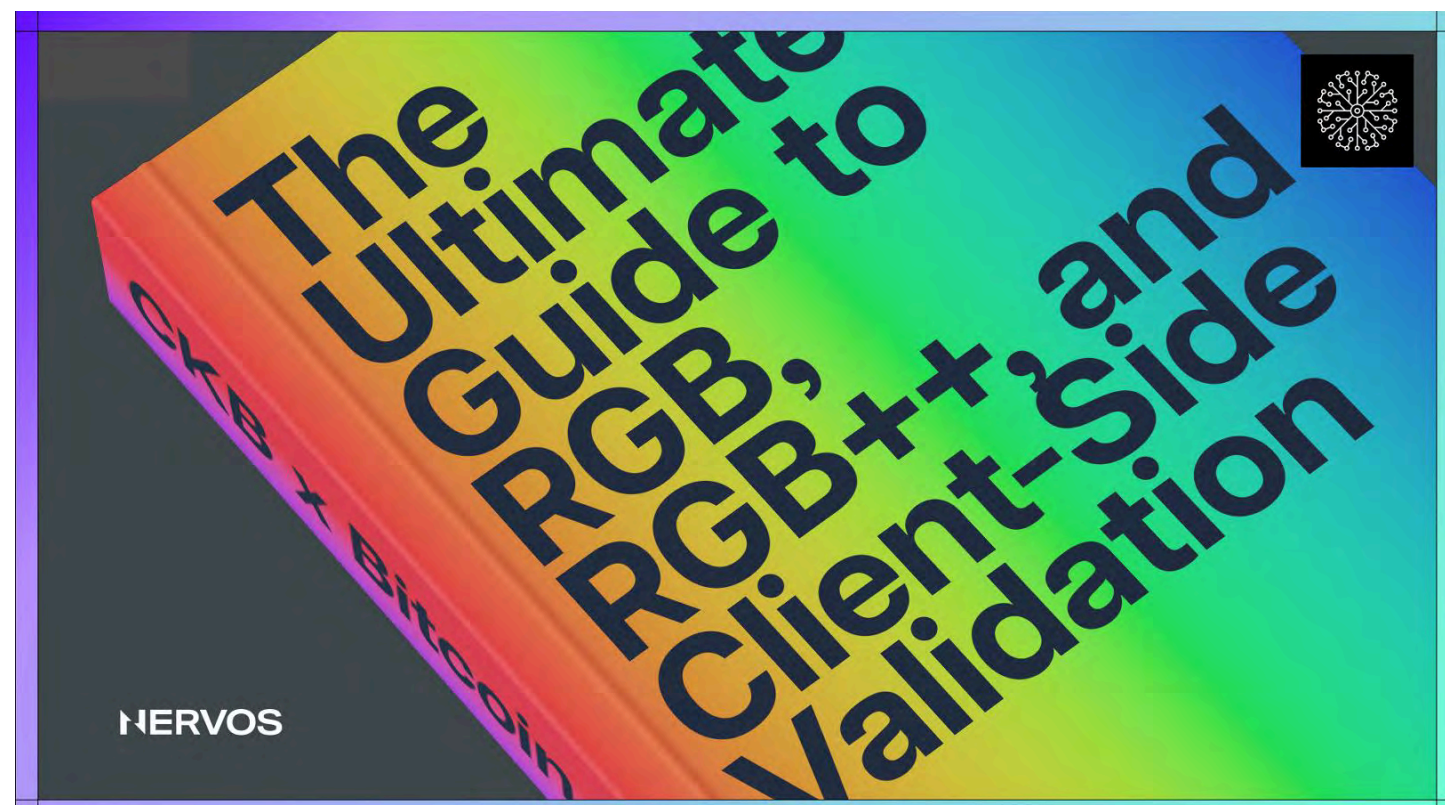
[The Ultimate Guide to Bitcoin Layer 2s: From Liquid, Rootstock, and Stacks to RGB \(Part 1\)](#)

These articles provide a comprehensive overview of the various scaling solutions available for the Bitcoin network. They examine the mechanics of payment channels, such as the Lightning Network, and explain how these solutions enhance transaction throughput and reduce costs without compromising on security.

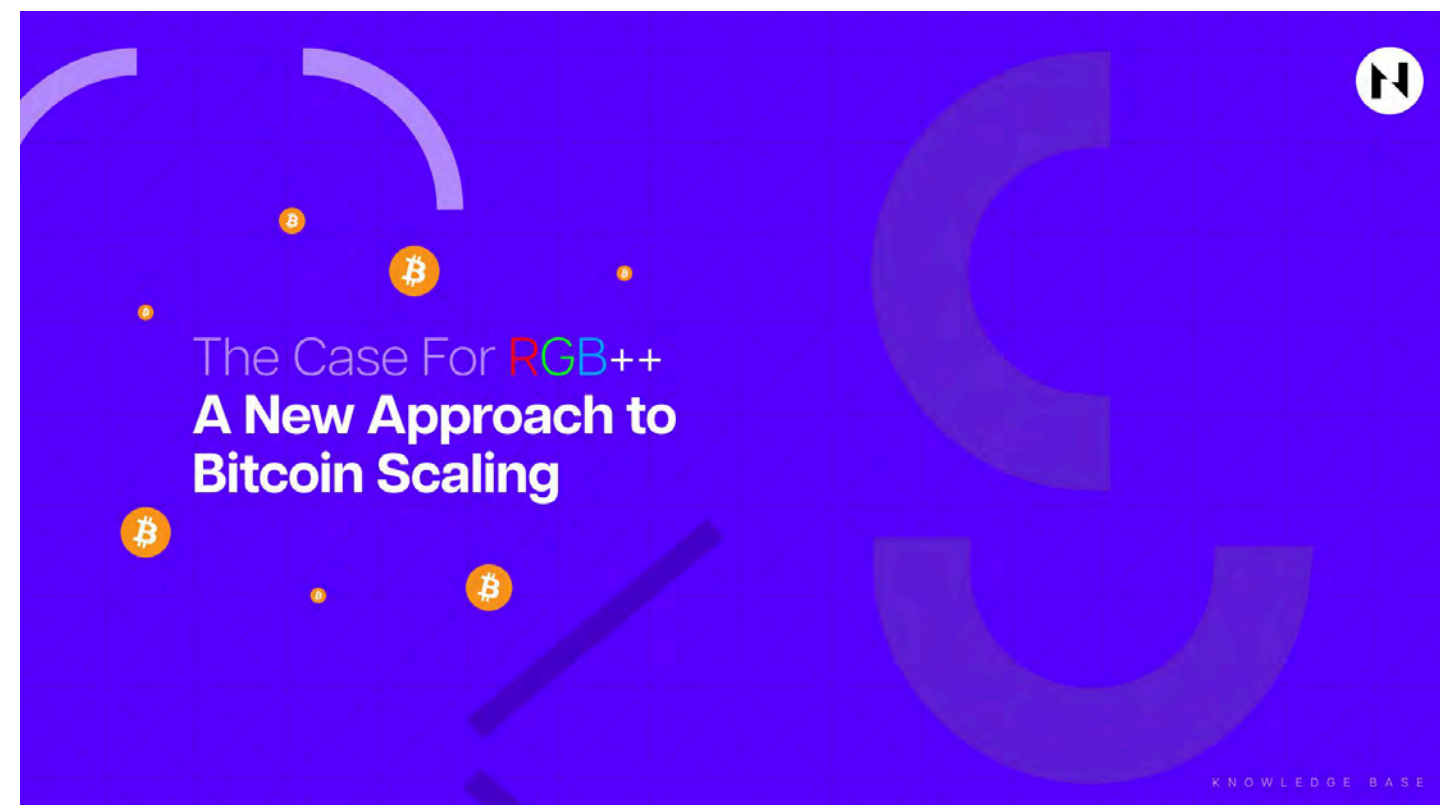
Additionally, the articles introduce the [RGB++](#) protocol as a novel approach to Bitcoin scaling, highlighting its potential to revolutionize how transactions are processed on the network. By exploring different Layer 2 solutions, these pieces underscore a commitment to finding innovative ways to address the scalability challenges faced by blockchain networks.



## RGB++ and Client-Side Validation



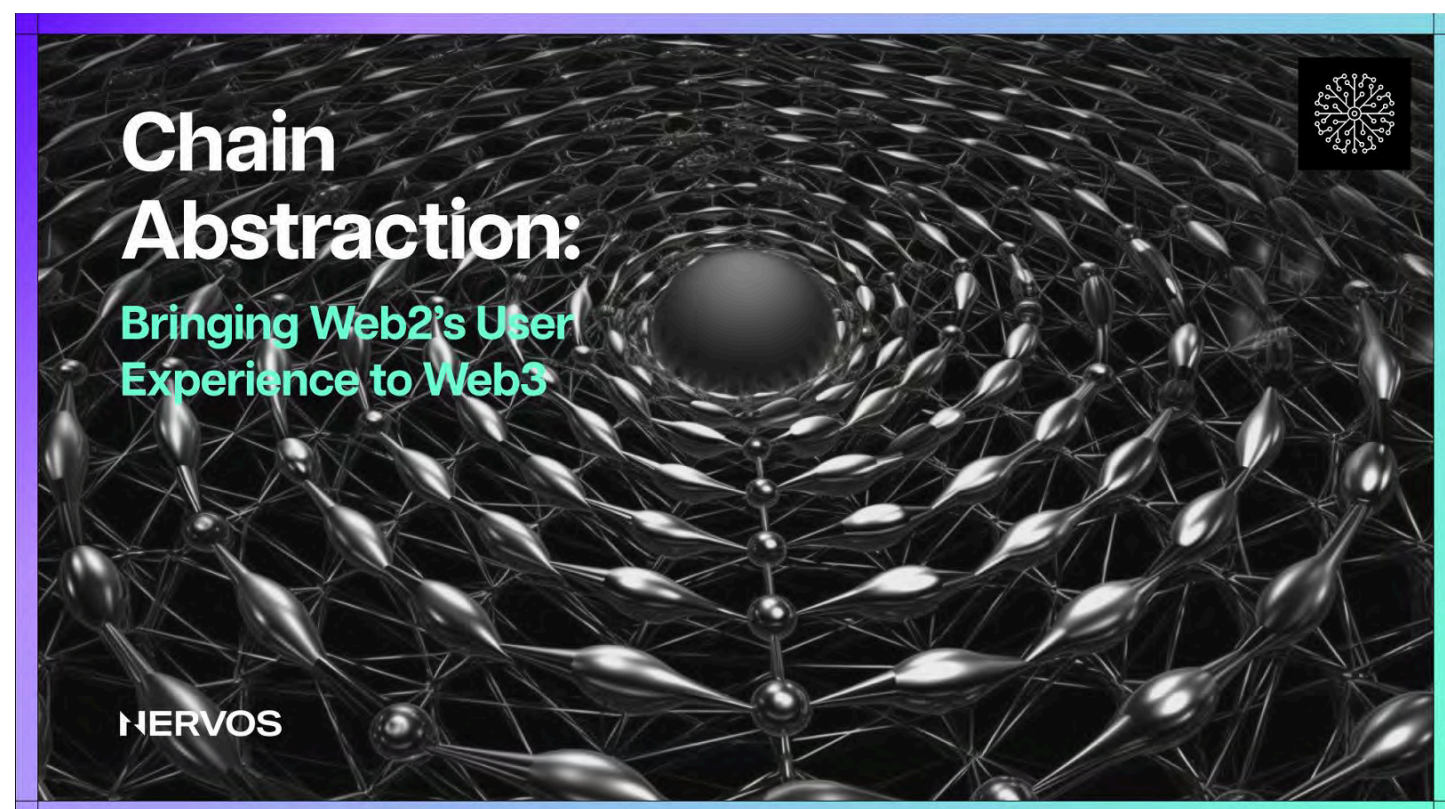
[The Ultimate Guide to RGB, RGB++, and Client-Side Validation](#)



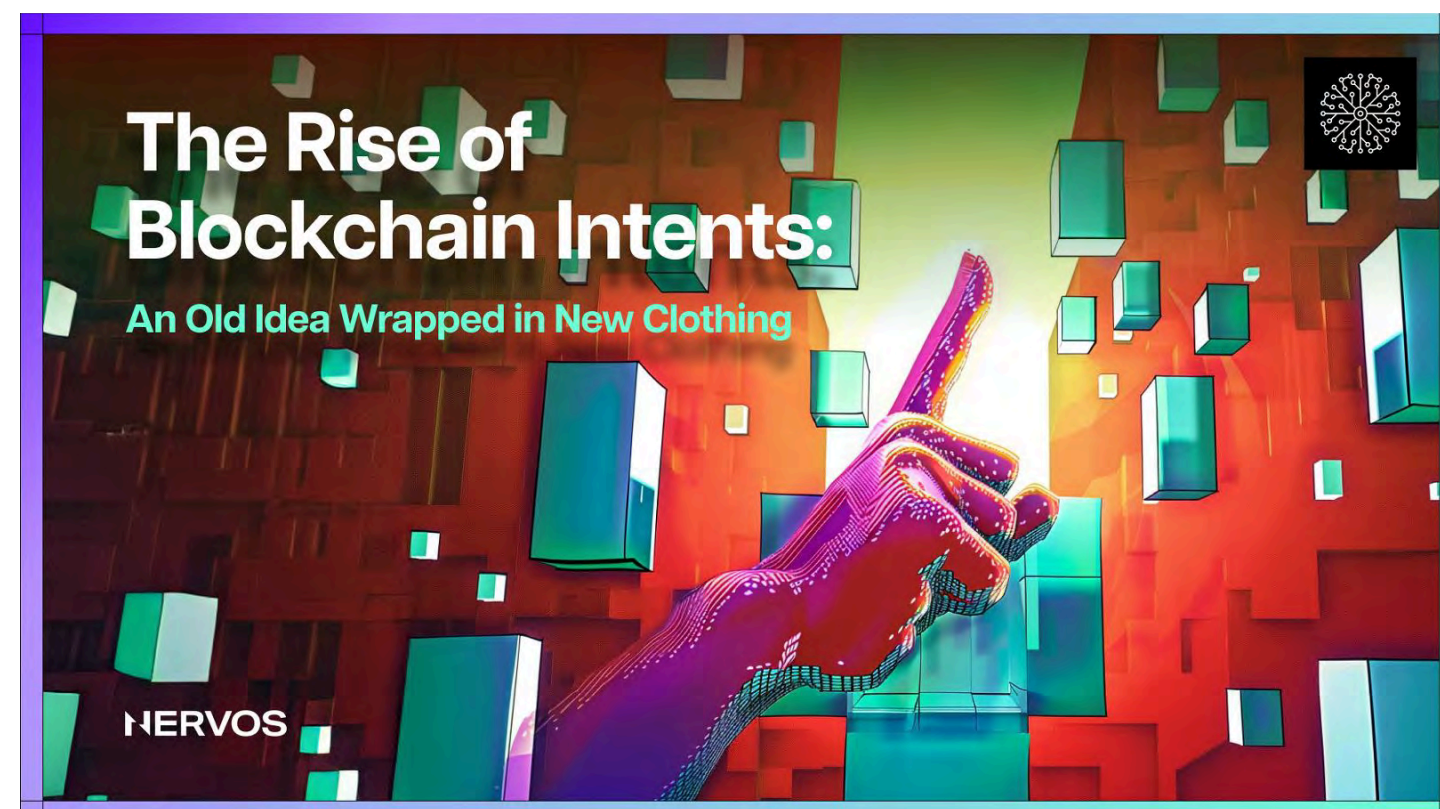
[The Case For RGB++: A New Approach to Bitcoin Scaling](#)

Here, we're digging deeper into the RGB++ protocol, explaining the key underlying primitives—client-side validation, and single-use seals—and how they're implemented to create a superior Bitcoin assets issuance layer. These pieces highlight the Nervos project's role in pioneering innovative scaling solutions that not only improve network performance but also empower users with greater control over their data and transactions.

## Blockchain Abstraction



[Chain Abstraction: Bringing Web2's User Experience to Web3](#)



[The Rise of Blockchain Intents: An Old Idea Wrapped in New Clothing](#)

These articles explore the concept of abstraction in blockchain technology and its potential to transform the user experience in decentralized systems. The first article explains how different projects approach chain abstraction and how CKB's native account abstraction compares to these solutions. The second article digs deep into the concept of blockchain intents and how it is being applied to account and UTXO-based chains.



## Bitcoin Ordinals and Incriptions



### [The Ultimate Guide to Bitcoin Ordinals and Incriptions](#)

In this piece, we're doing a comprehensive overview of the emerging trend of Bitcoin Ordinals and Incriptions, which has sparked both controversy and excitement within the crypto community. It explains the concept of Ordinal Theory, a methodology for tracking and labeling individual satoshis (sats) on the Bitcoin blockchain, and how this has enabled the creation of inscriptions—unique digital artifacts etched into the blockchain. The article also showcases how the CKB blockchain is embracing the concept of inscriptions through protocols like Omega and Spore, which leverage CKB's flexibility and programmability to enable new forms of digital ownership and value creation.

## Comparing Execution Environments



### [Comparing Blockchain Virtual Machines \(VMs\): EVM, WASM, SVM, and CKB-VM](#)

This article offers a detailed comparison of different blockchain virtual machines, such as Ethereum's EVM, NEAR's WASM, Solana's SVM, and of course, CKB-VM.

By examining the strengths and weaknesses of each environment, the article provides valuable insights for dApp developers looking for the right blockchain to build on. It highlights the unique features of the CKB-VM, such as its unprecedented flexibility, simplicity, execution speed, and language support, showcasing a focus on providing the most versatile and powerful platform for decentralized application development.



## Peering Into The Future



### [Web5: Extra Decentralized](#)

This comprehensive essay discusses the concept of Web5 and its implications for the future of blockchain networks. It reflects our forward-thinking approach and commitment to fostering a more decentralized and equitable digital landscape. It provides the case that the Nervos project is leading in envisioning and shaping the future of the Internet, emphasizing the importance of decentralization in empowering individuals in an increasingly subjugated world.

### Summary

Through our growing [Knowledge Base](#), we have provided comprehensive insights into the technical, theoretical, and practical aspects of our work. Beyond our highly technical deep dives, we've enriched our Knowledge Base with over 100 short-form articles on various niche topics augmented through use of AI, making it one of the best places for newcomers to learn about all things crypto.

These articles serve two primary purposes: first, they provide concise yet thorough answers to specific technical questions related to cryptocurrency that are often difficult to find. Second, they aim to improve the SEO and Google authority of the project's primary website, [Nervos.org](#), thereby attracting more attention.

Moving forward, we plan to restructure our Knowledge Base so that readers can immediately grasp the most crucial information regarding CKB and the key problems the technology solves. We will reorder the articles, placing the long-form technical deep dives at the top—arranged according to their "resolution" by moving from the macro perspective of CKB to the micro level—and positioning the short-form articles below them.

The revamped Knowledge Base will make onboarding new crypto enthusiasts to CKB much easier, as it will serve as the sole and most comprehensive CKB resource yet. These articles collectively demonstrate the Foundation's commitment to education, community reporting, and thought leadership.

As we look to the future, we remain dedicated to pushing the boundaries of what is possible and empowering individuals and organizations to harness the full potential of decentralized systems.



# Hashing it out

**Hashing it Out**

Guest  
**Kevin Wang**

Topic of Discussion  
**Khalani Network**  
The decentralized solver infrastructure for intent-driven applications

Tuesday, January 30th  
@ 12pm PST

Streamed on Youtube **NERVOS**

Kevin Wang - Nervos Network Co-Founder and CEO of Tunnel Vision Labs

[January: Khalani Network](#)

**Hashing it Out**

Guest  
**Rong Xin + Jia Qi**

Topic of Discussion  
**Spore Protocol**  
Next Generation On-Chain Digital Assets to Empower the Next Wave of NFTs

Thursday, February 22nd  
@ 7pm PST

Streamed on Youtube **NERVOS**

Rongxin - Head of Developer Relations Cryptape

[February: Spore Protocol](#)

**Hashing it Out**

Guest  
**Matt Quinn**

Topic of Discussion  
**Nervos Ecosystem News and Updates**

Thursday, April 18th  
@ 2pm EST

Streamed on Youtube **NERVOS**

Matt Quinn - Executive Director @ Nervos Foundation

[April: Nervos Ecosystem News](#)

**Hashing it Out**

Guest  
**ZenGate**

Topic of Discussion  
**Palmyra: RWA Trading and Lending**

Sunday, June 30th  
@ 5pm PST

Streamed on Youtube **NERVOS**

Dan Friedman - Chief Executive Officer  
Sam Lambert - Chief Operations Officer  
Theodore Morisio - Head of Operations

[June: ZenGate](#)

**Hashing it Out**

Guest  
**Hongzhou Chen**  
Research Lead @ CKB Eco Fund

Topic of Discussion  
**News and Updates from the CKB Eco Fund**

Monday, December 16th  
@ 6pm PT

Streamed on Youtube **NERVOS**

CKB Eco Fund News & Update!

[December: CKB Eco Fund](#)





# Technical Development



# Core Development Report from Cryptape

## Rolling Code To Production

A common analogy used in the blockchain world is that maintaining a public blockchain is much like changing the engine of a plane in flight. It's really not just enough when you have the code for a particular feature. Significant engineering efforts are required for any major overhauls in CKB.

This year, we paid special attention to continuous testing and monitoring, making sure new features can be shipped to mainnet smoothly and that existing features continue to work without any surprises.

### CKB Rich Indexer

The [rich indexer module](#) was continuously tested, benchmarked, and improved in 2024 so that it can be deployed as a stable, high-performance indexer that can serve all kinds of use cases.

### Block Synchronization Optimizations

Last year, a new [asynchronous process](#) for downloading and validating CKB blocks was designed and implemented. Such a major change inevitably carries risks.

We performed extensive testing on the new block synchronization process, including internal testing, RC versions for more extensive testing, and gray-scale rollouts in bootnodes.

The new block synchronization process was shipped in [CKB v0.118.0](#). Now, all nodes running the latest CKB versions can benefit from this new algorithm and enjoy a much faster block-downloading process.

### Transaction Pool Optimizations

Following last year's work, we have continued to monitor and enhance the transaction pool. Developer feedback and real-world monitoring of projects launched on Nervos CKB provided us with valuable insights, inspiring us to further [streamline the mechanics of CKB's transaction pool](#).

### Fuzzing CKB

Fuzzing has long been a common technique used among CKB-related projects to ensure code correctness. However, past experience with fuzzing has mostly been limited to CKB scripts.

Following our success in CKB scripts, we have adopted fuzzing for CKB's implementation itself. In 2024, we successfully introduced fuzzing to CKB's [P2P library](#) and [molecule](#)—CKB's heavily used serialization library. We will continue working on adding fuzzing to more code to make CKB as resilient as possible.

## Protocol & Reference Implementation

### Spawn Revisited

The [spawn](#) syscall designed last year is a major feature scheduled for activation in CKB's 2nd hard fork, [Meepo](#). It has the potential to reshape how CKB scripts will be architected in the coming years.

Due to the importance of this [syscall](#), we revisited its design and improved its implementation several times until its current status, based on internal testing data and external feedback. The final result will be a powerful [spawn](#) that suits many more potential use cases of parallel execution and reduces developers' attention to underlying technical details.



## Core Development Report from Cryptape

### Interruptable (Pause) Signal-Based CKB-VM Verification

We revisited the snapshot-based CKB-VM verification entirely, introducing a new interruptable signal named [Pause](#) to control the CKB-VM verification process.

This new design has two merits: (i) the suspension and resumption of a running [CKB-VM](#) instance is made more resilient than before; and (ii) a much more balanced transaction verification queue unifies the lifecycle for all CKB transactions, including those with large consumption cycles that were previously managed in a secondary queue. This way, all CKB transactions can get a fairer chance of being validated.

Consequently, the CKB node's resource utilization was also improved. The new [Pause](#) signal also enables asynchronous verification, which works perfectly with the new asynchronous block download and validation process.

### Fee Estimator

In [CKB v0.120.0](#), we added a new fee estimator with different underlying algorithms for more accurate results. This helps CKB applications better set more reasonable fees for different CKB transactions at different network congestion levels.

### Chain Freezer

We've been working on adding a chain freezer to CKB. As the chain continues to grow, more disk space, potentially more memory space, and CPU processing time will be required to validate and index it efficiently. Consequently, a chain freezer enables CKB to move old and infrequently used data to cold and/or inexpensive storage, freeing the latest and more frequently used data to hot storage. It will help CKB nodes function more cost-effectively in the coming decades.

### CKB on WASM

The CKB full node and light client implementation have been [ported](#) to the [WebAssembly](#) platform. The goal is to allow people to effectively run a CKB light client or even a CKB full node within a browser environment. This will make CKB a more versatile project suitable for many more scenarios, like running a [Fiber](#) node within a browser extension.



# Toolchain

## CoBuild

CKB's programming flexibility is both a blessing and a curse. On the one hand, it enables a project to design its cells however it wants, on the other, it blocks multiple projects from coordinating on particular tasks.

Many attempts have been made to solve this problem, with [CoBuild](#) being the latest. It proposes an off-chain procedure for multiple parties to create a CKB transaction collaboratively.

CoBuild includes standard procedures related to transaction building (Building) and signing (Signing), as well as standard data exchange formats.

The current draft version of CoBuild is [complete](#), and we hope it can serve as an example of how to enhance composability for CKB applications.

## CKB Script IPC

[CKB script IPC](#) is another attempt to solve the problem of composability, but from a different angle. It is placed on top of the [spawn](#) syscall and provides an IPC (Inter-Process Communication) framework to simplify multi-process communication.

We have an initial [implementation](#) of CKB script IPC available for developers to evaluate. Hopefully this can grow to a common protocol that can handle communications between multiple CKB scripts.

## Omnilock

The [omnilock](#) implementation received code cleanups and new signature validation implementations, making it more diverse. The [omnilock](#) and [ckb-auth](#) pair complement each other to serve different signature validation use cases for CKB applications.

## ckb-rust-std

A new library [ckb-rust-std](#) was introduced as a complement to [ckb-std](#). It augments CKB's no-std Rust environment with useful code from Rust's std library. For example, the [io](#) module can be quite helpful for many cases by providing Read/Write traits.

## musl libc & libcxx libc++

The libc/libc++ situation in CKB script development has always been rather messy: either a patched toolchain provides libc/libc++, or a [half-riddled libc](#) with only a handful of features being used.

We revisited this situation and chose two well-maintained libraries: [musl libc](#) and [LLVM libcxx](#), as our choice of libc and libc++ implementation on CKB. We then ported them over to CKB-VM, resulting in up-to-date lib/libc++ support for all C/C++ code that might be executed on CKB-VM. This helps ease the effort of porting new C/C++ code to CKB-VM while also providing a correct and performant implementation for most lower-level feature requirements.

This advancement has enabled us to [smoothly port](#) Bitcoin Script VM to CKB-VM. [libcxx](#) on CKB-VM enables us to leverage Bitcoin's C++ code directly without any modification.

As a result of this single-use case, any Bitcoin transaction can now be parsed and validated on CKB, read more [here](#).

## ckb-script-templates

Since the launch of the CKB-VM, developers have dreamed of one day using off-the-shelf compilers to generate RISC-V binaries that can be directly used as CKB scripts.

For historical reasons, developers had to use patched compilers and toolchains, which were shipped via docker containers, to build CKB scripts. [Capsule](#) was our solution back then to simplify toolchain management.

As RISC-V gains increasing popularity, industrial compilers and toolchains have caught up significantly in terms of their support for RISC-V. As a result, we created [ckb-script-templates](#) to turn developers' dreams into reality.

These templates help developers build CKB scripts using standard compilers and toolchains shipped with each OS's built-in package management solutions.

These are simple templates for redundant tasks, and there is nothing stopping developers from using off-the-shelf compilers directly.



## Toolchain

### offckb

We developed a new tool named [offckb](#) to provide a local CKB development environment. It simplifies development with many one-line commands including: starting a devnet, creating projects from boilerplate, providing pre-funded accounts and common scripts in all configurations, easing CKB script debugging, etc.

It aims to streamline all the tedious and complex steps for developers.

### nostr-binding

We propose a protocol that binds the basic data structure from the [Nostr](#) protocol to the CKB blockchain. Through such bindings, Nostr native data can inherit UTXO/Cell properties on the CKB blockchain, bringing new on-chain opportunities to the Nostr protocol.

The [Nostr binding protocol](#) enables users to control blockchain assets on the CKB network using native Nostr tools like [Alby](#). It also facilitates the minting of non-fungible tokens onto the CKB network based on Nostr social data.

The Nostr binding protocol also brings a new development paradigm: Instead of splitting a project into the off-chain server and the on-chain smart contract, one consistent system is leveraged with different levels of data, which is fundamentally different from the Ethereum pattern.

### SMT Tool & Global Registry

There are two design patterns for bookkeeping data with existence/non-existence proofs on CKB: Sparse Merkle Tree (SMT), which was originally designed elsewhere and introduced to CKB via [Godwoken](#), and the global registry, originally designed and implemented by the [d.id](#) team.

While the ideas are known to many, the implementations for both designs above were buried deeply in the code of each project respectively. We extract the code specific to the useful design patterns into separate libraries: [ckb-smt-tool](#) and [ckb-global-registry](#). We hope this can simplify the use of these patterns in new projects.

### molecule

Starting from [molecule](#) v0.8.0, Bytes replaces `Vec<u8>` in CKB scripts as the container for underlying data, reducing the memory usage of data in molecule formats while also reducing consumed cycles incurred by memory copying.

A new [serde](#)-based implementation of molecule was [developed](#) to streamline development off-chain, particularly in test case constructions.

## Fiber Network

The [Fiber Network](#) is a next-generation payment channel network built on CKB and off-chain channels. It is designed to provide fast and low-cost peer-to-peer transactions in all kinds of crypto assets.

By building off-chain payment channels on CKB, we aim to combine the successful experience of the Lightning Network with CKB's novel [UTXO](#) model to create a fast, low-cost, and decentralized multi-asset real-time payment network. This enables near-infinite scalability, lower transaction costs, higher transaction speeds, multi-asset support, and interoperability with other networks, such as the Bitcoin Lightning Network.

We have been working on the [Fiber Network Node](#) (FNN), the reference implementation of the Fiber Network Protocol. The FNN is still under heavy development. As things currently stand, FN nodes are capable of communicating with other FN nodes, users can create and close fiber channels, make payments to other parties on the Fiber Network over channels, and make cross-chain asset transfers.



# CKB DevRel Annual Report

## About Us

The [CKB DevRel](#) team was established in April 2024. It focuses on improving the developer experience and helping developers build their projects in the CKB ecosystem.

## JavaScript Toolchain

Considering that JavaScript is the native browser language, widely supported across platforms, it plays an indispensable part in the blockchain ecosystem. We deeply researched CKB's JS ecosystem and built a one-stop application development solution for developers based on the information we received.

### CCC - CKBer's Codebase [ckb-devrel/ccc](#)

CCC is a new SDK within the CKB JS/TS ecosystem. It serves as the successor to Lumos and ckb-sdk-js, offering a simple integration interface for developers new to the CKB ecosystem, while also allowing experienced developers to customize their code.

#### Key features of CCC include:

1. An abstracted wallet interface that eliminates the need to manually handle transaction signing.
2. A UTXO-oriented transaction composition design with robust code support.
3. Ready-to-use functionality: CCC includes a complete [front-end demo](#) and a live browser [playground](#) with code examples for various scenarios.

Developers can create their own CCC application projects with one command through [create-ccc-app](#).

### CCC Schedule Send [ckb-devrel/ccc-schedule-send](#)

CCC Schedule Send provides a high-performance and highly deterministic CKB backend solution. It is designed to meet the need for large-scale on-chain transactions of applications, such as large-scale airdrops or deposits/withdrawals.

### CKB Asset Indexer [ckb-devrel/ckb-indexer](#)

Indexers play a critical role in the UTXO model as they are the basis of asset querying. CKB Asset Indexer is a self-hosted solution based on CCC that provides on-chain tokens and DOB statistics.

## Application

### NervDAO [ckb-devrel/nervdao](#)

The [Nervos DAO](#) is a critical component of CKB's [tokenomics](#) design, protecting holders from the inflation caused by the secondary issuance of CKB. [NervDAO](#) is a front-end operating interface that enables users to deposit and manage their Nervos DAO deposits. It also supports the operation of [iCKB](#), keeping Nervos DAO deposits liquid.

## Contract Development

### CKB Proxy Locks [ckb-devrel/ckb-proxy-locks](#)

The CKB proxy lock provides a series of simple, composable on-chain contracts, including basic contracts such as a one-time sealing lock, time lock and ownership proxy.

Based on this project, we [proposed](#) different token issuance schemes in the CKB ecosystem.

### Script-Sourced Rich Information [ckb-devrel/ckb\\_ssri\\_sdk](#)

The [SSRI](#) solution allows on-chain contracts on CKB to expose information to off-chain applications. This means that applications can freely implement the contract's logic using the same interfaces. It also lowers the development threshold for front-end developers and reduces application development costs.

[The Pausable UDT](#) is the first SSRI script.



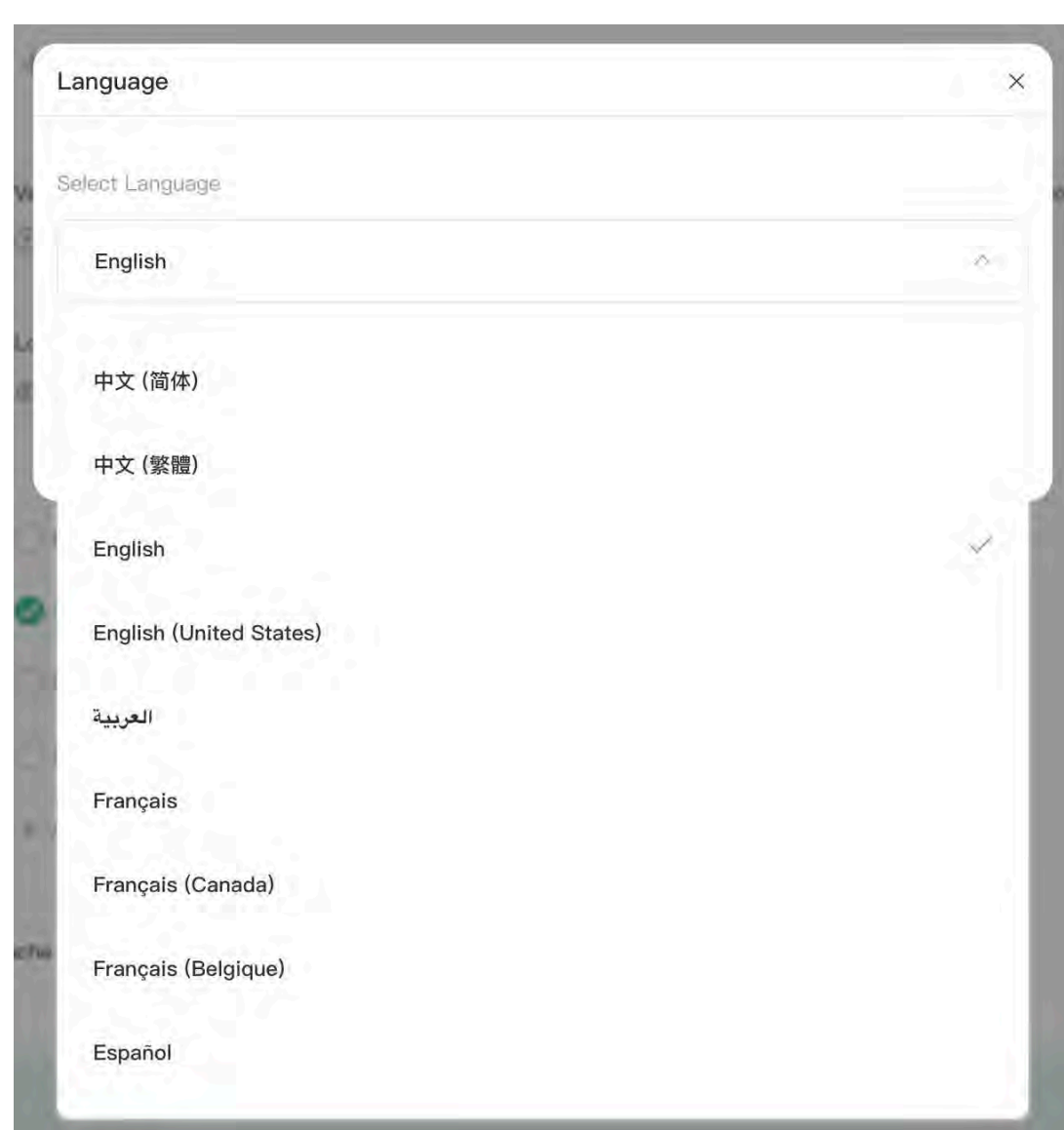
# Magickbase Annual Report

In 2024, [Magickbase](#) solidified its role as a cornerstone of the Nervos ecosystem, delivering critical infrastructure upgrades, pioneering experimental tools, and fostering community collaboration. Through its suite of products—[Neuron Wallet](#), [CKB Explorer](#), [Magickbase Platform](#), and Fiber Merchants—Magickbase advanced accessibility, interoperability, and commercialization for developers, enterprises, and users worldwide.

## Neuron Wallet: Empowering Secure Asset Management

### • Product Enhancements

- Launched 5 major [releases](#), introducing:
  - ◆ **Multi-language Support:** Added Arabic, French, and Spanish interfaces, broadening global accessibility.



- ◆ **Advanced Cell Management:** Enabled locking, modification, recycling, and consolidation of cells for optimized UTXO control.
    - ◆ **Cold Wallet Integration:** Published tutorials for secure cold storage workflows.
    - ◆ **Privacy Features:** Introduced window-locking to safeguard sensitive user data.
  - **Hardware Wallet Stewardship:** Assumed maintenance of hardware wallet applications, resolving critical issues like UNKNOWN\_ERROR(0x9405) on Ledger with tailored solutions.
- ### • Innovative Experiments
- Ran a full CKB node on iOS, exploring mobile full-node capabilities.
  - Tested [WebRTC](#) integration to enable Neuron as a remote app signer.
- ### • Community Engagement
- Recovered assets stranded in deprecated products, earning widespread trust.
  - Collaborated with white-hat hackers to fortify repository security, praised for rapid vulnerability resolution.

## Future Plans

- **Expand multi-sig functionality for complex governance scenarios.**
- **Support HD wallet address derivation to enhance privacy.**
- **Introduce advanced customization options for professional users.**

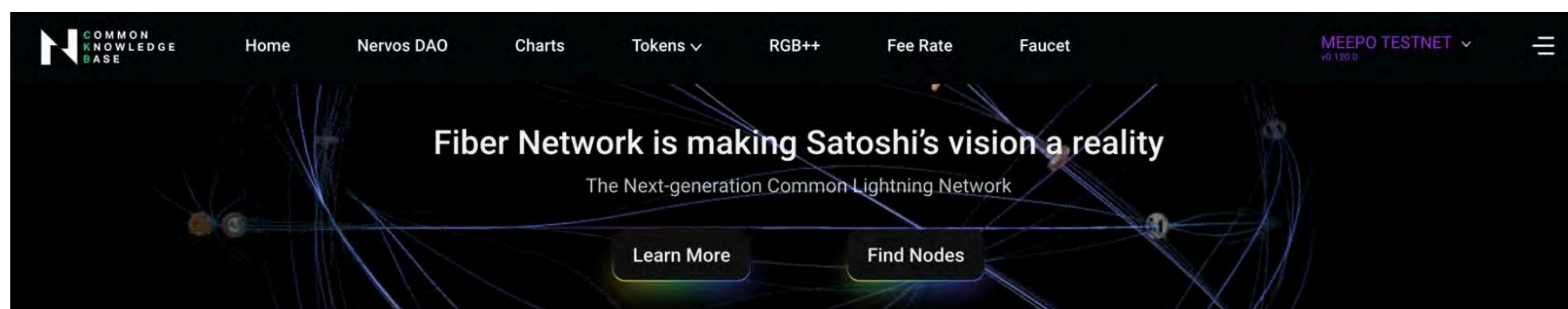


# Magickbase Annual Report

## CKB Explorer

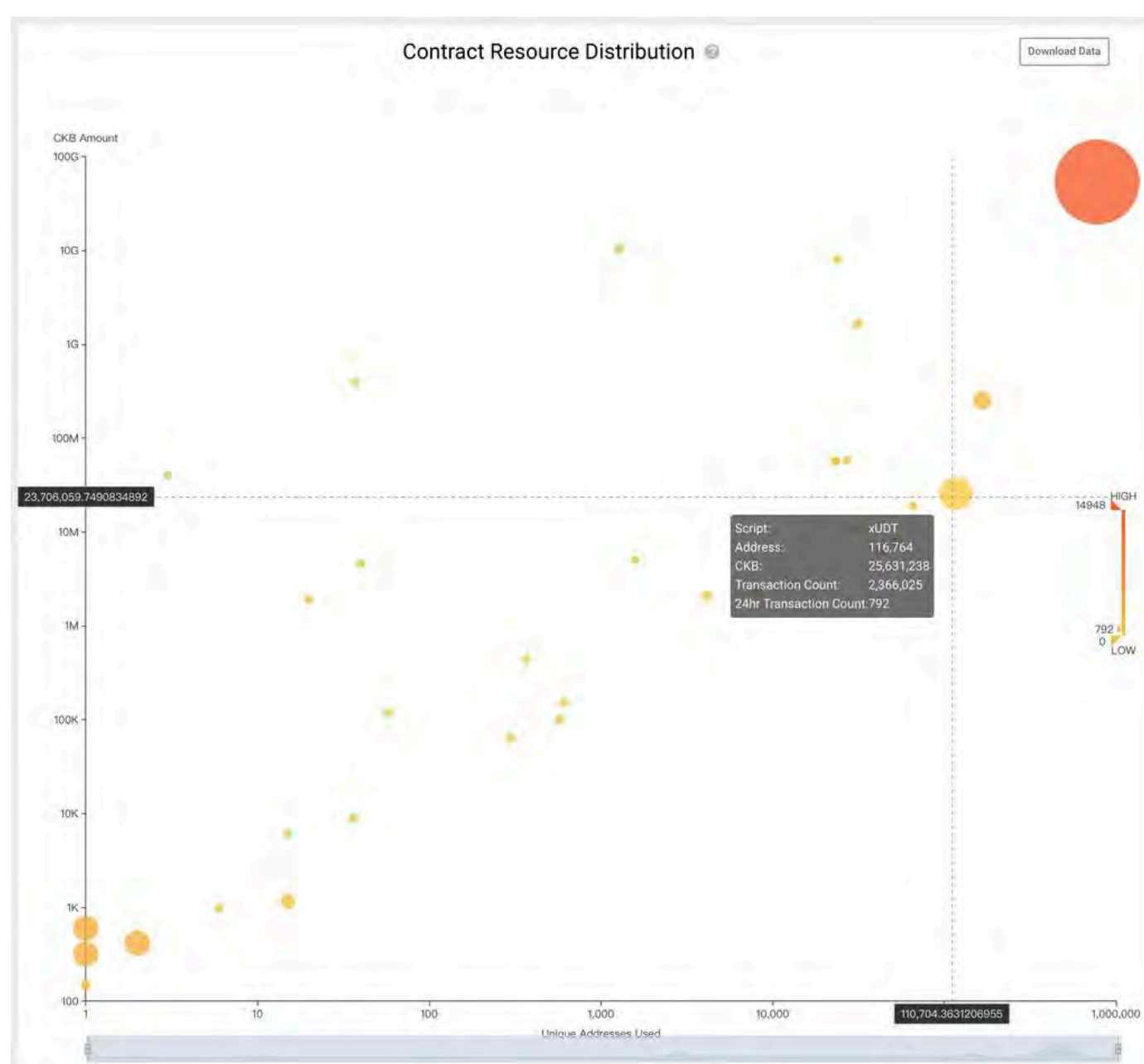
- **Protocol & Ecosystem Support**

- Delivered real-time data queries for RGB++, DOB, and Fiber Network.



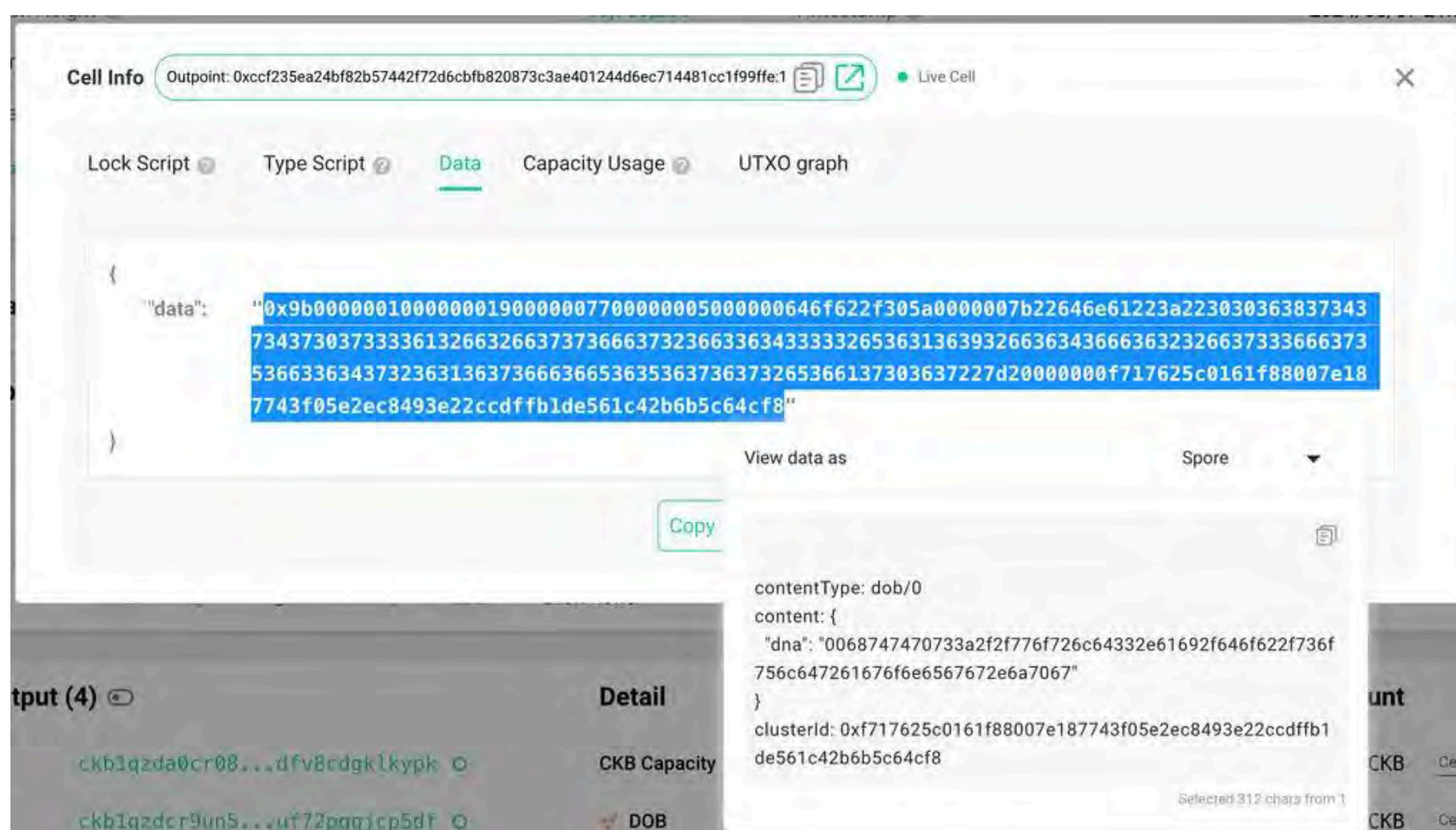
- **Market-Oriented Features**

- Added analytics for active addresses, trending projects, and global node distribution.



- **Developer-Centric Innovations**

- Launched utilities for encoding/decoding, address conversion, and transaction broadcasting.
- Introduced node-connection mode for local node data access, streamlining development workflows.





# Magickbase Annual Report

## CKB Explorer

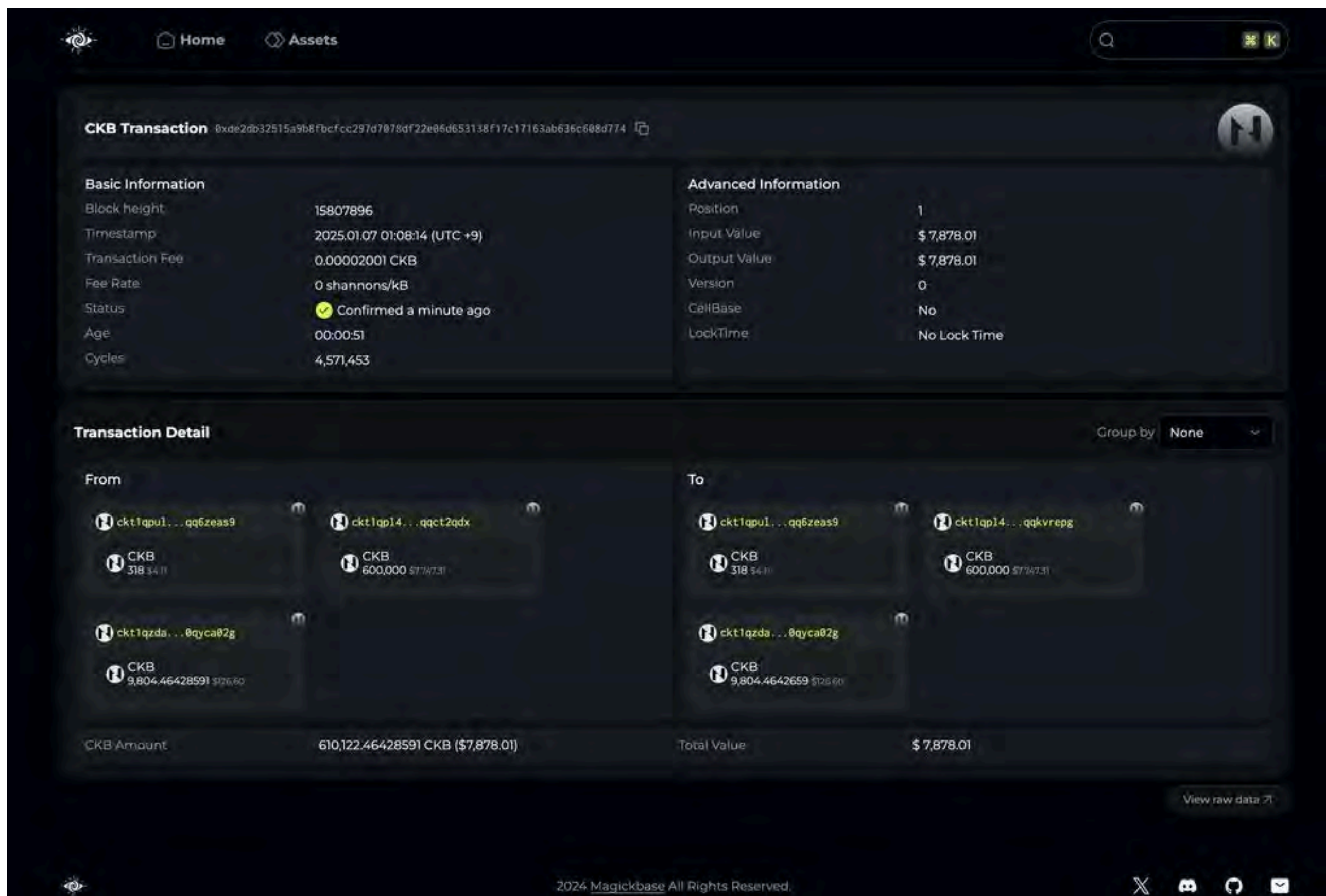
- **Application Enhancements**
  - Refined fee rate estimation using on-chain traffic analysis for accuracy.
  - Expanded asset metadata with categories, tags, and granular statistics.
- **Experimental Initiatives**
  - Prototyped a portfolio interface with HD wallet integration, positioning the Explorer as an asset management platform.

## Future Roadmap

- **Deepen collaboration with RGB++ and Fiber teams for enhanced data services.**
- **Prioritize Fiber Network inspection and RGB++ development on Dogecoin.**

## Magickbase Platform

- **Launched [P](#) | Magickbase, a comprehensive data platform**
  - Offers data processing workflows for project management.
  - Expands coverage to ecosystems integrated with CKB, including BTC and Dogecoin.
  - Initiated commercialization pilots, providing tailored data services to select projects.





# Cryptape Research Team's Annual Report

## Supporting Development

Throughout this year we have provided cryptographic and protocol-level support to the Fiber development team.

## Publication

“[Selfish Mining Time-Averaged Analysis in Bitcoin: Is Orphan Reporting an Effective Countermeasure?](#)” – This paper quantifies NC-Max's resistance to selfish mining, laying the foundation for future improvements.

## Working Papers

This year, we initiated and continued several research projects closely related to our ecosystem. We anticipate that some of these will be ready for submission to top academic conferences in 2025.

### Systemization of Knowledge on Ledger Models

This study presents a theoretical analysis of ledger models—how states and transactions are encoded—in existing blockchains. By understanding that the UTXO and account models are fundamental design choices for Bitcoin and Ethereum, respectively, we analyzed their implementations. Our research reveals that, despite Bitcoin's limited expressiveness, the UTXO model is not inherently incompatible with complex smart contracts. Conversely, the security and efficiency challenges of Ethereum are deeply rooted in its ledger model.

For a look into the research, check out Ren Zhang's [talk](#) from CKCON24.

### Cell Model

This paper formally introduces and evaluates the Cell model, demonstrating its superior expressiveness, parallelizability, and upgradability compared to existing ledger models.

### RGB++ UTXO Binding

In this research, we present the RGB++ protocol and the UTXO binding technique within the Nervos CKB blockchain ecosystem. We discuss the limitations of client-side validation, particularly its impact on security and data availability.

Building on this, we propose a design for UTXO binding and [isomorphic binding](#), which enables secure and efficient cross-chain interactions between Bitcoin and CKB.

This design leverages shadow UTXOs on CKB to enhance programmability and data availability for Bitcoin-based tokens, facilitating robust functionality for issuing new tokens on the Bitcoin blockchain. Additionally, we compare several Bitcoin Layer 2 projects based on critical metrics such as security, scalability, and programmability, highlighting the advantages of our proposed approach over existing solutions.

### CKB Fiber Network

This study explores several critical aspects for enhancing the efficiency and security of the CKB Fiber network.

A primary focus is to identify memory-efficient methods for revocation, which reduce the storage costs of past session keys on each node. Another key area is ensuring a secure connection between the Lightning Network and the Fiber Network, allowing seamless invoice sharing between the two systems. Furthermore, the research examines the compatibility of [multi-hop payment contracts](#) based on [adaptor signatures](#), ensuring they will be compatible with future upgrades to the Lightning Network.



# Cryptape Research Team's Annual Report

## Selfish-Mining Resistance Difficulty Adjustment Mechanism

Our new design further improves the consensus protocol's resistance to selfish mining.

## Analyzing the Ethereum Global Network

The Ethereum Global Network (EGN) is a peer-to-peer (P2P) network underpinning Ethereum and various blockchain services. Unlike traditional single-service P2P networks, EGN's multi-service architecture has been widely adopted, allegedly improving node discovery efficiency and security. This paper challenges that belief by scrutinizing EGN's design and its claimed advantages.

Our findings reveal critical shortcomings in EGN's node discovery process, as EGN nodes struggle to connect with peers offering the desired services; most connection attempts end up reaching nodes for other services. This blended architecture undermines EGN's security, rendering the network highly susceptible to DHT pollution and partition attacks. Learn more in Ren Zhang's [talk](#) from CKCon 2024

## Other Ongoing Research

Additional research topics include anonymity in the Lightning Network and PCN, zkPBS for Ethereum, arbitrage attacks on [proposer-builder separation \(PBS\)](#), and post-quantum upgrades for BTC and CKB.

## Community Services

**Yunwen Liu** served on the program committees of two top cryptography journals: [IACR Communications in Cryptology](#) and [IACR Transactions on Symmetric Cryptology](#).

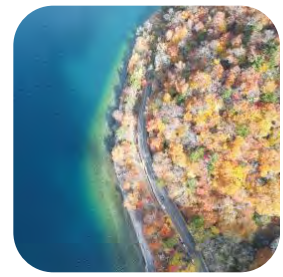
**Ren Zhang** participated in the program committees for [ACM CCS](#) and the [NDSS Symposium](#).

We actively delivered presentations and wrote blog posts to promote our designs and research findings.

- **Yunwen** presented on Payment Channel Networks at Bitcoin Singapore 2024.
- **Yunwen** participated as a panelist on "Lightning Network" at the Hong Kong Web3 Festival.
- **Ren Zhang** presented "[My Biases Against Every Consensus Protocol That Is Not Nakamoto Consensus](#)" at Bitcoin Singapore 2024 and the Web3 Scholars Conference at the 2024 Hong Kong Web3 Festival.
- **Ren Zhang** also presented "[My Biases Against Ethereum's Ledger Model and P2P Network](#)" at CKCON.
- **Yunwen** [presented on RGB++](#) at CKCON.
- **Yunwen** authored a [blog post about Bitcoin Layer 2 projects](#).



# CKB Dev Logs



[CKB Dev Log 2024-01-10 #4296](#)



[CKB Dev Log 2024-01-24 #4321](#)



[CKB Dev Log 2024-02-07 #4342](#)



[CKB Dev Log 2024-03-06 #4375:](#)



[CKB Dev Log 2024-03-20 #4385](#)



[CKB Dev Log 2024-04-03 #4401](#)



[CKB Dev Log 2024-04-18 #4421](#)



[CKB Dev Log 2024-05-01 #4446](#)



[CKB Dev Log 2024-05-15 #4463](#)



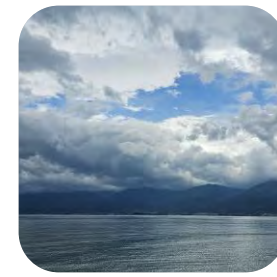
[CKB Dev Log 2024-05-29 #4471](#)



[CKB Dev Log 2024-06-12 #4481](#)



[CKB Dev Log 2024-06-26 #4502](#)



[CKB Dev Log 2024-07-11 #4515](#)



[CKB Dev Log 2024-07-22 #4534](#)



[CKB Dev Log 2024-08-02 #4568](#)



[CKB Dev Log 2024-08-21 #4602](#)



[CKB Dev Log 2024-09-04 #4634](#)



[CKB Dev Log 2024-09-13 #4651](#)



[CKB Dev Log 2024-09-29 #4667](#)



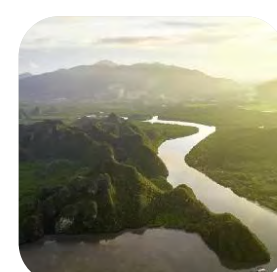
[CKB Dev Log 2024-10-16 #4680](#)



[CKB Dev Log 2024-10-30 #4707](#)



[CKB Dev Log 2024-11-27 #4732](#)



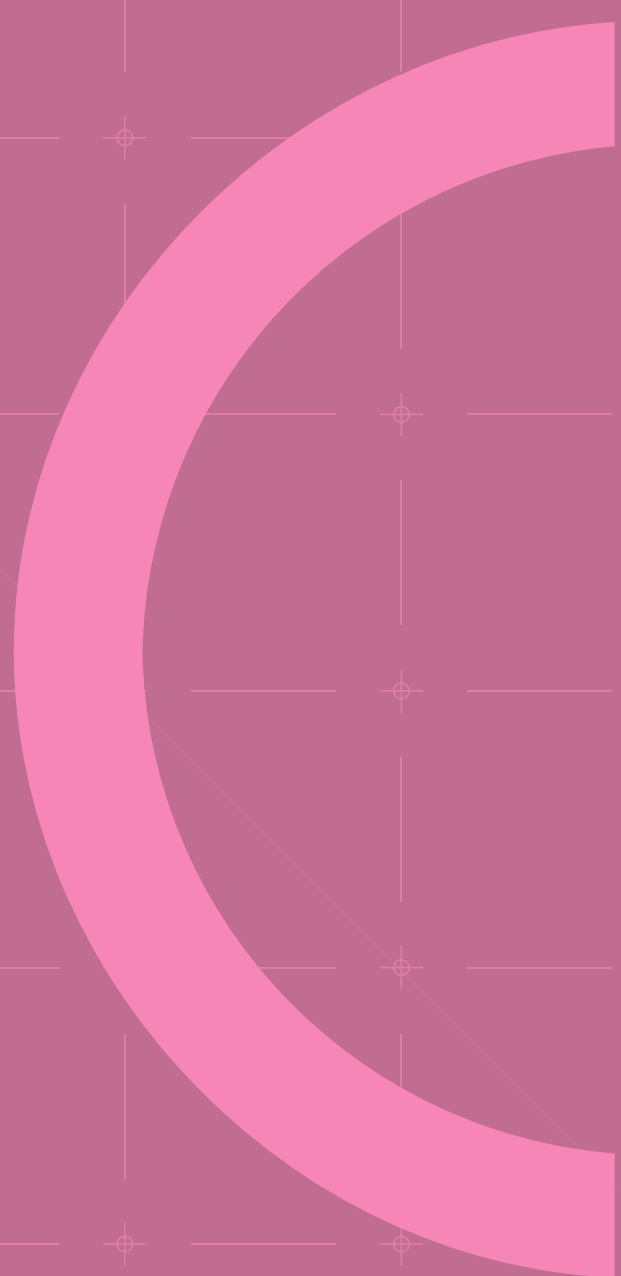
[CKB Dev Log 2024-12-12 #4750](#)



[CKB Dev Log 2024-12-26 #4761](#)



# Community





## CKB Community Fund DAO

The [CKB Community Fund DAO](#) is a community-governed funding mechanism established by key contributors in the Nervos ecosystem in 2022. It aims to empower and support individuals and teams in building projects, organizing events, and driving the growth of the CKB ecosystem.

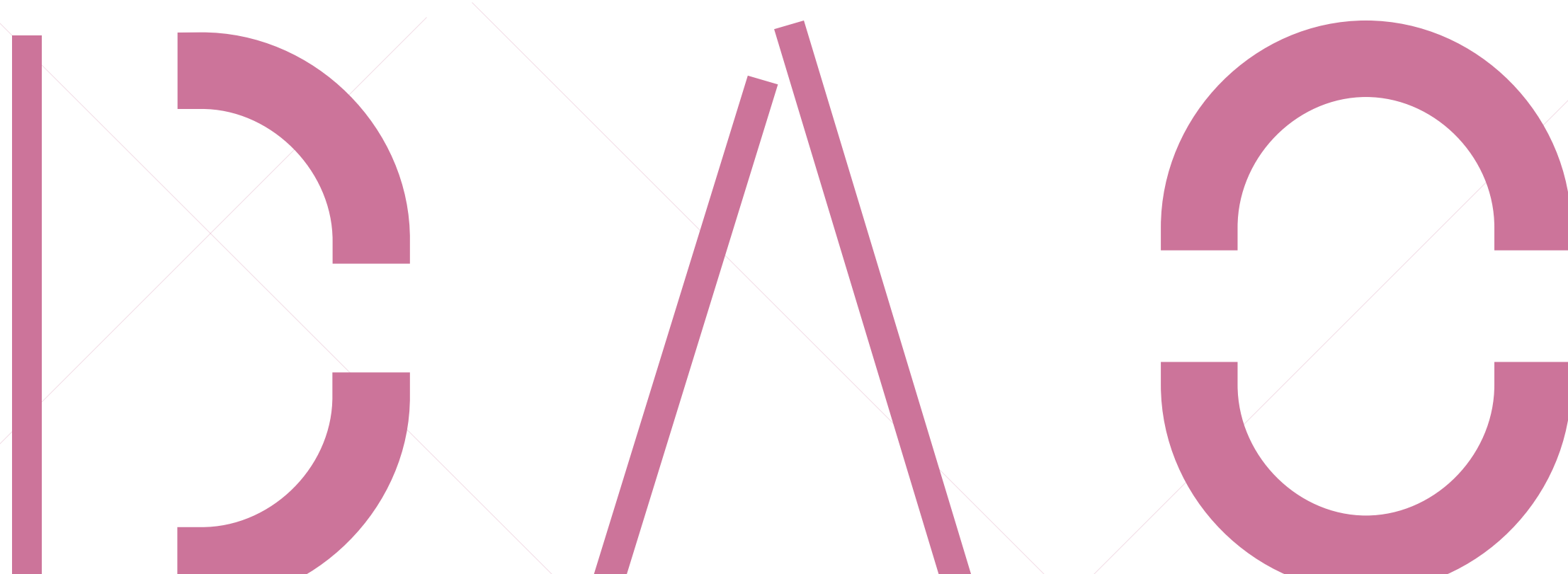
In 2024, several funding initiatives were voted on, with five being approved and eight being dismissed.

### Passed

- ✓ [Spore Protocol Mainnet Launch Sponsorship](#)
- ✓ [Telmo Talks - A Nervos Talk Show](#)
- ✓ [Palmyra: RWA Lending on Nervos](#)
- ✓ [Omiga Inscription Protocol Sponsorship](#)
- ✓ [iCKB & dCKB Rescuer Funding Proposal \(Non-Coding Expenses\)](#)

### Failed

- ✗ [Nervos Campus Invasion: Mass Blockchain Education](#)
- ✗ [If the price fluctuates by more than 10%, a recalculation of the CKB quantity is required at the time of payment](#)
- ✗ [Proposal to support the Francophone community](#)
- ✗ [Futurist blockchain conference proposal](#)
- ✗ [Use USD amounts for DAO payments, calculated on the date of payment](#)
- ✗ [RGCat \(CAT++\) GameFi sponsorship](#)
- ✗ [ArtCells : Generative Art Platform on RGB++](#)
- ✗ [Proposal for SubQuery to Bring Indexing Support to CKB](#)





# Merchandise

While the technology of CKB can be a very challenging subject to grasp, there is a rich history of eye-catching visual design which aids in making things more approachable and captures the humanity behind the innovation.

This is your tour of this year's designs from around the ecosystem!

Beginning with the first annual Common Knowledge Conference (CKCON 2024)!

1



2



3



- ① CKCON Event T-shirt
- ② CKCON Event Nervape Plushie
- ③ CKCON Event Wristband



# Merchandise



1

- ① Nervos Nation CKCON Event T-shirts
- ② Nervos Nation CKCON Event Tote bag



2



# Merchandise

1



2



3



① BTCKB T-shirt

② Wojak "Do you find me abstract" T-shirt

③ CKCON BTCKB Pepe T-shirt



# Merchandise

1



3



4

- ① CKB Eco Fund - Lightning APE T-shirt
- ② CKB Eco Fund - Lightning Cap
- ③ CKB Eco Fund - CKB Tote Bag
- ④ CKB Eco Fund - CKB Mini Spaceman Hand Fan



# Merchandise

1



2

- ① Nervos x OneKey Hardware Wallet
- ② CKB Happy New Year Gift Box Set





# Budget Report



## Budget Report 2024

The [Nervos Foundation](#) funds dedicated teams of blockchain enthusiasts who share a vision for improved global financial infrastructure and enabling the next era of the Internet.

The foundation supports these teams' funding and operational needs, while each team contributes to the ecosystem in its focused domain. For example, [Cryptape](#) is focused on the research and development of CKB, while [Magickbase](#) is focused on supporting network infrastructure such as [CKB Explorer](#) and [Neuron Wallet](#).

In line with our destination of decentralization, the teams funded by the foundation change over time.

2024 saw the launch of the [CKB Eco Fund](#), a team dedicated to driving innovation on CKB through startup investment and community engagement, while the formerly funded Nervina Labs team sought external funding and has shifted its focus to [UTXO Stack](#), a liquidity staking layer for Bitcoin's Lightning Network and CKB's [Fiber Network](#).

Total spending for 2024 was **\$10,082.731 USDT** and **590,505,023 CKB**. Out of the overall USDT spending, \$7,114,094.13, or 71%, of spending was allocated toward technical development, 22% to Marketing and Operations, 7% to investment.

As for CKB spending, 70% was spent on grants to CKB Eco Fund and other ecosystem projects. 22% was used for Marketing and Operations, and 8% was used for technical development.

The Foundation's mission is to raise awareness and increase CKB's adoption among sophisticated developers and tech-centric blockchain enthusiasts worldwide. In 2025 and beyond, the foundation will continue to identify opportunities to grow the ecosystem, with a focus on enhancing the infrastructure and funding teams who can evangelize CKB's unique attributes.

As time goes on, the foundation plans to gradually donate CKB to the [CKB Community Fund DAO](#) and other [Nervos DAO](#)-governed funding vehicles, moving power to the hands of CKB holders.

### Total spending



### CKB spending



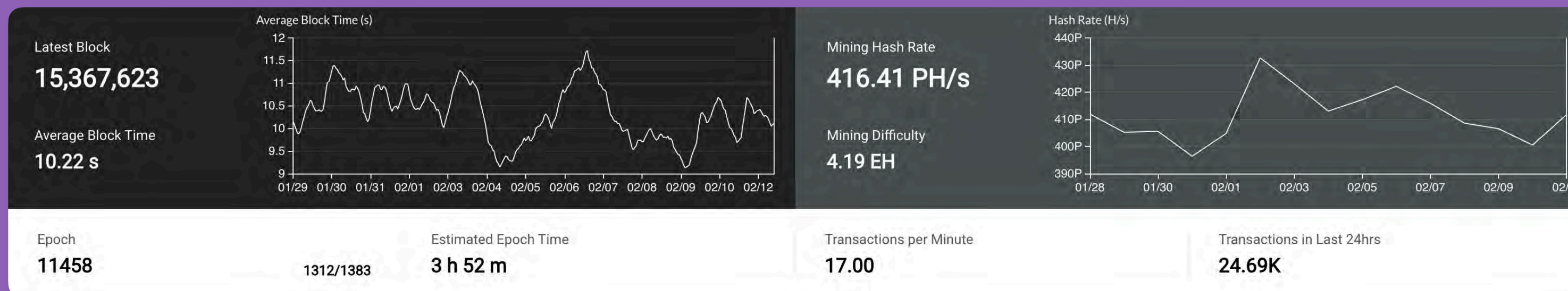




# Growth & Metrics



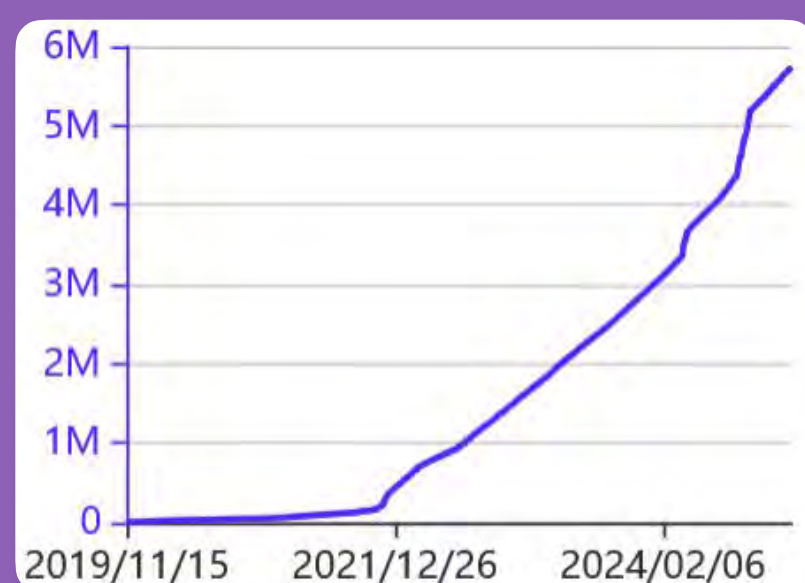
# Network Growth and Metrics



2024 marked a year of exceptional growth and ecosystem maturity for Nervos CKB:

## Unique Addresses

Increased by 183%, from 2.96 million to 5.43 million



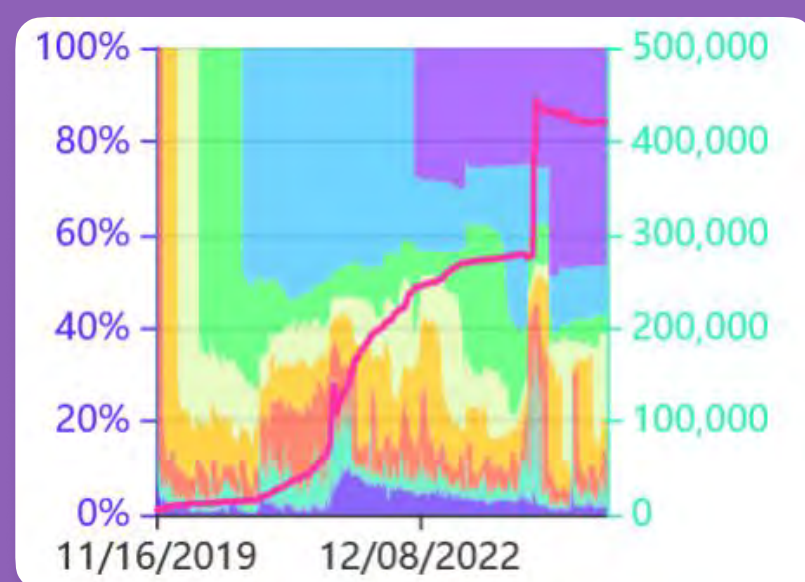
## Hash Rate

Surged by 270%, reaching an all-time high of 442.48 PH/S



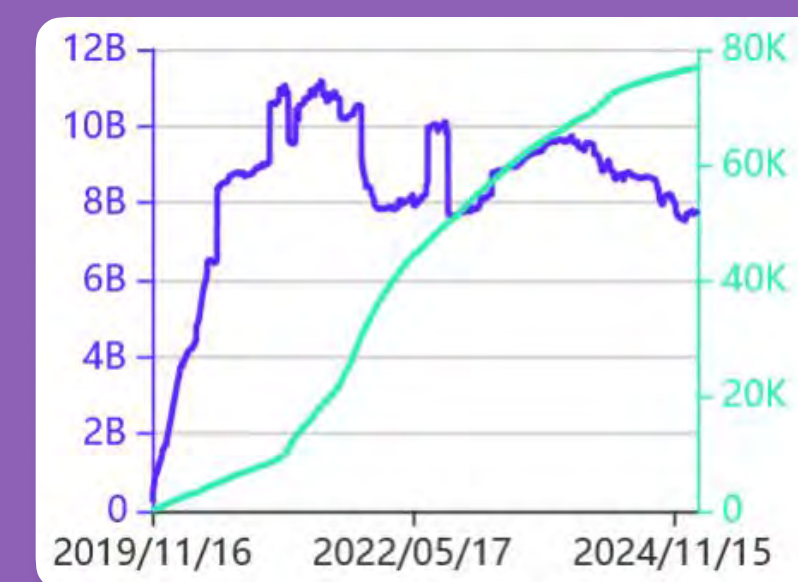
## Long-Term Holders (>3 years)

Grew from 25.21% to 46.72%, reflecting a more stable and committed user base.



## Nervos DAO Depositors

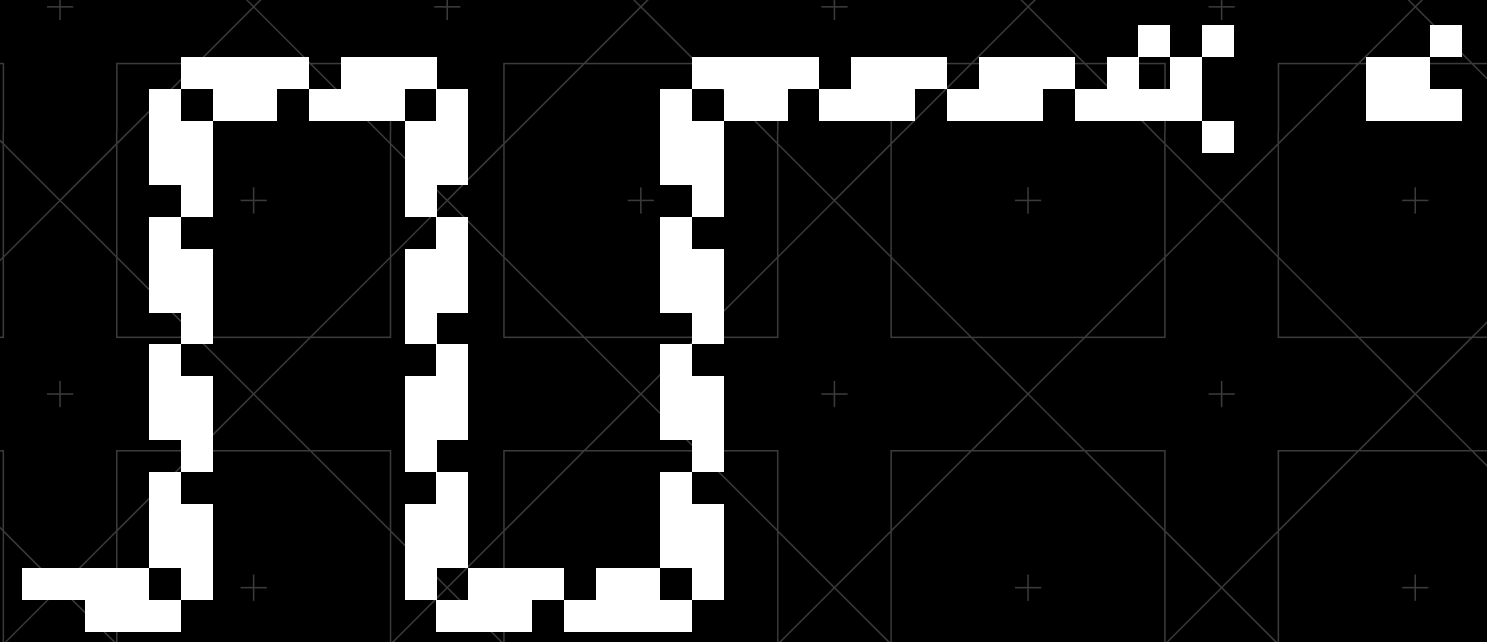
Increased by 113%, with the total number growing to 66,530



## Total Holders

Rose by 151%, reaching 419,000





Whether you prefer to say "Nervos" or "CKB", this network is the product of hundreds of passionate contributors around the world, from diverse regions, backgrounds and skill sets.

At the Nervos Foundation, we strive to support every contributor in manifesting their future through this shared journey.

More than 7 years into this project, excitement about possibility still beats in the heart of this community.

The passion and enthusiasm that we share makes the impossible possible. The vision we carry has the power to change everything.

To 2025 and beyond 🍀