bitcoinOS:

A Bitcoin Assets Issuance and Management System and AI Platform based on RGB + ICP

Keyword: Bitcoin、RGB、ICP、AI、DePin、Bitcoin Layer2

@BitcoinOS Labs

1. Introduction

BitcoinOS is an innovative project combining Bitcoin and AI. It serves as a Bitcoin Layer2 asset issuance and management system, featuring the security of Bitcoin, the privacy and smart contract capabilities of RGB, and the linear scalability of the ICP network. Additionally, it emphasizes personal data sovereignty and data asset management, while also supporting AI innovation with GPT large model capabilities.

Bitcoin is a peer-to-peer electronic cash system designed to establish a decentralized financial ecosystem and provide individuals with sovereignty over their identity and digital assets. BitcoinOS builds upon Bitcoin as its core, enhancing it with data asset sovereignty protection. It operates as a modular blockchain network, utilizing Bitcoin L1 as the settlement layer and building Bitcoin L2: Fastnet with RGB smart contracts and ICP network technology at its core.

BitcoinOS is built upon three core elements: the best blockchain - Bitcoin, the best encrypted cloud network - ICP, and the best confidential smart contract protocol - RGB. It is driven by two core principles:

Firstly, BitcoinOS inherits and extends the decentralized financial capabilities of Bitcoin, enabling transactions and staking of native Bitcoin assets. While maintaining the sovereignty of identity and currency, BitcoinOS supports not only Ordinals, Atomicals, and RGB protocol assets but also introduces support and protection for data assets. By enhancing privacy and scalability, BitcoinOS possesses rapid payment capabilities similar to the Lightning Network, providing users with a more convenient trading experience.

Secondly, BitcoinOS aims to become a decentralized AI innovation platform, with dedicated components such as Data Store to support data sovereignty, and GPT Store to support the development of AI large models and applications. Data, regarded as the digital oil of the AI era, is supplied abundantly by various Data Stores to fuel AI models and applications, igniting a new industrial revolution in the AI era. Thus, BitcoinOS realizes a positive feedback loop between Bitcoin assets and artificial intelligence, bringing infinite possibilities and innovations to all participants.

If Bitcoin is likened to the encrypted asset kernel akin to the Linux computing resource kernel, and ICP resembles the encrypted network protocol akin to the TCP/IP communication protocol, then bitcoinOS can be likened to the encrypted asset operating system similar to the Android mobile operating system. Just as Android was born for the mobile internet, bitcoinOS is born for the value internet

2. Vision

Bitcoin Assets Hub:

bitcoinOS serves as a comprehensive platform for managing Bitcoin native assets, including but not limited to BTC transfers, as well as issuing and trading Ordinals, Atomicals, and RGB assets. As the Bitcoin L2 layer within bitcoinOS, Fastnet facilitates the issuance and trading of RGB assets, providing financial support and fast payments for dApp and ecosystems. bitcoinOS is an excellent hub and funding pool for various Bitcoin assets, catering to a wide range of asset needs.

One-stop platform:

While Bitcoin L1 has successfully established sovereignty over identity and assets, bitcoinOS takes this concept to new heights. Built upon Bitcoin L1 as its core, bitcoinOS utilizes the RGB smart contract protocol on the ICP network to construct Bitcoin L2: Fastnet. Fastnet offers comprehensive Bitcoin smart contract functionality and unlimited scalability, while also strengthening support for data sovereignty, elevating data assets to first-class status. Thanks to the excellent privacy features of RGB and ICP, bitcoinOS not only enables the development of better Web3 applications but also facilitates the development of superior Web2 applications, making it a unified platform for various applications.

Gateway to AGI:

Data assets are considered among the most important digital assets. Just as Bitcoin is digital gold, data is digital oil, and bitcoinOS serves as the catalyst for the digital oil revolution. As the first Bitcoin network to grant data ownership, bitcoinOS is positioned as the gateway to the era of artificial intelligence. In the age of artificial intelligence, data

becomes the most crucial factor of production, and possessing bitcoinOS and data assets becomes the ticket for every individual to enter the era of artificial intelligence. You may not have your own large-scale model, but you must have your own unique intelligent entity.

Foundation for Bitcoin mass adoption:

As the cornerstone driving the widespread adoption of Bitcoin, bitcoinOS combines the transparency of Bitcoin assets with the versatility of the Fastnet universal network. Fastnet not only facilitates fast payments but also ensures the privacy of content and services, while almost unlimited scalability meets diverse application needs. bitcoinOS positions Bitcoin assets as the universal token of the digital world in the era of artificial intelligence.

Copilot of Developers & Creators:

The runtime environment of bitcoinOS is based on WebAssembly, standing at the forefront of the IT industry's standards and benefiting from the research achievements of the entire industry. The core functionality of bitcoinOS smart contract containers simplifies the complexity of developing smart contracts for developers. They can utilize various programming languages that support WebAssembly, such as Golang, JavaScript, Python, and Rust, for development. Additionally, the built-in dApp Store, Data Store, and GPT Store in bitcoinOS greatly facilitate developers and users in accessing various resources of the Bitcoin ecosystem and innovating using data and AI models.

3. Technology

bitcoinOS is an enhancement and extension of Bitcoin, aimed at addressing some of the major challenges encountered by Bitcoin in large-scale applications. Here are some of the main challenges currently faced by Bitcoin:

Challenges	Solutions
Scalable	Lightning, ICP, P2P, Layer2, ...
Smart contract	RGB, Taproot, BitVM, EVM, ...
Privacy	RGB, SegWit, HD wallet, BIP, ...
Data sovereign	RGB, Taproot asset, ...

The challenges facing Bitcoin can be traced back to its core values. Bitcoin was designed to safeguard individual sovereignty, ensuring personal identity and asset sovereignty. The technical choices and features of Bitcoin are made to maintain these core values in the long run. Decisions such as PoW (Proof of Work), producing one block every 10 minutes, and a block capacity of 1 MB are all trade-offs made to ensure individual sovereignty.

While Bitcoin L1 focuses on ensuring maximum security and consensus, Bitcoin L2 addresses challenges in other aspects. After comprehensive comparison of various solutions and their advantages, RGB and ICP are considered the most ideal choices. RGB serves as the confidential smart contract technology for the Bitcoin community, while ICP acts as a generalized version of the Lightning Network. Both emphasize privacy and scalability, effectively addressing the challenges faced by Bitcoin in large-scale applications.

3.1 RGB

RGB is an extensible and confidential smart contract protocol, similar to zero-knowledge proofs (ZK) in its generic technology,

and it also incorporates ZK features. RGB operates as an off-chain smart contract, where all computations occur off-chain and are later verified on-chain, a process known as client-side validation. Through client applications such as wallets, users can verify the legitimacy and correctness of transactions and data without being restricted by on-chain smart contracts, theoretically enabling unlimited scalability.

At the core of RGB are UTXOs (Unspent Transaction Outputs) and Single-Use Seals. The concept of Single-Use Seals was first proposed by Bitcoin core developer Peter Todd in 2016, allowing a message to be locked with an electronic seal, ensuring that the message can only be used once, similar to the concept of UTXOs. Specifically, RGB utilizes Bitcoin's UTXOs as the carrier of messages, with Bitcoin's consensus mechanism ensuring that these UTXOs can only be spent once, thus preserving the nature of single-use seals.

The RGB protocol maps RGB state changes to the ownership of Bitcoin UTXOs based on single-use seals. Therefore, Bitcoin not only guarantees ownership of RGB states but also enables the tracing of all state changes through the historical records of UTXOs. Single-use seals and UTXOs provide RGB with security guarantees equivalent to those of Bitcoin, addressing issues such as double-spending and transaction traceability.

RGB data is stored in corresponding stashes, and the state of smart contracts and raw transaction data is maintained and verified by the contract participants. The data of RGB smart contracts is only visible among participants, and original data exchange can be conducted through various means such as email, file sharing, USB drives, etc., but the optimal method is through P2P encrypted network transmission. Data does not need to be verified by Bitcoin nodes; instead, proofs (hash) or commitments of transaction data are written into Bitcoin UTXOs, serving as a proof-of-ownership record system for RGB assets.

Client-side validation technology enables users to only verify UTXO historical data relevant to them, without concerning themselves with transaction histories unrelated to them, thereby enhancing privacy and providing more confidentiality than Bitcoin.

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into Bitcoin L1 and the Lightning Network, but before achieving this goal, several issues need to be addressed:

The Bitcoin community has long anticipated the application of RGB to both Bitcoin L1 and the Lightning Network, but before achieving this goal, several challenges need to be addressed:

1. Data Exchange Issue: The challenge lies in the fact that Bitcoin L1 propagates commitments of RGB transaction data instead of the raw transaction data itself. Therefore, the original RGB data needs to be disseminated through a separate P2P network, which is a crucial issue that needs to be addressed.

2. Data Availability: The client-side validation approach of RGB requires smart contract data to be stored locally on the client side. Hence, ensuring data synchronization and reliability among multiple clients becomes crucial as data is synonymous with assets. Ensuring high data availability is vital for the successful application of RGB.

3. User Experience Issue: When transferring RGB assets, the recipient needs to generate an invoice using UTXOs and addresses, then send the invoice information to the sender. Subsequently, the sender makes the payment using the invoice, and finally, the recipient verifies and confirms the transaction. The entire process is relatively lengthy and requires both parties to be online, leading to inconvenience in user interaction experience.

4. Lightning Network operates on channel technology, supporting only payment messages and not generic messages. Therefore, significant upgrades are required for the Lightning Network to better support the functionalities of RGB smart contracts. Addressing this issue is crucial for integrating RGB into the Lightning Network to enable broader functionalities and applications.

3.2 ICP

ICP (Internet Computer Protocol) is an encrypted consensus protocol consisting of core components such as the P2P network layer, consensus layer, message routing layer, and execution layer. Networks applying the ICP protocol are referred to as

Internet Computers, which function as blockchain cloud networks. ICP serves as a Layer 0 infrastructure upon which various blockchains can be built.

Leveraging robust cryptographic technologies such as Chain-Key Cryptography and Threshold Cryptography, ICP operates with multiple subnets on the network, exhibiting excellent interoperability between these subnets and with the external internet. Through the built-in cryptographic oracle mechanism, ICP achieves a complete Bitcoin full node implementation on Canister containers.

ICP's smart contract container: Canister, utilizes WebAssembly as its runtime, aligning with cutting-edge technology standards and benefiting greatly from research advancements in the industry. It boasts incredibly fast processing speeds, with each Canister capable of storing over 400GB of data.

In summary, ICP presents an excellent choice for building modular blockchains, offering enhanced privacy with robust execution and data availability layers (DA), while also serving as a generalized version of the Lightning Network on-chain.

RGB + ICP combination perfectly addresses the challenges mentioned earlier with RGB. ICP itself functions as an on-chain high-speed network supporting a universal messaging protocol, unrestricted by payment channels like the Lightning Network, thus resolving the issue of RGB data transactions.

ICP's Canister large data storage capacity resolves the RGB data availability problem. RGB data can securely reside on Canister while maintaining privacy, aligning with RGB's emphasis on privacy protection philosophy and serving as the foundation for personal data sovereignty. Smart contracts on the RGB Canister are responsible for maintaining RGB's checkpoint state and proof on ICP, periodically committing the state to Bitcoin UTXO, thus achieving a level of security comparable to the Lightning Network.

The smart wallet in bitcoinOS benefits from both RGB and ICP technologies as they are both compatible with WebAssembly. By running RGB clients (such as wallets) within smart contract containers Canister, the wallet's functionality running on

Canister is much more powerful than mere account abstractions. It enhances wallet programmability and automatic interaction capabilities, enabling automatic completion of non-critical steps in RGB transactions.

For example, when Alice wants to make a payment to Bob, she can initiate a payment request from her smart wallet to Bob's smart wallet. Bob's smart wallet will automatically generate an invoice and send it back to Alice's smart wallet.

Subsequently, Alice's smart wallet will make the payment against the invoice and transmit the raw transaction data via ICP to Bob's smart wallet, simultaneously committing the transaction data to Bitcoin UTXO.

Upon receiving Alice's payment message and transaction data, Bob's smart wallet will validate the payment transaction by combining the commitment data in Bitcoin UTXO. Once validation is successful, Bob's smart wallet will confirm the transaction.

Throughout the entire transaction process, only Alice needs to initiate the payment request and input the amount, without Bob's active involvement. This interaction experience is similar to current Bitcoin transactions.

4. Product features

The product of bitcoinOS revolves around two driving forces: decentralized finance capabilities and an AI innovation platform. Correspondingly, its two main products are the SmartWallet and Bitcoin Layer2: Fastnet.

Fastnet, as the Bitcoin Layer 2 solution within bitcoinOS, adopts a technological approach combining RGB and ICP, leveraging the strengths of both to complement and enhance each other, demonstrating a typical modular blockchain architecture. RGB is responsible for smart contracts, while ICP provides the network, execution, and data availability layers.

bitcoinOS utilizes WebAssembly as its runtime, supporting general-purpose computing and providing excellent support for applications such as Artificial General Intelligence (AGI) and Large Language Models (LLM). Users can leverage Bitcoin ecosystem assets on bitcoinOS to empower AI applications.

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The smart wallet in bitcoinOS benefits from both RGB and ICP technologies, as they are both compatible with WebAssembly. By running the RGB client (such as the wallet) within the smart contract container Canister, the functionality of the wallet running in Canister is much more powerful than simple account abstractions. It enhances the programmability and automatic interaction capabilities of the wallet, enabling it to automatically guide through non-critical steps of RGB transactions.

For example, when Alice wants to make a payment to Bob, she can send a payment request to Bob's smart wallet through her own smart wallet. Bob's smart wallet will automatically generate an invoice and send it back to Alice's smart wallet. Then, Alice's smart wallet will make the payment against the invoice and send the raw transaction data via ICP to Bob's smart wallet, while also writing the commitment of the transaction data into Bitcoin UTXO. Upon receiving Alice's payment message and transaction data, Bob's smart wallet will validate the payment transaction against the commitment data in Bitcoin UTXO. Once validated, Bob's smart wallet will confirm the transaction. The entire transaction process only requires Alice to send the payment request and enter the amount, without Bob's direct involvement. This interaction experience is similar to current Bitcoin transactions.

SmartWallet is a decentralized, non-custodial, programmable Bitcoin wallet, and also a perpetually online RGB wallet and client. It serves not only as the gateway to the decentralized financial platform of bitcoinOS but also allows users to access native BTC as well as other Bitcoin L1 assets such as Ordinals, Atomicals, and RGB.
The functionalities of SmartWallet extends further to become a comprehensive decentralized financial platform, akin to a

decentralized version of Alipay, including services like native
BTC pledging, lending, financial management, and payments.

   Fastnet is a Bitcoin Layer2 network based on RGB and ICP,
carrying the majority of functionalities within bitcoinOS.
Leveraging ICP's universal chain-based high-speed network and
ckBTC, it enables fast Bitcoin payments, addressing issues such
as insufficient liquidity and unstable payment routing in the
Lightning Network, providing a better user experience than the
Lightning Network.
   Fastnet also offers product components such as smart contract
containers, dApp Store, Data Store, and GPT Store, facilitating
developers to quickly develop smart contracts and AI
applications within the Bitcoin ecosystem.

   bitcoinOS adopts WebAssembly as its Runtime, supporting
general-purpose computing, providing good support for artificial
intelligence (AGI), large language models (LLM), and other
applications. Users can leverage Bitcoin ecosystem assets to
empower AI applications on bitcoinOS.
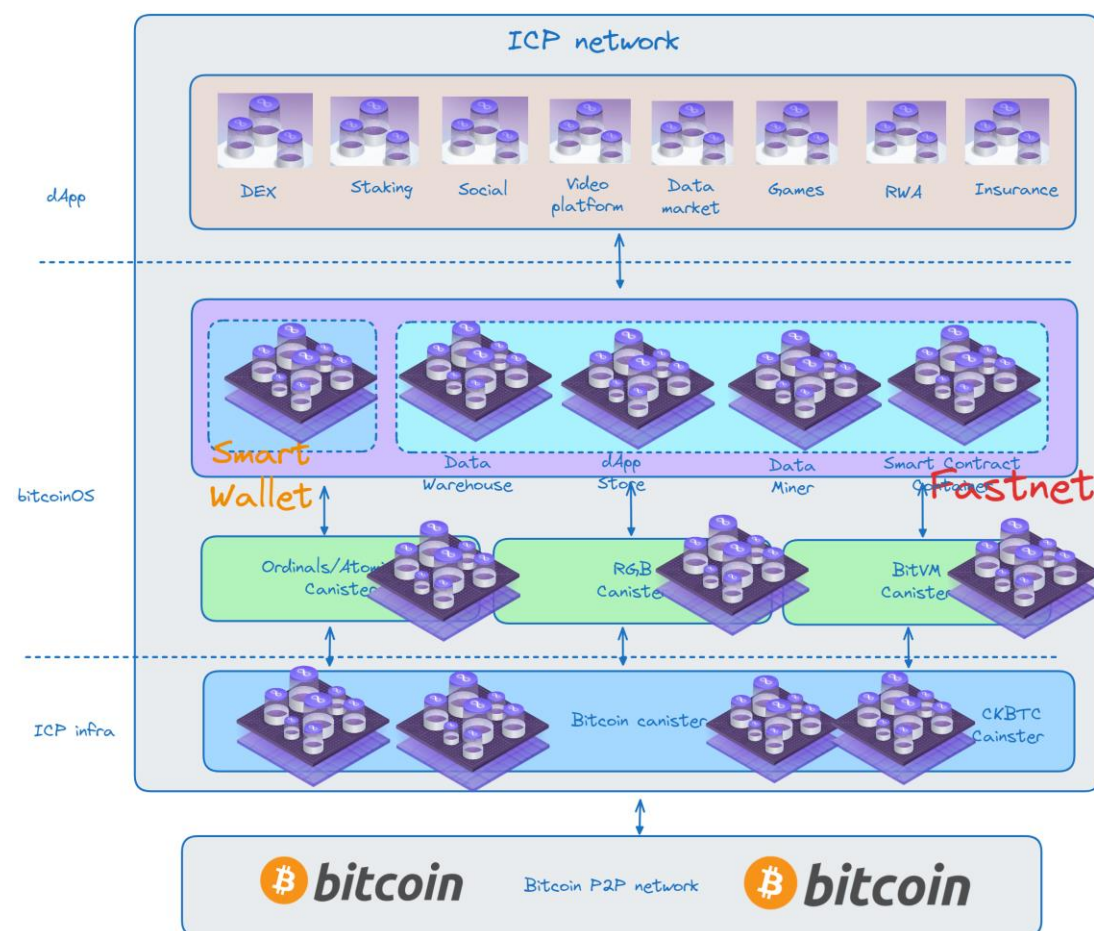
bitcoinOS is an open, powerful system and platform that can integrate various Bitcoin technologies and assets, not limited to specific technologies and protocols. In the future, it can also integrate cutting-edge technologies including BitVM, providing users with a wider range of services and features.

Fastnet serves not only as a solution for Bitcoin L2 but also as the primary carrier of data asset networks within bitcoinOS. bitcoinOS has developed various types of Data Warehouse smart contract containers for various data assets, designed and optimized for different application scenarios, such as personal digital assistants, personal game assistants, and personal agents. Each type of data asset has corresponding evaluation criteria and protocols. By combining Data Miner contract containers, bitcoinOS has successfully bridged the channel and connection between individual users and data consumers (including AI institutions, enterprises, or individuals).

bitcoinOS also opens up a new paradigm for data sovereignty applications, where data protocols and data containers are at the core of applications or ecosystems. Individuals have complete control and ownership of their data and can choose to access different dApp autonomously. Data is both an asset and a center, while dApp serve as channels and agents for data.

Developers can fully utilize various data containers to develop dApp, achieving separation of data and applications. In this system, each user can act as a data miner, mining by generating data. When individual users are rewarded for mining through dApp, dApp developers also receive rewards simultaneously.
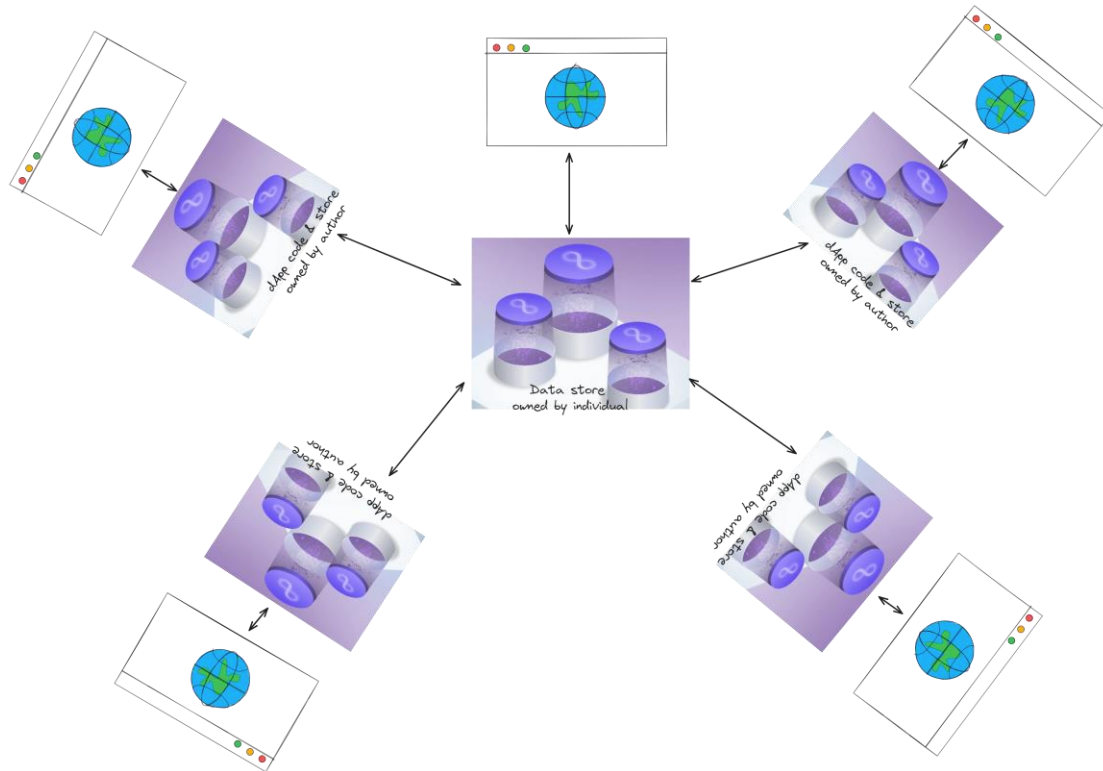
Data is considered the most important production material and element in the AI era, much like digital oil, thus data ownership becomes the first step of the AI era. With the continuous development of artificial intelligence, it is possible that up to 80% of personal work may be replaced by AI, and individuals' biggest job may be to contribute data to AI. Therefore, the importance of data assets is increasingly highlighted. Through data ownership, we can activate everyone to innovate with massive data and large language models (LLMs) or large world models (LWM), and emerge collective wisdom. This will help break the limitation of blockchain only having financial functions, enabling blockchains with better data privacy to be as colorful as Web2 and seamlessly integrate with Web3. Through such efforts, we can move towards the large-scale application of Bitcoin and blockchain, entering the Web5 era.

The main advantages of bitcoinOS can be summarized as follows:

a) Excellent Scalability:

bitcoinOS leverages multi-subnet technology to achieve a transaction processing capacity of over 100,000 transactions per second. By continuously adding subnets, the network's scalability is linearly improved, opening up vast prospects for future development.

b) Outstanding Privacy Protection:

Utilizing RGB and ICP networks, bitcoinOS ensures complete confidentiality of data without external exposure, ensuring full privacy of transaction information. Only participants and smart contracts have access to original transaction data, achieving efficient and secure transaction privacy protection comparable to zero-knowledge proof (ZK) technology.

c) Seamless Integration of Web2 and Web3:

bitcoinOS achieves seamless integration of Web3 applications with Web2 through cryptographic oracles on the ICP, cleverly introducing Bitcoin's financial properties into the Web2 domain. For example, enabling fast payments and transactions using Bitcoin assets. Additionally, through built-in smart contract containers, bitcoinOS quickly brings a large number of Web2 users and developers into the Web3 ecosystem, promoting their organic integration and mutual development.

d) Enhancement of Data Sovereignty:

bitcoinOS elevates data to a first-class asset, giving users complete data sovereignty and asset control. Data is stored in dedicated smart contract containers, no longer scattered across smart contracts of various dApp, enabling users to fully control their data and generate revenue through data trading and collaboration.

e) Innovative Data Mining Mechanism:

Users in bitcoinOS incentivized through a bi-directional reward mechanism by using dApp developed by developers, combined with staking tokens and generating data. This innovative data mining mechanism disrupts traditional dApp development models, benefiting both users and developers. Data mining complements data sovereignty, truly changing the relationship between users and the means of production, making users not only users of dApp but also partners of dApp developers, jointly promoting the development and prosperity of the network.

f) Friendly Support for Artificial General Intelligence:

The WebAssembly runtime in bitcoinOS supports the execution of AGI large language models, combined with

exclusive data from the Data Store in bitcoinOS and powerful artificial intelligence computing power provided by the ICP network, providing a platform for innovative exploration for various AI institutions and individuals. This comprehensive technical support provides a solid foundation for the development and application of artificial intelligence applications.

5. Development Roadmap

The feature of bitcoinOS design will be developed and implemented in stages, with the initial plan as follows:

Genesis Era (Q3 2024) – BTC Empowerment:

The focus is on building the core infrastructure of bitcoinOS, primarily developing the SmartWallet, which includes support for native BTC staking, lending, wealth management, and asset issuance, trading, and management based on RGB. It also involves enabling fast payments with ckBTC. Collaborating with ecosystem partners to launch over 100 dApp, with a focus on accumulating ecosystem assets.

Fastnet Era (Q1 2025) – Bitcoin Layer2:

Development of Bitcoin Layer 2, Fastnet, and supporting infrastructure, including launching app stores and smart contract containers to expand bitcoinOS functionality. Issuance of various RGB assets, staking BTC to issue RGB stablecoins, and enabling fast payments based on stablecoins on Fastnet. Building a DEX for native BTC assets and RGB assets on Fastnet. The emphasis is on creating a better Bitcoin Layer 2.

Data Era (Q3 2025) – Data Assets:

Establishing various data protocols and Data Stores to assist developers in quickly developing various dApp, such as games. Users and developers can earn rewards through data mining by staking tokens for data mining, completely reversing the relationship between developers and users for a win-win situation. The focus is on establishing data assets as first-class digital assets, similar to Bitcoin being a first-class digital asset.

Smart Era (Q4 2025) – Smart Brain:

Launching the GPT Store and collaborating with AGI large model institutions or developers to make bitcoinOS GPT Store the preferred choice for AGI agents. Developers can train and deploy their own large models and various agents on bitcoinOS to create a decentralized AI ecosystem, games, and digital worlds. Individual users can use their exclusive data on bitcoinOS to create their own second or third brain, protecting their interests from harm.

Better Era (Q2 2026):

Designing and launching the Bitcoin Phone, a mobile device with the bitcoinOS mobile operating system built-in, running as a lightweight node on the bitcoinOS network.

6. Tokenomics

To better build the bitcoinOS network and ecosystem, a token with the same name, bitcoinOS (BOS), will be issued. The total supply of BOS tokens will be 210,000,000, and there will be no additional issuance.

1) **Token Total Supply**:
   210 million (210,000,000)

2) **Token Utility**:
   i.   Stake BOS for Data Mining: Both users (miners) and application developers (owners) can earn rewards by staking BOS. Users (miners) need to stake BOS to receive BOS rewards when generating data using an application; otherwise, they only receive the data itself. Application developers or owners also need to stake BOS within the application's container to receive rewards.

   ii. Gas Fees for User Application Usage: BOS can be used as gas fees when users interact with applications.

   iii. Settlement Currency for Various Applications in dApp Store, Data Store, and GTP Store: Similar to the

practices of iOS or Android, BOS can be used as the settlement currency for various applications, and a certain percentage of fees can be charged.

iv.   Settlement Currency for Data Assets: Organizations or individuals purchasing or using data can settle transactions using BOS, similar to the role of the US dollar, and a certain fee can be charged for transactions.

3) Token distribution

Team/Contributors	10%	Max 24 Months Cliff, 48 Months Vesting
ICO	10%	100% TGE
Airdrop	2%	100% TGE
Presale	20%	Max 12 Months Cliff, 24 Months Vesting
Mint	50%	Data Mining (Like PoW)
bitcoinOS Foundation	8%	100% TGE

4) Token Release and Unlocking

Upon the launch of the bitcoinOS mainnet, a small portion of BOS tokens will be minted and allocated as follows:

- 10%: allocated to the development team, subject to a maximum lock-up period of 24 months with linear unlocking on a monthly basis.

- 20%: allocated to pre-sale investors, whether institutions or individual investors, with a maximum lock-up period of 12 months, also unlocking linearly on a monthly basis.

- 10%: allocated for a public ICO, immediately tradable and transferable.

- 2%: allocated for airdrops to eligible addresses or users.

- 8%: allocated to the bitcoinOS Foundation, responsible for ecosystem development, including branding, partnerships, Hackathons, and other initiatives.

- 50%: generated through data mining in the future. Data mining operates on a PoW basis, with rewards halving every 5 years. Due to increasing data growth and escalating difficulty, the quality and richness of data become crucial until all BOS tokens are mined.

When users engage in data mining, they must first stake a certain amount of BOS tokens. Data generated after staking belongs entirely to the individual, and after evaluation by an AI model for data quality and quantity, BOS tokens are distributed. 10% of the BOS mining rewards can be immediately circulated, while the remaining 90% are linearly unlocked over a month. Without staked BOS tokens, data sovereignty remains with the individual, but no BOS rewards are granted.

5) **Token Governance**

bitcoinOS DAO is the governing organization for the bitcoinOS network and ecosystem, with the bitcoinOS Foundation being a part of this DAO. BOS holders also have the opportunity to initiate their own governance organizations (DAOs), with the same rights and privileges as the bitcoinOS DAO.

All BOS holders are granted voting power proportional to the amount of BOS they hold. They can propose their own initiatives and vote on proposals submitted by others (voting options include approval, rejection, or abstention).

BOS holders can stake their BOS tokens to the bitcoinOS DAO or other DAOs within the bitcoinOS ecosystem. By staking BOS, holders receive equivalent stBOS tokens and their BOS tokens are locked for a certain period, during which they cannot be traded. Staking BOS allows holders

to earn staking rewards through governance actions conducted by the DAO on the bitcoinOS network.

Once the staking period expires, BOS holders can redeem their staked BOS tokens along with any accrued rewards using their stBOS tokens. Upon redemption, the corresponding stBOS tokens are destroyed, and the reclaimed BOS tokens are free to be traded as usual.