CoinMarketCap | Footprint Analytics

BTCFi: Analyzing Bitcoin DeFi Ecosystem through On-chain Data

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Bitcoin's role in decentralized finance (DeFi) is dramatically transforming. Once limited to simple peer-to-peer transfers, the world's first cryptocurrency is now emerging as a formidable player in the DeFi arena, challenging Ethereum's long-standing dominance.

This report examines the rise of Bitcoin DeFi (BTCFi), leveraging on-chain data to comprehensively analyze its current state, growth trajectory, and potential impact on the broader crypto ecosystem. We'll explore:

- The technological innovations enabling DeFi capabilities on Bitcoin.
- Key metrics of BTCFi adoption and market influence.
- Comparative analysis between native BTC DeFi and Ethereum-based DeFi.
- Challenges and opportunities shaping the future of BTCFi.

As we delve into the data, a clear picture emerges: BTCFi represents not just a technological shift, but a potential paradigm change in Bitcoin's role in decentralized finance. The implications of this shift, as we'll explore, could redefine the dynamics of the entire DeFi sector.

The Emergence of Bitcoin DeFi

Bitcoin, introduced by Satoshi Nakamoto in 2008, was primarily designed as a peer-to-peer electronic cash system. Its original architecture, while revolutionary for digital currency, posed significant limitations for more complex financial applications like those seen in DeFi.

Bitcoin's Original Design and Limitations Regarding DeFi

Core design elements and their limitations:

- ***UTXO Model:*** Bitcoin uses an Unspent Transaction Output (UTXO) model, which, while efficient for simple transfers, lacks the flexibility needed for complex smart contracts.
- ***Limited Scripting:*** Bitcoin's unique, stack-based scripting language is intentionally restricted to prevent potential security vulnerabilities, but this also limits its ability to support sophisticated DeFi applications due to the limited set of operational codes (opcodes) that can be performed.
- ***Lack of Turing Completeness:*** Unlike Ethereum, Bitcoin's script is not Turing complete, making it challenging to implement complex, state-dependent smart contracts essential for many DeFi protocols.
- ***Block Size and Transaction Speed:*** Bitcoin's 1MB block size limit and 10-minute block time result in lower transaction throughput compared to DeFi-focused blockchains.

These design choices, while enhancing security and decentralization, created barriers for implementing DeFi functionalities directly on the Bitcoin

blockchain. The absence of native support for features like loops, complex conditions, and state storage made it challenging to build applications like decentralized exchanges, lending platforms, or yield farming protocols directly on Bitcoin.

Early Attempts and Developments to Introduce DeFi on Bitcoin

Despite these limitations, Bitcoin's robust security model and widespread adoption motivated developers to find innovative solutions:

- ***Colored Coins (2012-2013):*** One of the earliest attempts to extend Bitcoin's functionality, Colored Coins aimed to represent and transfer real-world assets by “coloring” specific bitcoins with unique metadata. While not strictly DeFi, this laid the groundwork for more complex financial applications on Bitcoin.
- ***Counterparty (2014):*** This protocol introduced the ability to create and trade custom assets on the Bitcoin blockchain, including the first non-fungible tokens (NFTs). Counterparty demonstrated the potential for more complex financial instruments on Bitcoin.
- ***Lightning Network (2015-present):*** While primarily designed for scalability as a layer-2 protocol, the Lightning Network's introduction of payment channels opened up possibilities for more complex financial interactions, including rudimentary DeFi applications.
- ***DLC (Discreet Log Contracts) (2017-present):*** Proposed by Tadge Dryja, DLCs allow for complex financial contracts on Bitcoin without requiring changes to the base layer, opening up possibilities for derivatives and other DeFi instruments.
- ***Liquid Network (2018-present):*** Developed by Blockstream, Liquid is a sidechain-based settlement network that enables the issuance of

digital assets and more complex Bitcoin transactions, paving the way for DeFi-like applications.

- ***Taproot Upgrade (2021):*** Through Merklized Alternative Script Trees (MAST), Taproot condenses complex transactions into a single hash, reducing transaction fees and minimizing memory usage. While not a DeFi solution itself, the Taproot upgrade improved Bitcoin's smart contract capabilities, making it easier and more efficient to implement complex transactions and laying a foundation for future DeFi developments.

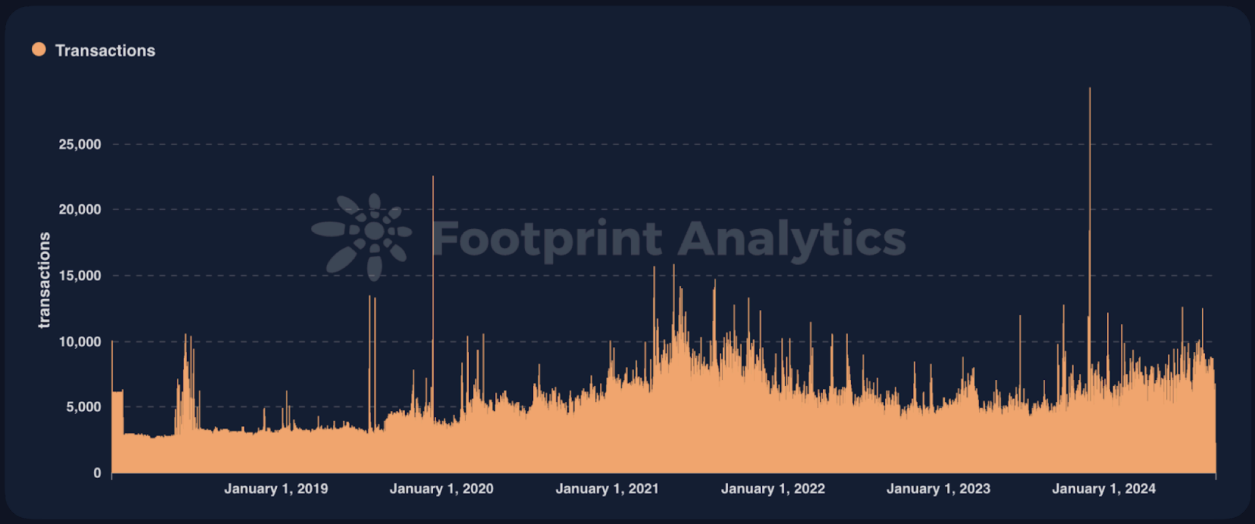
These early developments laid the foundation for extending Bitcoin's capabilities beyond simple transactions. While highlighting the challenges of bringing DeFi to Bitcoin, they also demonstrated the ecosystem's innovative potential. This groundwork set the stage for the emergence of Layer-2 solutions and sidechains, and the current wave of Bitcoin DeFi innovations, which we'll explore next.

Key Innovations: Enabling Smart Contracts on Bitcoin

The Bitcoin ecosystem has witnessed a surge in protocols aiming to bring smart contract capabilities and DeFi functionalities to the world's first cryptocurrency. These innovations are reshaping Bitcoin's utility, extending its role beyond a simple store of value or medium of exchange. The following are some of the protocols enabling smart contracts on Bitcoin:

- ***Rootstock:*** As a pioneer in Bitcoin-based smart contracts, Rootstock is the longest-standing Bitcoin sidechain that has established itself as a cornerstone of the BTCFi ecosystem. Leveraging 60% of Bitcoin’s

hashing power, it offers dual-mining and EVM compatibility for deploying Ethereum smart contracts. Its unique Powpeg mechanism ensures seamless BTC-to-RBTC conversion, and its "defence-in-depth" security model prioritizes simplicity and robustness. Since its mainnet launch in 2018, Rootstock has shown steady growth in on-chain activity, solidifying its position as a stable and scalable solution within the Bitcoin ecosystem, according to Footprint Analytics.



Source: Footprint Analytics - Rootstock Overview

- ***Core:*** Core is a "Bitcoin-powered, Bitcoin-aligned, EVM-compatible" layer-1 blockchain that has emerged as a formidable player with its innovative Dual Staking model, combining Bitcoin and CORE. This approach establishes a Bitcoin Risk-Free Rate through Non-Custodial Bitcoin Staking, effectively transforming Bitcoin into a yield-bearing asset. Core reports that 55% of Bitcoin mining hash power is being delegated to its network, which may contribute to its security model for DeFi applications.
- ***Merlin Chain:*** As a relative newcomer, Merlin Chain is a Bitcoin Layer 2 that is making waves with its focus on unleashing Bitcoin's DeFi potential. By integrating ZK-Rollup technology, decentralized oracles, and on-chain BTC fraud-proof modules, Merlin offers a

comprehensive suite of DeFi capabilities to Bitcoin holders. The introduction of M-BTC, a wrapped Bitcoin asset earning staking rewards, opens up new avenues for yield generation and DeFi participation.

- ***BEVM:*** BEVM represents a significant leap in bringing Ethereum's vast DeFi ecosystem directly to Bitcoin. As the first fully decentralized EVM-compatible Bitcoin Layer 2 using BTC as gas, BEVM allows seamless deployment of Ethereum DApps on Bitcoin. Backed by mining giant Bitmain, BEVM is pioneering the concept of "hashrate RWA," potentially unlocking new dimensions of value in the Bitcoin ecosystem.

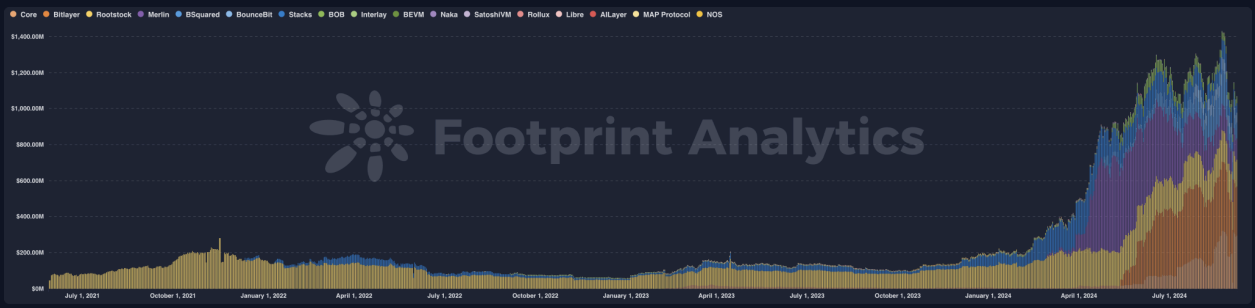
Key Innovations among Bitcoin Layer 2s and Sidechains

- Wrapped Bitcoin Assets
- Smart Contracts and EVM Compatibility
- Yield-Bearing Bitcoin
- Scalability and Privacy Enhancements

These protocols are not merely replicating Ethereum's DeFi playbook on Bitcoin; they're forging new paths, leveraging Bitcoin's unique attributes. From Rootstock's defence-in-depth approach to Core's dual staking model, Merlin's comprehensive DeFi suite, and BEVM's hashrate RWA innovations, the BTCFi space is evolving rapidly.

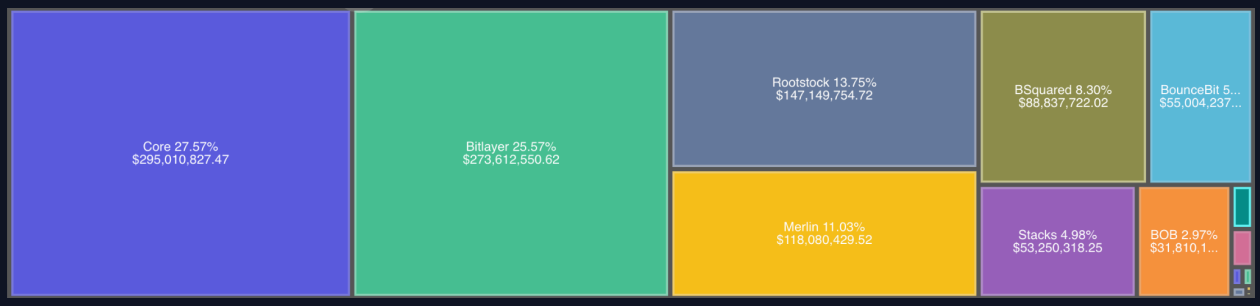
As of September 8, 2024, the total value locked (TVL) across Bitcoin Layer-2 solutions and sidechains reached $1.07 billion, representing a 5.7x

increase since January 1, 2024, and a remarkable 18.4x growth since January 1, 2023.



Source: Footprint Analytics - Bitcoin Scaling Solutions TVL

Leading the pack, Core holds 27.6% of the TVL, followed by Bitlayer at 25.6%, Rootstock at 13.8%, and Merlin Chain at 11.0%.



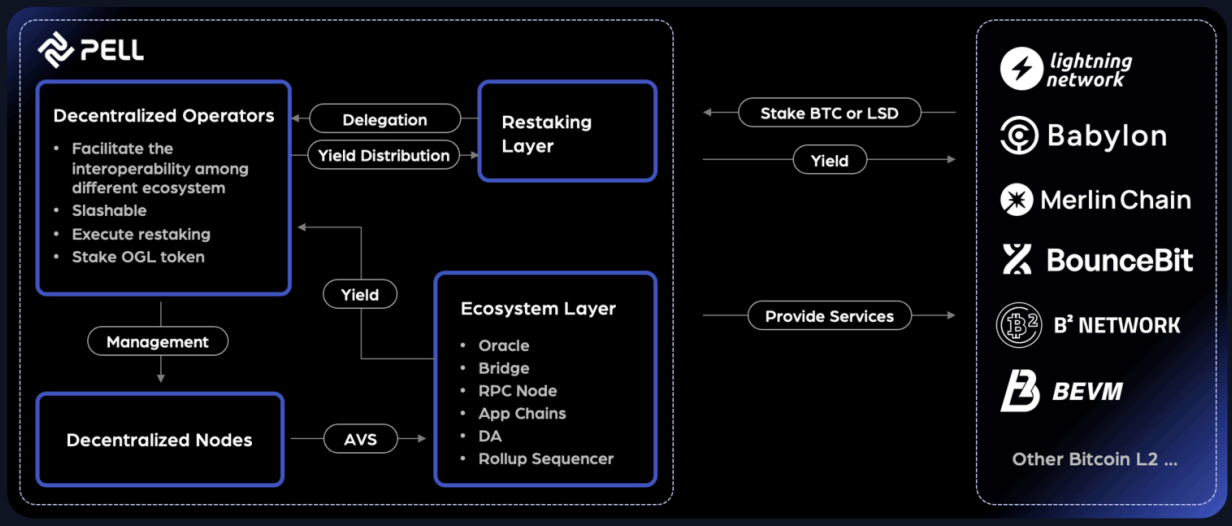
Source: Footprint Analytics - Bitcoin Scaling Solutions TVL

Current State of Bitcoin DeFi

As Bitcoin's DeFi ecosystem continues to mature, several key projects have emerged as pivotal players, driving innovation and adoption. These projects build on the robust foundations provided by Bitcoin Layer 2 solutions and sidechains, offering a diverse range of decentralized financial services:

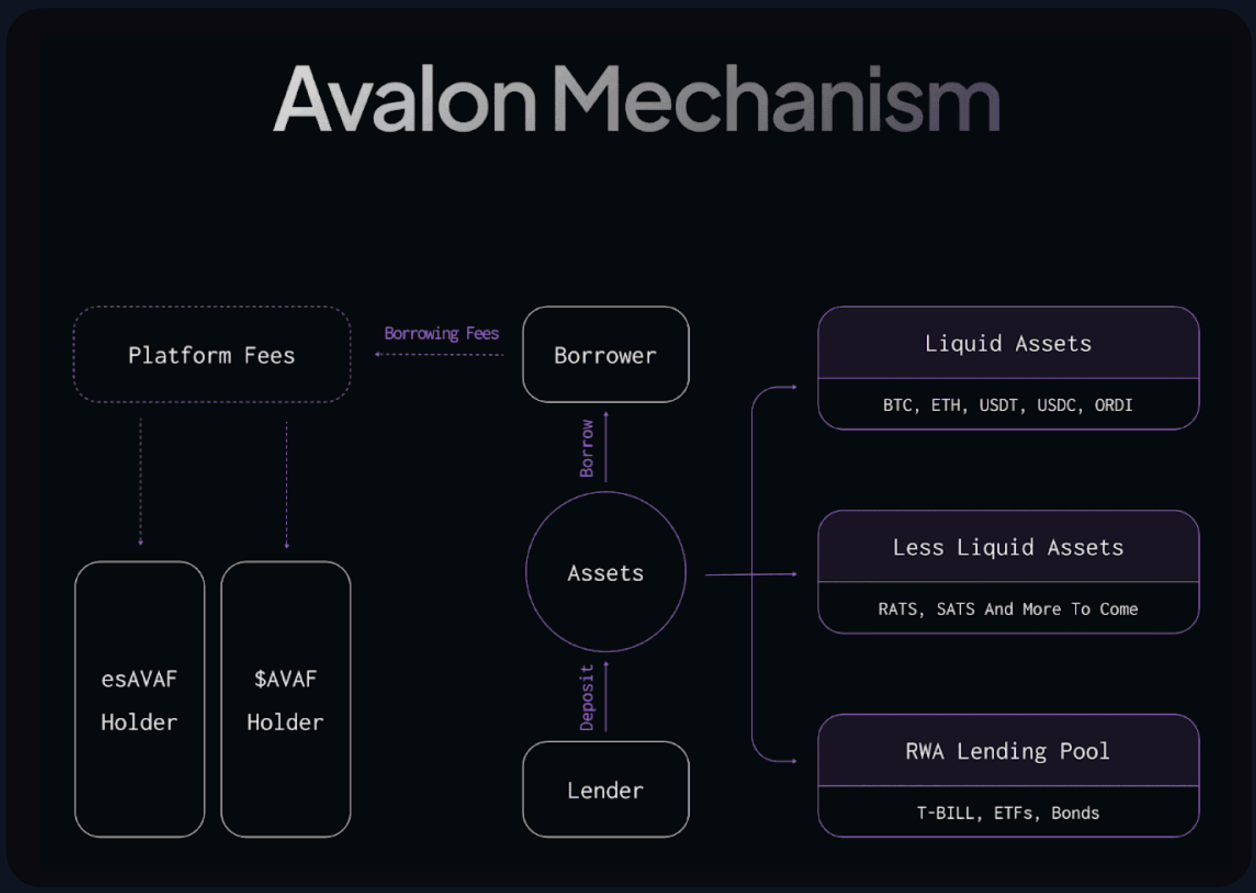
Major BTCFi Projects

Pell Network (Multi-chain)



Pell Network is a multi-layered restaking protocol designed to enhance security and optimize yield within the Bitcoin ecosystem. By staking BTC or liquid staking derivatives (LSD), users earn returns while decentralized operators run validation nodes, ensuring network security. Pell offers actively validated services like oracles, cross-chain bridges, and data availability, supporting the broader Bitcoin layer-2 ecosystem. With its robust infrastructure, Pell aims to become a key player in providing liquidity and cryptonomic security, driving sustainable growth across the Bitcoin economy.

Avalon Finance (Multi-chain)

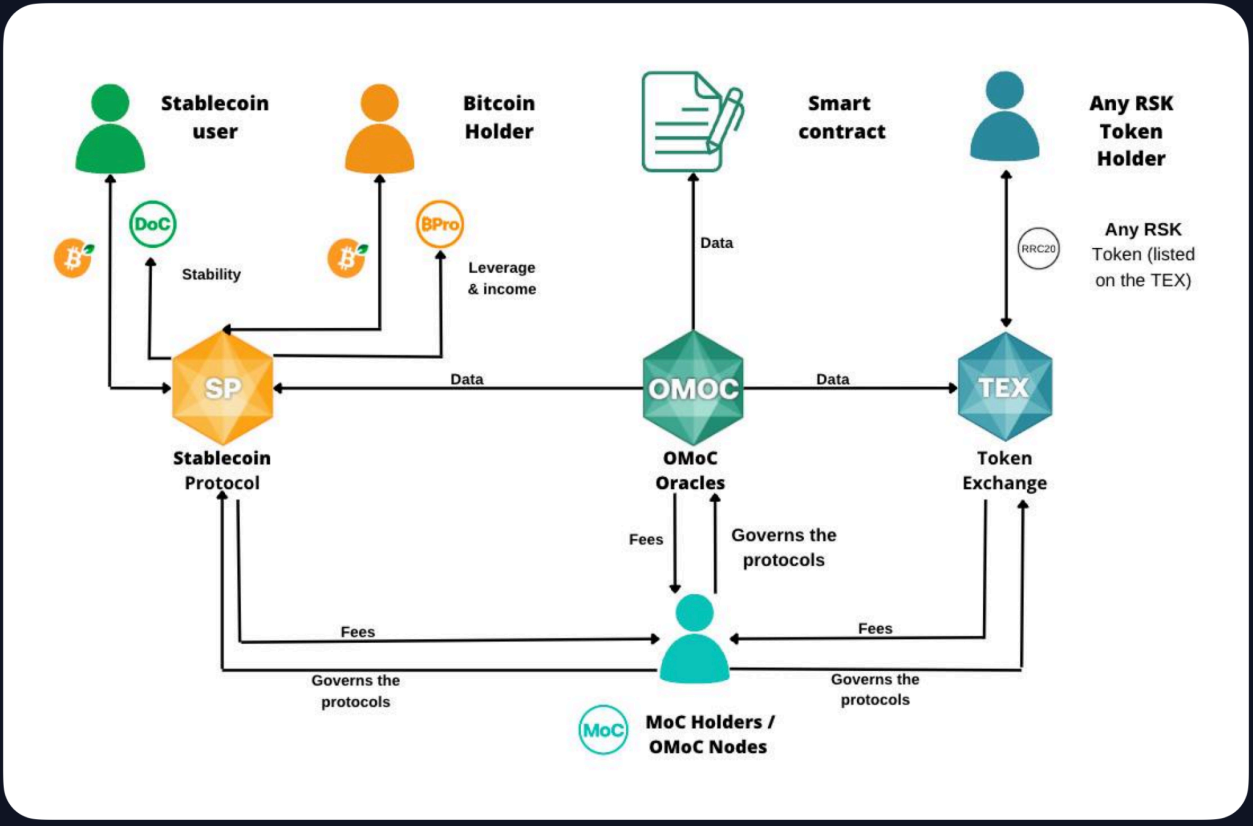


Avalon Finance is a multi-chain DeFi platform operating across Bitlayer, Core and Merlin Chain, known for its comprehensive lending and trading services within the BTC DeFi ecosystem. Avalon's key offerings include overcollateralized lending with specialized isolation pools for both major and less liquid assets. The platform also integrates derivatives trading, enhancing the functionality of its lending services. Additionally, Avalon features an algorithmic stablecoin designed to optimize capital efficiency, positioning it as a versatile and secure DeFi solution within the Bitcoin ecosystem. Its governance token, AVAF, follows an ES token model, incentivizing liquidity provision and usage of the protocol.

Colend Protocol (Core)

Colend Protocol is a decentralized lending and borrowing platform built on the Core blockchain, enabling users to securely lend and borrow Bitcoin and other assets. By leveraging Core's dual staking model, Colend integrates seamlessly with the broader DeFi ecosystem, enhancing Bitcoin's utility within decentralized finance. Key features include decentralized, tamper-proof transactions, multiple liquidity pools with dynamic interest rates, and a flexible collateral system.

MoneyOnChain (Rootstock)

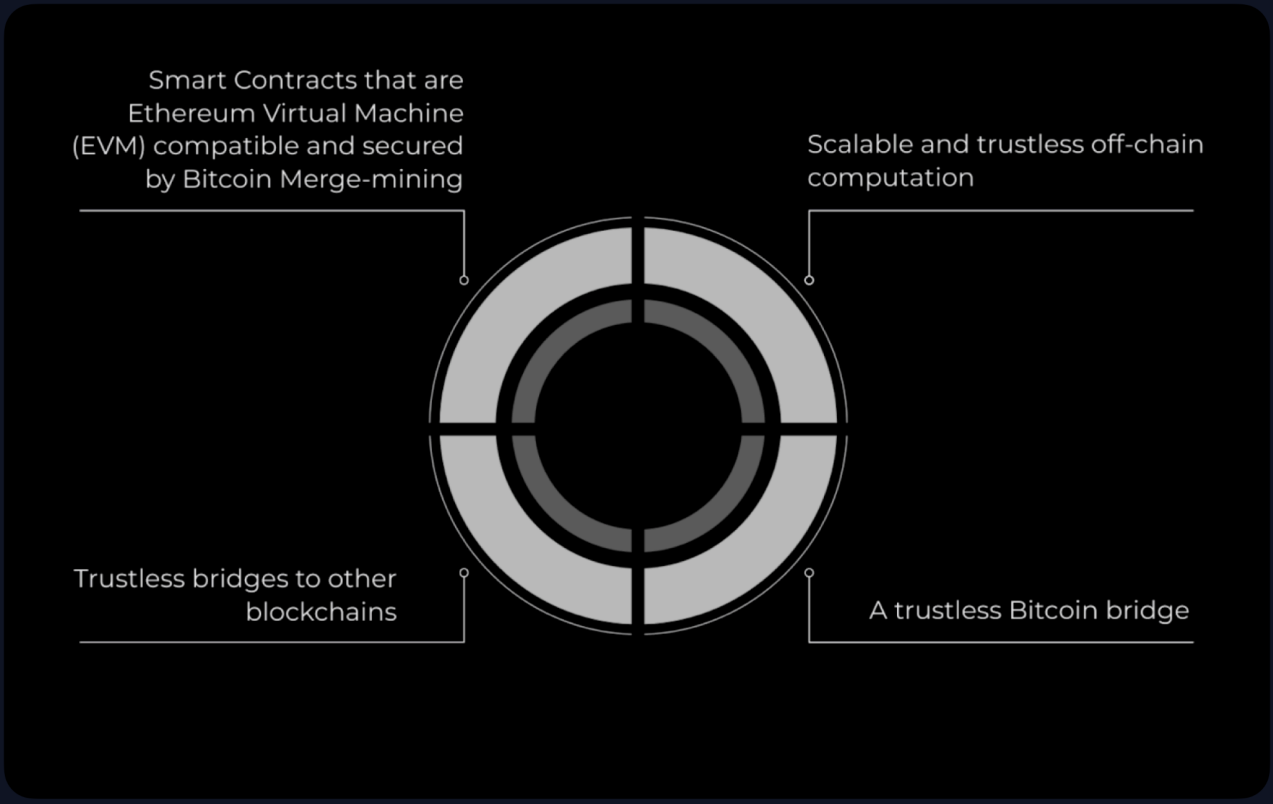


MoneyOnChain is a comprehensive DeFi protocol built on Rootstock that allows Bitcoin holders to improve the performance of their assets while retaining full control of their private keys. The protocol is centered around the issuance of Dollar on Chain (DoC), a stablecoin fully collateralized by

Bitcoin, designed for users who want to preserve the USD value of their BTC holdings. Additionally, MoneyOnChain offers BPRO, a token that provides leveraged exposure to Bitcoin, enabling passive earnings.

The protocol's architecture is built on a risk-sharing mechanism, utilizing a proprietary financial model designed to withstand extreme market volatility. It also features decentralized token exchange (TEX), decentralized oracles (OMoC), and a governance token (MoC) that allows users to participate in protocol decision-making, staking, and rewards.

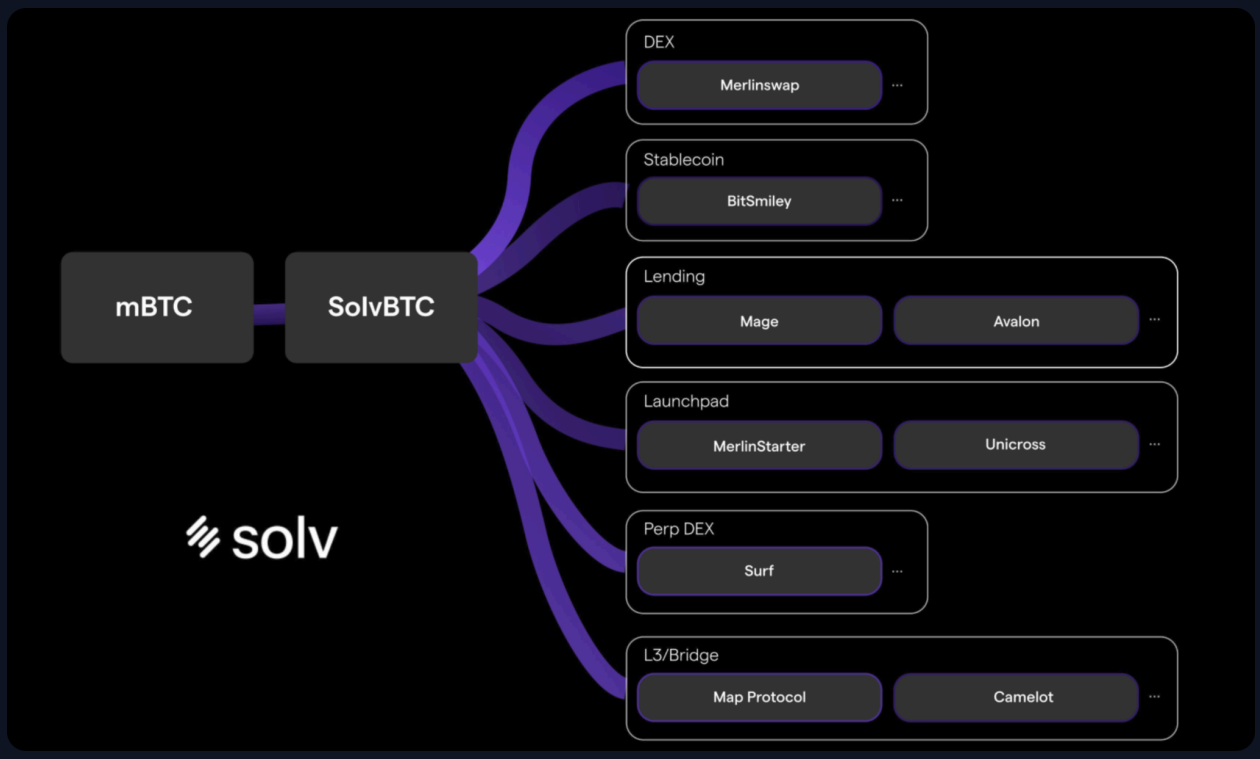
Sovryn (Multi-chain)



Sovryn is a decentralized exchange and one of the most feature-rich DeFi platforms built on Bitcoin, designed to empower users to trade, borrow, lend, and earn income using their Bitcoin. Operating across both the BOB and Rootstock, Sovryn offers a variety of DeFi services including trading, swapping, liquidity provision, staking, and lending. Sovryn's focus on

creating a permissionless financial layer for Bitcoin and integrating with other blockchains makes it a unique, multi-chain platform within the Bitcoin DeFi ecosystem. The platform's governance token, SOV, plays a key role in managing the decentralized protocol through its Bitocracy system, representing voting power and rewarding active participants.

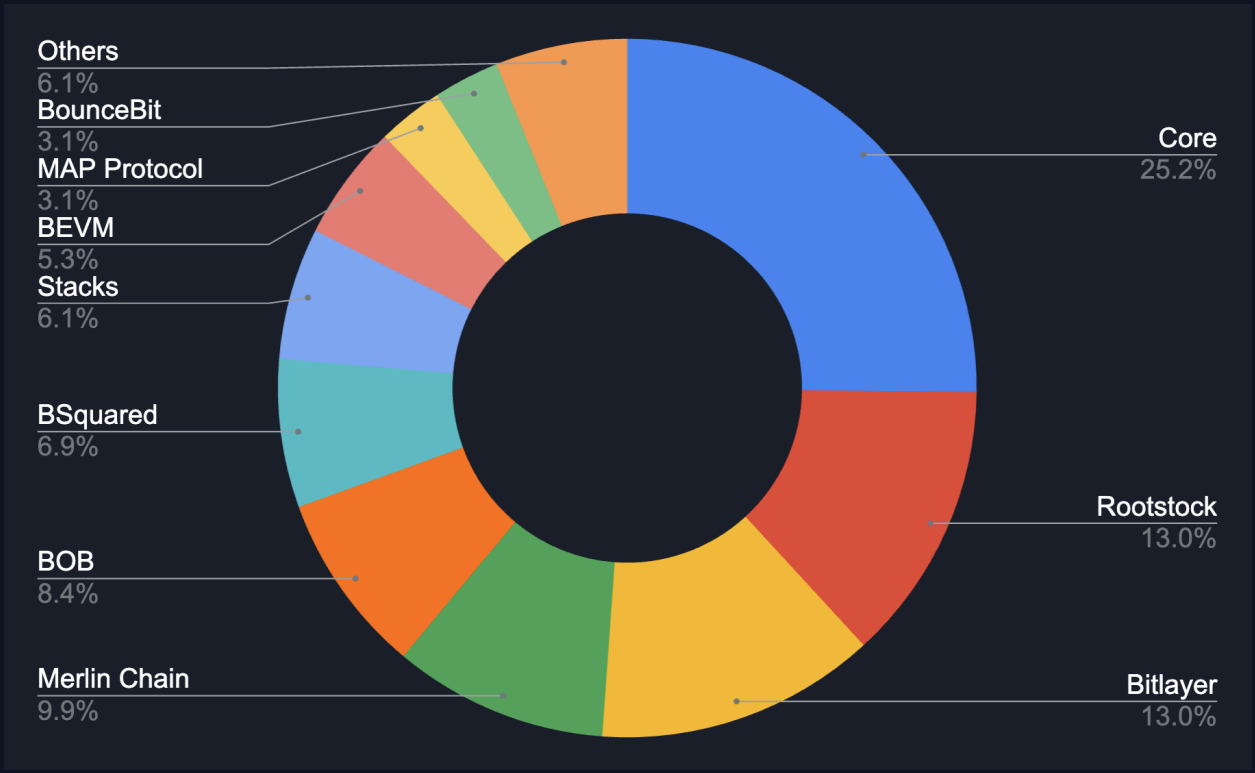
Solv Protocol (Merlin Chain)



Solv Protocol is at the forefront of financial NFTs, enabling users to create, trade, and manage on-chain vouchers. The protocol is designed to tokenize and aggregate yields from various DeFi protocols in the Merlin Chain ecosystem. Its flagship product, SolvBTC, serves as a yield-bearing token that allows Bitcoin holders to earn returns while maintaining liquidity. Solv Protocol aims to create a robust liquidity layer through staking and other yield-generating activities. This flexibility has made it an important DeFi project on Merlin Chain, helping to unlock new financial opportunities within the Bitcoin ecosystem.

These projects underscore the dynamic and rapidly evolving landscape of Bitcoin DeFi, each contributing distinct functionalities that extend the ecosystem's reach.

As of September 8, 2024, Core leads the Bitcoin DeFi space in terms of number of projects building on it, hosting 25.2% of active projects, which reinforces its central role in the ecosystem. Rootstock and Bitlayer are both significant players, each supporting 13.0% of projects, reflecting their importance in enhancing liquidity and capital efficiency within the Bitcoin DeFi landscape. Merlin Chain, with 9.9% of projects, also plays a key role in expanding DeFi functionality on Bitcoin. Other platforms like BOB (8.4%), BSquared (6.9%), and Stacks (6.1%)contribute to the ecosystem's diversity, while BEVM (5.3%), BounceBit (3.1%), and MAP Protocol (3.1%) add to the overall growth with their specialized solutions.



Source: Footprint Analytics - Bitcoin Scaling Solutions TVL

Pell Network (on seven chains) emerges as the top DeFi project by total value locked (TVL), with $260.8 million, underscoring its leadership in the financial NFTs space. Avalon Finance (on three chains) and Colend Protocol (Core), with TVLs of $206.2 million and $115.5 million respectively, are also significant contributors. Other notable projects include MoneyOnChain and Sovryn, reflecting the diverse focus areas within the BTCFi space — from yield farming to stablecoins.

Project	Chains	TVL (SUM)
Pell Network	BSquared, BOB, BounceBit, Merlin Chain, Bitlayer, Core, BEVM	260,798,082
Avalon Finance	Bitlayer, Core, Merlin Chain	206,216,512
Colend Protocol	Core	115,472,072
MoneyOnChain	Rootstock	65,656,380
Sovryn	Rootstock, BOB	62,629,708
DeSyn Liquid Strategy	Bitlayer	44,876,680
COREx Network	Core	32,159,350
Zest	Stacks	25,595,212
Surf Protocol	Merlin Chain	21,619,195
Buzz Farming	BSquared	21,254,214

Source: Footprint Analytics - BTC DeFi Projects TVL Across Chains

Key Narratives among Major BTCFi Projects

- ***Security and Decentralization First:*** The Bitcoin DeFi ecosystem is built on the uncompromising principles of security and decentralization. Bitcoin's unparalleled security framework is the foundation upon which the BTCFi ecosystem is constructed, ensuring that all developments remain true to these core values.

- ***Bitcoin as Programmable Money:*** BTCFi is revolutionizing Bitcoin's role, transforming it from a store of value into programmable money. This shift enables a new generation of complex financial applications through the deployment of smart contracts. For example, Solv Protocol's SolvBTC claims to be the "first-ever yield bearing BTC" which offers yield through its yield vaults from delta-neutral trading strategies, and through DeFi protocols on Ethereum, Arbitrum, Merlin Chain and more.

- ***Interoperability with Ethereum:*** By bridging with Ethereum's DeFi ecosystem through EVM-compatible solutions, BTCFi harnesses the strengths of both networks. This interoperability creates a powerful

synergy, combining Bitcoin's security with Ethereum's flexible smart contract capabilities. For instance, Core utilizes the EVM for executing smart contracts, which means that dApps developed for Ethereum can be easily transferred to the Core blockchain without significant modifications.

- ***Unlocking Bitcoin's Capital:*** The BTCFi ecosystem is unlocking substantial capital for DeFi use, offering yield opportunities while allowing users to maintain their Bitcoin exposure, thereby expanding the utility and appeal of Bitcoin within decentralized finance.

Comparative Analysis with Ethereum-based DeFi

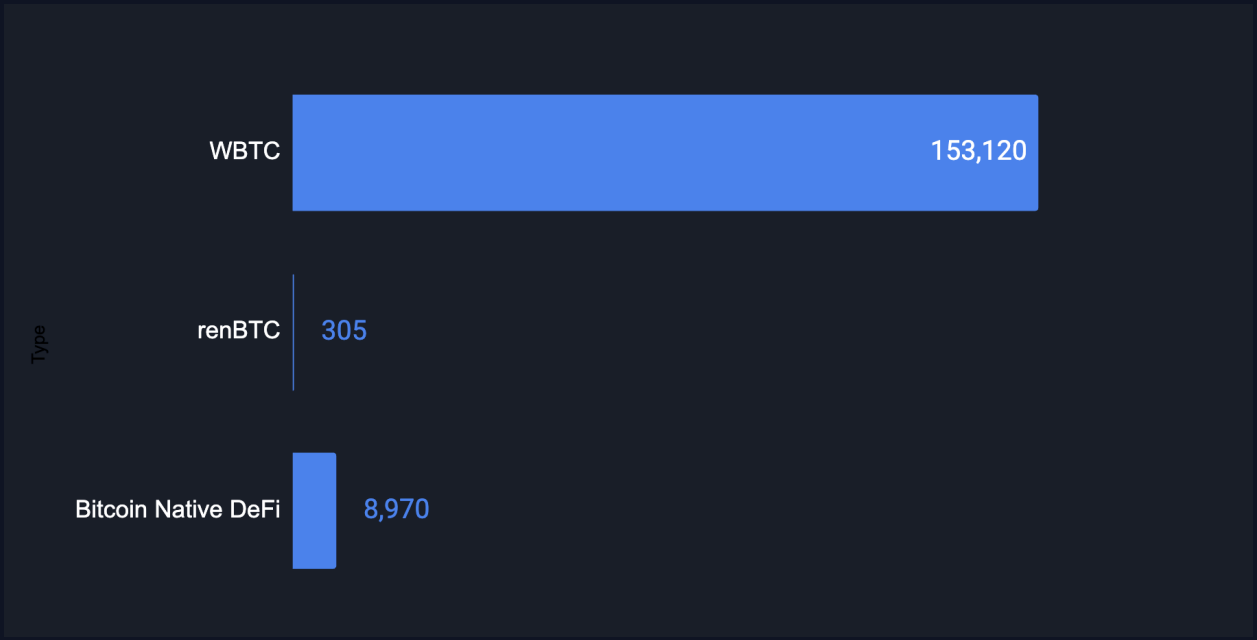
As Bitcoin DeFi continues to gain traction, it's crucial to compare its development with that of Ethereum-based DeFi, particularly focusing on how Bitcoin is represented in Ethereum's ecosystem through wrapped assets like wBTC and renBTC, and what lessons can be drawn from Ethereum's journey.

BTC on Ethereum DeFi vs. Native Bitcoin DeFi

The integration of Bitcoin into Ethereum's DeFi ecosystem has been predominantly facilitated through wrapped assets like wBTC and renBTC. These tokens allow Bitcoin holders to access Ethereum's vast DeFi landscape by converting BTC into ERC-20 tokens that can be used on Ethereum-based platforms such as MakerDAO, Aave, and Uniswap.

There is a significant disparity in the usage of BTC between these ecosystems. As of September 8, the amount of BTC locked in Ethereum

DeFi protocols, 153.4K, far exceeds that within Bitcoin's native DeFi ecosystem, 8.97K. This trend is driven by Ethereum's mature and diverse DeFi infrastructure, which offers a wider range of financial products, including lending, trading, and yield farming.



Source: Footprint Analytics - Bitcoin Bridged to Ethereum

While wrapped Bitcoin tokens like wBTC provide liquidity and access to advanced DeFi functionalities, they also introduce dependencies on custodians and cross-chain bridges, which can add layers of risk. In contrast, native Bitcoin DeFi projects, although smaller in scale, operate within the security framework of Bitcoin itself, avoiding some of the risks associated with cross-chain transfers. However, the nascent state of Bitcoin DeFi means that the range of available financial services is still limited compared to Ethereum.

Lessons for Bitcoin from Ethereum's Development and Vice Versa

What Bitcoin Can Learn from Ethereum:

- ***Diversity of Offerings:*** Ethereum's success in DeFi largely stems from the broad array of financial products and services it supports, from decentralized exchanges to synthetic assets. For Bitcoin DeFi to grow, it needs to expand its offerings beyond the current set of lending and stablecoin services. Developing more complex financial instruments and interoperable solutions could help attract a wider user base.
- ***Developer Ecosystem:*** Ethereum has cultivated a vibrant developer community that continuously innovates and builds on its platform. Bitcoin DeFi projects could benefit from fostering a more engaged developer ecosystem, encouraging the creation of new protocols and applications tailored to Bitcoin's strengths.
- ***Interoperability:*** Ethereum's DeFi ecosystem thrives on its interoperability, both within its own ecosystem and across other blockchains. Enhancing the interoperability of Bitcoin DeFi with other chains, including Ethereum, could unlock new opportunities for users to leverage the strengths of both ecosystems.

What Ethereum Can Learn from Bitcoin:

- ***Security and Decentralization:*** Bitcoin's emphasis on security and decentralization remains unparalleled. Ethereum projects can learn from Bitcoin's conservative approach to security, ensuring that rapid innovation does not come at the expense of these core principles. This is particularly relevant as Ethereum transitions to more scalable solutions like Layer 2s, where security trade-offs must be carefully managed.

- ***Simplicity and Robustness:*** Bitcoin's simpler and more robust scripting capabilities, although less flexible, have resulted in fewer vulnerabilities compared to the complex smart contracts on Ethereum. Ethereum developers could benefit from prioritizing simplicity and robustness in smart contract design to minimize security risks.
- ***Focus on Store of Value:*** While Ethereum is known for its smart contract capabilities, Bitcoin's dominance as a store of value remains strong. Ethereum's ecosystem could benefit from exploring ways to enhance its value storage functionalities, potentially integrating more Bitcoin-based assets to attract users who prioritize security and value preservation.

While Bitcoin DeFi is still in its early stages, it holds significant potential to grow by adopting lessons from Ethereum's more mature ecosystem. At the same time, Ethereum can draw from Bitcoin's strengths in security and decentralization to further solidify its DeFi offerings. As both ecosystems evolve, their collaboration and mutual learning could drive the next phase of growth in decentralized finance.

Challenges and Opportunities

As this sector continues to evolve, both technical and regulatory hurdles must be navigated, while advancements in technology and emerging growth areas present significant expansion opportunities.

Technical and Regulatory Challenges

Technical Hurdles

Implementing DeFi on Bitcoin presents several technical challenges. Scalability is a primary concern, as Bitcoin's base layer is limited in transaction throughput due to its block size and block time constraints. Unlike Ethereum, which has developed extensive Layer 2 solutions, Bitcoin's Layer 2 and sidechain ecosystems are still in their early stages, limiting the range of DeFi applications that can be effectively supported. Additionally, interoperability remains a significant challenge. Bridging Bitcoin with other blockchain ecosystems without compromising security or decentralization is complex and requires innovative solutions.

Regulatory Concerns

As Bitcoin DeFi continues to grow, regulatory scrutiny is expected to increase. Governments and financial regulators may impose stricter regulations on decentralized financial services, particularly those related to anti-money laundering (AML) and know-your-customer (KYC) requirements. The decentralized and pseudonymous nature of Bitcoin poses challenges for compliance, potentially slowing down the adoption and development of DeFi on Bitcoin. Navigating these regulatory landscapes will be crucial for the sustainable growth of Bitcoin DeFi.

Future Opportunities

Advancements in Technology

There are significant opportunities for technological advancements that could bolster Bitcoin DeFi. Enhancements in Layer 2 solutions, such as more efficient and secure sidechains and the development of more scalable and interoperable frameworks, could dramatically increase the capabilities of Bitcoin's DeFi ecosystem. Innovations like Discreet Log Contracts (DLCs) and advancements in privacy-preserving technologies, such as Zero-Knowledge Proofs, could enable more complex and secure financial applications.

Predictions for Future Growth Areas

As the Bitcoin DeFi ecosystem matures, several areas show high potential for growth. Yield-generating products, decentralized exchanges (DEXs), and cross-chain liquidity pools are expected to attract significant interest. Additionally, as institutional interest in Bitcoin continues to grow, DeFi products that cater to institutional needs — such as custodial solutions, compliant financial instruments, and Bitcoin-backed stablecoins — are likely to see increased demand. These developments present high ROI opportunities for early adopters and innovators within the Bitcoin DeFi space.

Conclusion

Looking ahead, the Bitcoin DeFi ecosystem is poised for continued growth, driven by advancements in technology and increasing institutional interest. The development of more scalable Layer 2 solutions, enhanced interoperability, and the introduction of more complex financial products will be critical to this expansion. As the ecosystem matures, opportunities in yield-generating products, decentralized exchanges, and institutional-grade DeFi services are expected to attract significant attention and capital.

However, this growth will be accompanied by challenges, particularly in navigating the evolving regulatory landscape and overcoming technical hurdles related to scalability and security. Addressing these challenges will be essential for sustaining the momentum of Bitcoin DeFi and ensuring its long-term success.

In conclusion, the future of Bitcoin DeFi looks promising, with substantial opportunities for innovation and growth. As the ecosystem continues to evolve, it has the potential to significantly alter the broader DeFi landscape, positioning Bitcoin as a central player in decentralized finance.

About

CoinMarketCap

CoinMarketCap is the world's most-referenced price-tracking website for crypto assets in the rapidly growing cryptocurrency space.
Its mission is to make crypto discoverable and efficient globally by empowering retail users with unbiased, high quality and accurate information for drawing their own informed conclusions.

CoinMarketCap Research aims to leverage CMC's data analysis and bring unique insights into the crypto market. We look to collaborate with other industry-leading voices and create a platform for people to learn and share their passion for crypto.

Footprint Analytics

Footprint Analytics is a comprehensive blockchain data analytics platform that simplifies complex analysis for businesses and projects in the Web3 ecosystem. It offers tailored solutions that eliminate the need for extensive expertise and infrastructure maintenance. The platform provides long-term growth tools designed to help build and manage communities step by step, emphasizing sustainable growth and user loyalty. By combining powerful analytics with community management tools, Footprint Analytics enables projects to leverage blockchain data effectively for decision-making and growth strategies across various sectors including GameFi, NFT, and DeFi.

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