tenderly

EVM Network Landscape Report

A 2023 overview of L2s and appchains

→ Chapter 01

Executive summary

Ethereum Mainnet is the primary production network in the blockchain ecosystem, with almost $29B in TVL.[1] However, the increased on-chain activity also brings challenges such as network congestion, higher gas fees, and, most pressingly, the issue of network capacity.

Therefore, as the ecosystem continues to evolve and new applications arise, scaling Ethereum becomes essential for further innovation. While different Mainnet improvements, such as the proto-danksharding update included in the Dencun upgrade, aim at addressing Ethereum scalability to some extent, alternative, multichain solutions have emerged as a more promising way to scale Ethereum.

With great efforts to develop optimistic and zero-knowledge rollup solutions, an increasing number of L2 networks and application-specific blockchains (appchains) have gained momentum in the current Ethereum landscape, leading to more EVM-based networks being launched than ever.

[1] https://defillama.com/chain/Ethereum

The current state of the EVM network landscape

Several indicators signal a greater focus on and steady transition to L2s and appchains, and Ethereum itself states this as its expected growth strategy.

Gas price trends

With increasing on-chain activity, the price of gas on Ethereum has shown major fluctuations. It has steadily increased accompanied by major spikes over time, especially since 2020 as the popularity of blockchain development grew.

However, the gas price has been slightly declining and reaching a steady rate since mid-2022. While the impact of the bear market cannot be denied, this trend can also be attributed to the increasing popularity of L2 solutions leading to less congestion and, therefore, lower gas prices on Ethereum.[2]

The low price of gas on Ethereum correlates with a high number of transactions on L2 networks. Additionally, the gas spent on L1 data fees has also seen major spikes recently due to the high number of L2 transactions.[3]

EVM equivalence standardization

L2 solutions have different levels of EVM equivalence that determine their implementations and performance. EVM equivalence also has a major impact on tooling portability and support for different ecosystem and application-specific networks in a multichain environment.

Efforts to standardize EVM types are still in the early stages, but they will significantly facilitate tooling support on different scaling solutions. With clear standards, tooling and infrastructure providers can ensure reliable and consistent performance across various chains running on top of different EVM types.

Such standardization would also enable the repurposing of Web3 tools on different networks, supporting the adoption of not only new chains but also blockchain technology in the long run.

New rollup launches and L1 to L2 transitions

With Optimism, Polygon, and Avalanche offering ready-made solutions, launching new L2s and rollups has become significantly easier. This trend is also visible in the increasing number of Rollup-as-a-Service providers, enabling easy deployment, customization, and integration of new rollup solutions.

Additionally, a certain number of L1 networks are also transitioning to L2 solutions

[2] https://etherscan.io/chart/gasprice
[3] https://dune.com/cryptokoryo/ecosystems

on Ethereum. This shift is happening due to the increasing need for shared tools and liquidity.

Why a multichain future is the way forward

Multichain solutions, such as L2s and appchains, expand the capabilities of a single network and open new possibilities for innovation and blockchain adoption. Aside from addressing immediate scalability challenges and the blockchain trilemma, a multichain environment supports a sustainable blockchain ecosystem as a whole.

An ecosystem of independent, yet interconnected networks introduces the following benefits:

- **Ensuring long-term Ethereum scalability:** Scaling a single Ethereum network infinitely is impossible and ultimately leads to facing the blockchain trilemma. With multichain solutions in place, on-chain activity can be distributed across different networks, relieving the load off of Ethereum while maintaining security and decentralization.

- **Establishing greater ecosystem resilience and efficiency:** Instead of relying on a single dominant production network, a multichain environment is characterized by multiple self-governed, efficient networks that can seamlessly co-exist. Such a robust system of distributed activity increases the resilience and efficiency of the blockchain ecosystem while mitigating the effects of potential security risks.

- **Fostering growth and innovation:** A multichain ecosystem benefits both developers and end users, speeding up transaction execution and minimizing gas fees. Additionally, appchain development allows innovators to build specialized solutions and dapps, addressing the unique needs and challenges of their users. Finally, as the blockchain industry continues to evolve, Web2 and Web3 companies will require scalable networks they can easily launch and customize to meet their specific requirements.

- **Supporting the overall blockchain vision**: Decentralization is one of the pillars of blockchain technology, and this vision transcends the underlying infrastructure. Nurturing the growth of a multichain ecosystem supports network diversity and removes overreliance on a single network as a dominant source of on-chain activity.

Report overview

The 2023 EVM Network Landscape Report outlines key data showing the increasing on-chain activity on the following ecosystem networks: Optimism, Arbitrum, Polygon, BNB Chain, Avalanche, and Base. Based on data for different chain-specific use cases, these five networks have been identified as the leading scaling solutions with growing and thriving ecosystems.

The report further explores the most widely used technology stacks for building L2 and appchain solutions, including the OP Stack, Polygon zkEVM, and Avalanche Subnets. These essential stacks are the underlying technologies behind many other L2 networks and application-specific blockchains.

Finally, the report compares and outlines the availability of commonly used Web3 tools and infrastructure components on these networks. Tooling availability is one of the key indicators of a growing network ecosystem required to accommodate the needs of the developer community.

Report goals

The 2023 EVM Network Landscape Report analyzes the current trends of on-chain activity in the EVM network ecosystem. It aims to show the increasing on-chain activity on L2 solutions and appchains that indicates a developing multichain system.

Additionally, the report gathers comprehensive information on the availability of different tools and infrastructure components that support the leading L2 networks and technology stacks. Aside from this information signaling a growing ecosystem on these networks, it can also serve as a resource for developers looking to spin up their scaling solutions or expand their dapp development to new chains.

Finally, as a valuable resource for network and dapp developers, the report can also contribute to Web3 standardization, facilitating the launches of scaling solutions and innovative applications. Such standardization becomes even more important as the blockchain continues to move toward a multichain future.

Criteria and methodology

When evaluating the current landscape of EVM networks in the multichain environment, we considered a few different factors. Aside from analyzing on-chain activity and metrics such as TVL, transaction costs, gas consumption, daily active addresses, and others, we also considered the use cases of each network.

Since not all blockchains target the same total addressable market, we evaluated the top three metrics for each selected network. The analysis provided insights into the strengths of each network and their corresponding use cases.

In the current space of growing numbers of L2s built on different technologies, it

makes little sense to treat these solutions as all being general-purpose ecosystems. In many cases, they are used for a specific purpose either based on the core technology they are built on or by their business development approach. For example, this is the case with Base which is built using Optimism's OP Stack. After selecting the networks that show growth in different aspects of on-chain activity, we collected data on the available tools and infrastructure components on these networks. We considered tooling providers with widespread presence across different chains.

Key report findings and final thoughts

The 2023 EVM Network Landscape Report shows a significant increase in the number of L2 and appchain solutions, as well as in on-chain activity. Additionally, based on the evaluation of developer tooling and infrastructure availability, there's a clear correlation between the available support and the developing ecosystems on the listed chains.

This finding indicates that a wide range of tooling and infrastructure vendors keep extending their services to some of the most used networks in the ecosystem. This signals an increase in the importance of multichain solutions as a growing number of providers strive to establish their presence on ecosystem networks and appchains.

However, the lack of some providers' tooling support on specific networks is also evident in the report. Two possible reasons lie behind this:

- **Technological incompatibility** makes integration of some stacks more difficult and requires significant effort and investment on the part of the provider.

  For instance, Polygon PoS and Polygon zkEVM are different types of technology. Therefore, providers with diverse tech stacks, such as these two, in their portfolios have to deal with greater inconsistencies when it comes to ensuring tooling availability on different chains.

- **No business models** that accommodate the specific requirements of the still-young multichain system or accurately gauge the costs of network integration.

Finally, while Ethereum TVL surpasses TVL on individual networks, the aggregate value of L2 TVL is significant. The growing number of projects on different L2 solutions and appchains inevitably leads to TVL fragmentation between networks, but still amounts to figures greater than on Ethereum.

Legal disclaimer

This report contains data that is for informational purposes only and is not intended to provide financial or legal advice. The information is based on our internal sources and network analysis. However, it also contains information collected from publicly available resources for which we cannot guarantee completeness or accuracy. We strongly advise you to conduct your analysis and research as this report does not assure any future results or performance.

→ Chapter 02

The leading ecosystem networks

Scalability is a fundamental challenge and a paramount objective for blockchain technology, particularly for networks such as Ethereum that support a vast array of decentralized applications, smart contracts, and a continuously growing user base.

The ability of a blockchain network to efficiently handle an increasing volume of transactions is crucial for its long-term viability and success. As the number of users and the complexity of applications on a blockchain grow, the demands on the network's throughput, transaction speed, and cost efficiency escalate significantly.

The following ecosystem networks play a crucial role in scaling Ethereum, supporting the ecosystem growth, and meeting developers' and end users' needs in distinct ways.

Optimism

Optimism is a scalable L2 solution built using optimistic rollups, with around $800M in TVL.[4] It supports many existing Ethereum smart contracts and tools, greatly facilitating dapp development and deployment.

Additionally, thanks to rollup technology, Optimism offers low transaction costs and fast execution times. As an L2 solution, the chain relies on the Ethereum consensus mechanism for security.

A multichain future is part of Optimism's vision. By enabling the deployment of new L2s and appchains using their OP Stack, Optimism strives to facilitate Ethereum scaling. Their end goal is to enable seamless communication and composability of OP Stack-powered solutions as a single Optimism Superchain.

Optimism Superchain is a unified network of individual, scalable chains built on the OP Stack codebase. By sharing a communication layer and security, the Superchain networks will help overcome fragmentation while still maintaining a high level of interoperability and composability.

The performance efficiency of Optimism

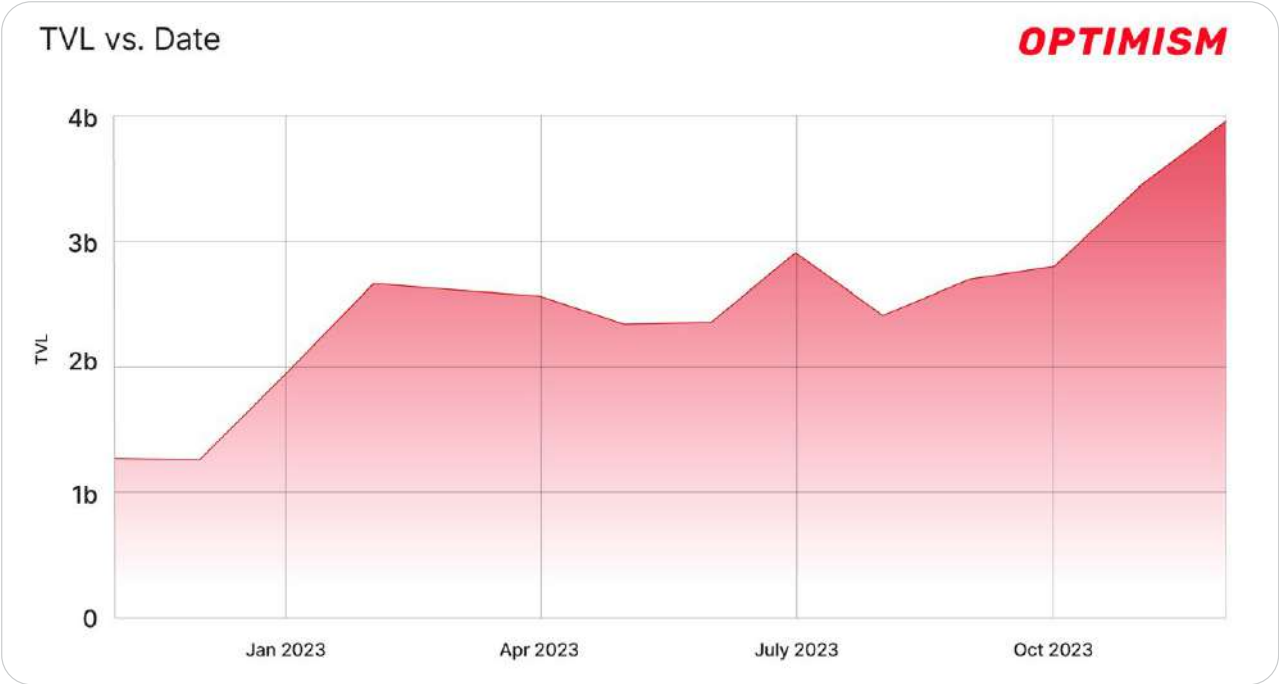
Optimism, leveraging optimistic rollups, represents a significant stride in addressing Ethereum's scalability challenges. By processing transactions off the main Ethereum chain and subsequently recording them on it, Optimism enhances the network's capacity to handle a larger number of transactions more efficiently and at a lower cost.

Optimism's approach not only alleviates congestion on Ethereum Mainnet but also offers the following advantages:

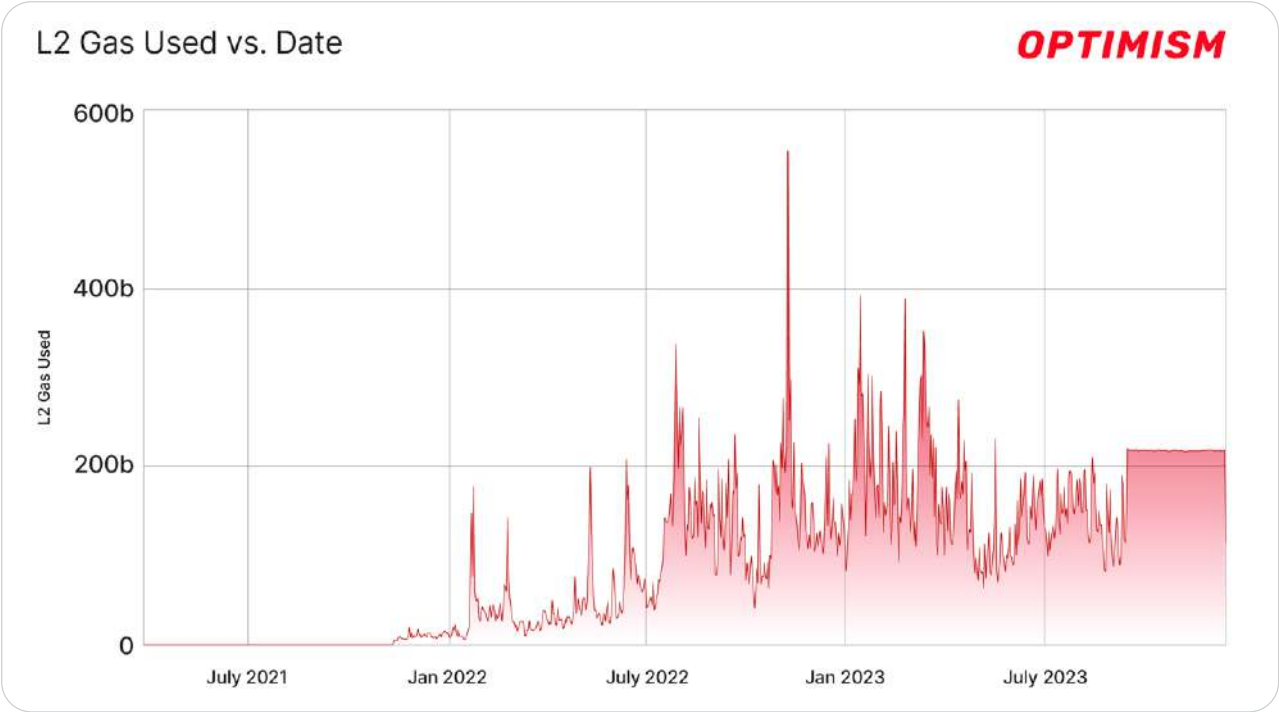
Total Value Locked (TVL): Optimism's TVL has seen a remarkable increase, soaring from just below one billion dollars to approximately four billion dollars in just over a year. This substantial growth in TVL indicates a growing trust in the network and

[4] https://defillama.com/chain/Optimism

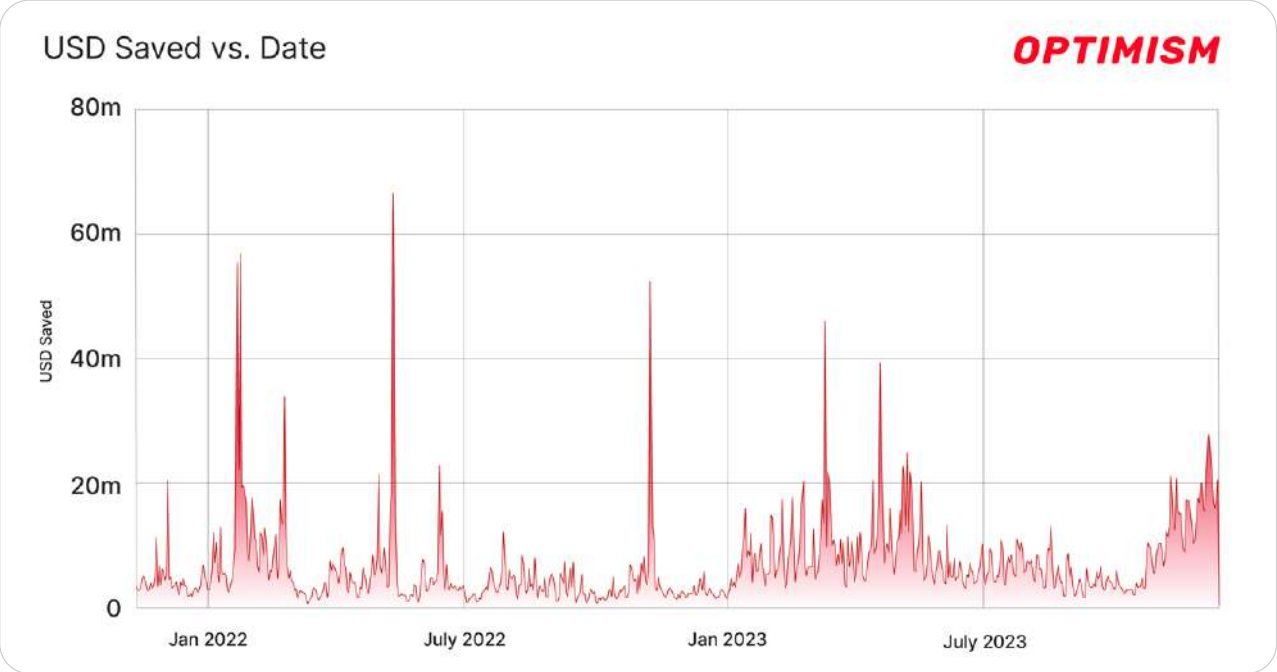
an increase in the amount of assets managed on the chain. Such a spike reflects the network's expanding utility and adoption within the decentralized finance (DeFi) space.



Gas consumption: The consistent increase in gas consumption on Optimism points to the growing complexity and volume of transactions being processed on the network. This trend suggests that users and developers are actively engaging with more sophisticated applications on Optimism, leveraging its scalability benefits. The rise in gas consumption is a direct indicator of the network's capability to handle a high volume of complex transactions efficiently.



Cost savings: One of Optimism's most significant impacts is the considerable cost savings it offers. By processing transactions on Optimism instead of Ethereum Mainnet, users have saved an impressive 20 million dollars per day in the last month. This figure highlights the economic efficiency of using Optimism, especially in terms of reduced transaction fees compared to those on Ethereum. The cost-effectiveness of Optimism makes it suitable for users seeking to execute transactions more affordably.



Arbitrum

Arbitrum One and Arbitrum Nova are two popular chains from the Arbitrum ecosystem. Thanks to Arbitrum Nitro, a technical stack enabling scalability, Arbitrum features improved Ethereum compatibility, increased transaction throughputs, and reduced transaction costs across its chains.

Featuring a bridge that facilitates fund transfers between Arbitrum chains and Ethereum and support for different applications, including DeFi, on-ramps and bridges, NFTs, and gaming, Arbitrum enables developers to build solutions optimized for their users.

Additionally, with the Stylus upgrade, Arbitrum will greatly facilitate dapp development by enabling the use of familiar Web2 languages on its L2 solutions. Arbitrum Stylus can have a major impact on the growth of the developer community on the Arbitrum chains, further enabling multichain ecosystem development.

With Arbitrum Orbit, a system of interconnected networks, developers can launch their own chains and customize them for specific use cases. Relying on Arbitrum Rollups and the Nitro tech stack, Orbit is Arbitrum's step toward the multichain future and scaling Ethereum with rollup technology.

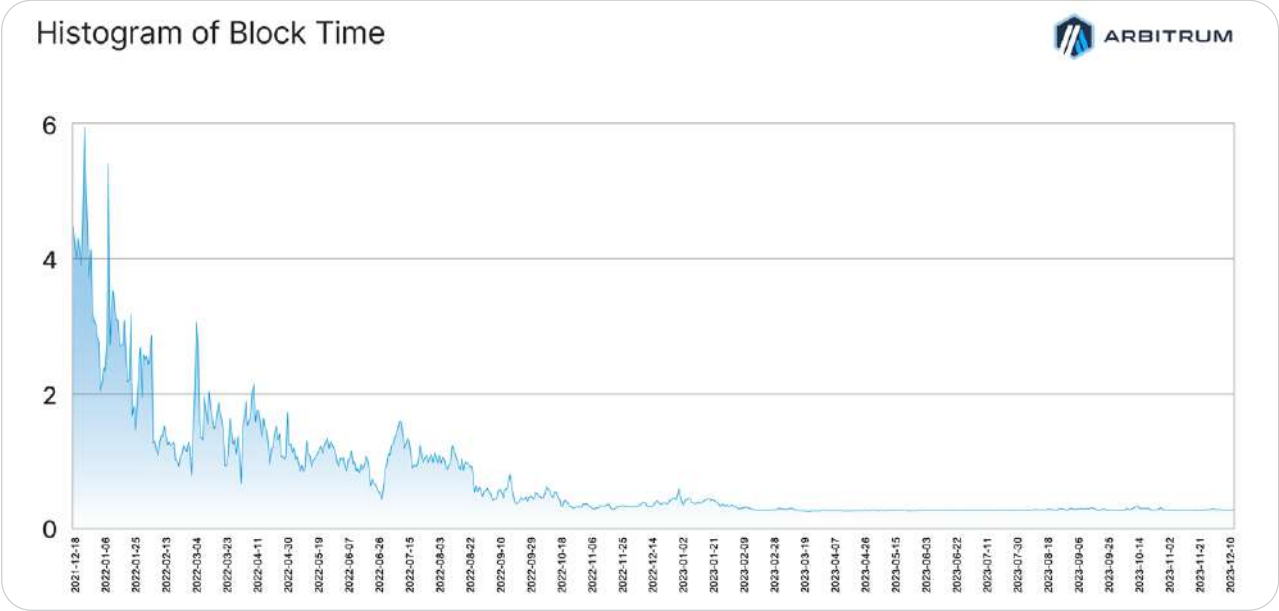
Arbitrum's integral role in scaling Ethereum

Arbitrum has emerged as another essential solution for scaling the Ethereum network. Thanks to the use of optimistic rollups, this L2 chain enables faster, more efficient transactions, facilitating broader adoption and more sophisticated applications in the blockchain industry.

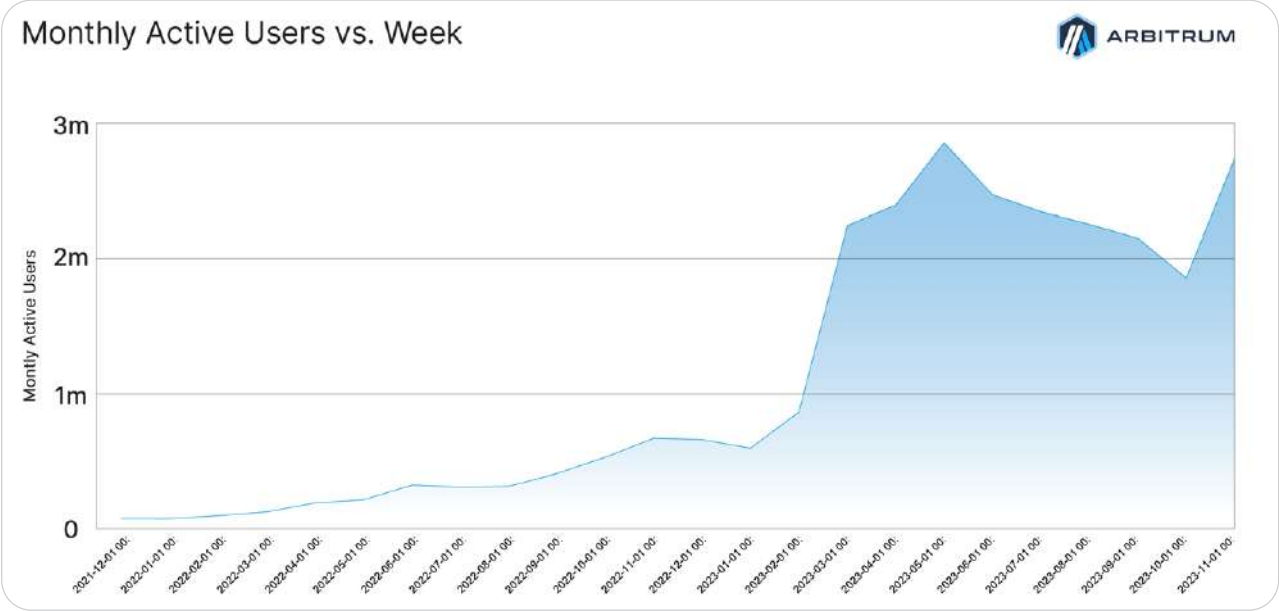
Some of the advantages of the Arbitrum chain include the following:

Fast block time of 250ms: Arbitrum's extremely fast block time of 250 milliseconds significantly accelerates transaction processing, making it comparable to traditional Web2 experiences.

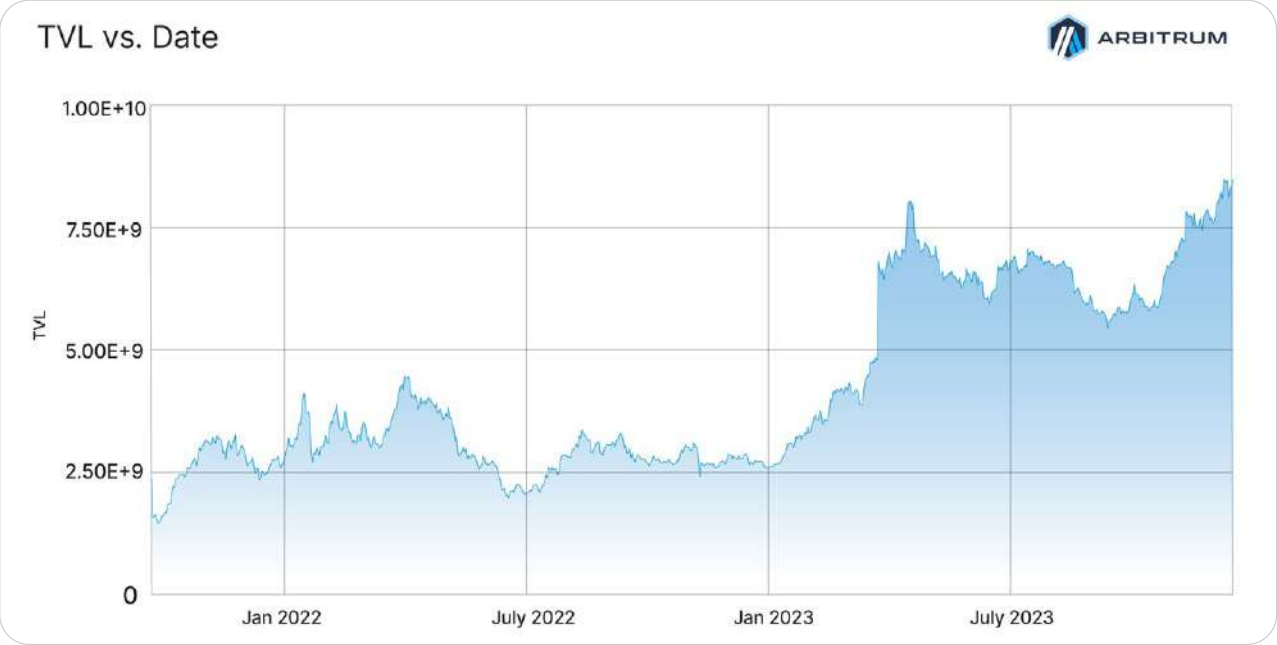
Such fast block time is crucial for real-time applications, offering users a seamless and responsive experience vital for the adoption of blockchain technology in mainstream applications.



Significant growth in MAU: Arbitrum's monthly active users have increased by 8 times over one year. This metric indicates the growing popularity and trust in Arbitrum's capabilities. However, this eightfold increase also points to a healthy, vibrant ecosystem that is attracting a diverse range of participants.



Robust Total Value Locked (TVL): Arbitrum's TVL incorporates native currencies as well as assets bridged from other networks. The continuous and significant TVL growth signifies a strong and liquid market presence, indicating the confidence of investors and users in Arbitrum. A rising TVL is also indicative of a thriving ecosystem, demonstrating Arbitrum's capacity to support a wide array of dapps and financial protocols.



Arbitrum has had a major impact on the Ethereum ecosystem primarily due to its ability to significantly enhance scalability. The network's rapid block time, growing active user base, and increasing TVL are clear indicators of its effectiveness and potential. These metrics not only showcase Arbitrum's technical focus but also its vital role in fostering the next generation of blockchain applications.

"Project infrastructure has advanced significantly and has been a major reason we've seen the entry and growth of many notable projects in the Arbitrum ecosystem. As the refinement of infra and tooling continues, we'll see more and more players become involved in the space and ultimately drive further adoption of blockchain technologies." – Nina Rong, Head of Ecosystem at Arbitrum Foundation

Polygon

Polygon PoS is a scaling solution that offers near-zero gas fees, two-second block times, and fast transaction execution. It supports a wide range of existing Ethereum tools and a growing builder community. Thanks to its low fees, account abstraction adoption, and ongoing focus on technical innovation, Polygon is one of the user-friendliest chains in the ecosystem.

The network is a hybrid plasma Proof-of-Stake Ethereum sidechain. However, a transition to a zk-based validium is part of an ongoing discussion in the Polygon community. The transition would bring an inherent interoperability layer and a network of inter-connected zk-based L2 chains.

The underlying vision for the transition and the overall Polygon ecosystem is a unified multichain future with zero-knowledge technology at its core. Polygon zkEVM and its CDK already enable developers to launch application-specific chains. While Polygon also allows developers to use Polygon CDK to launch Validium-based appchains, zkEVM is currently a more commonly used scaling solution.

It is important to note that Polygon is an ecosystem of solutions, so there is a difference between the Polygon PoS chain technology stack and the technologies that are a part of Polygon CDK such as zkEVM. This difference leads to inconsistencies in tooling support, although Polygon's ecosystem is more robust and versatile because of this.

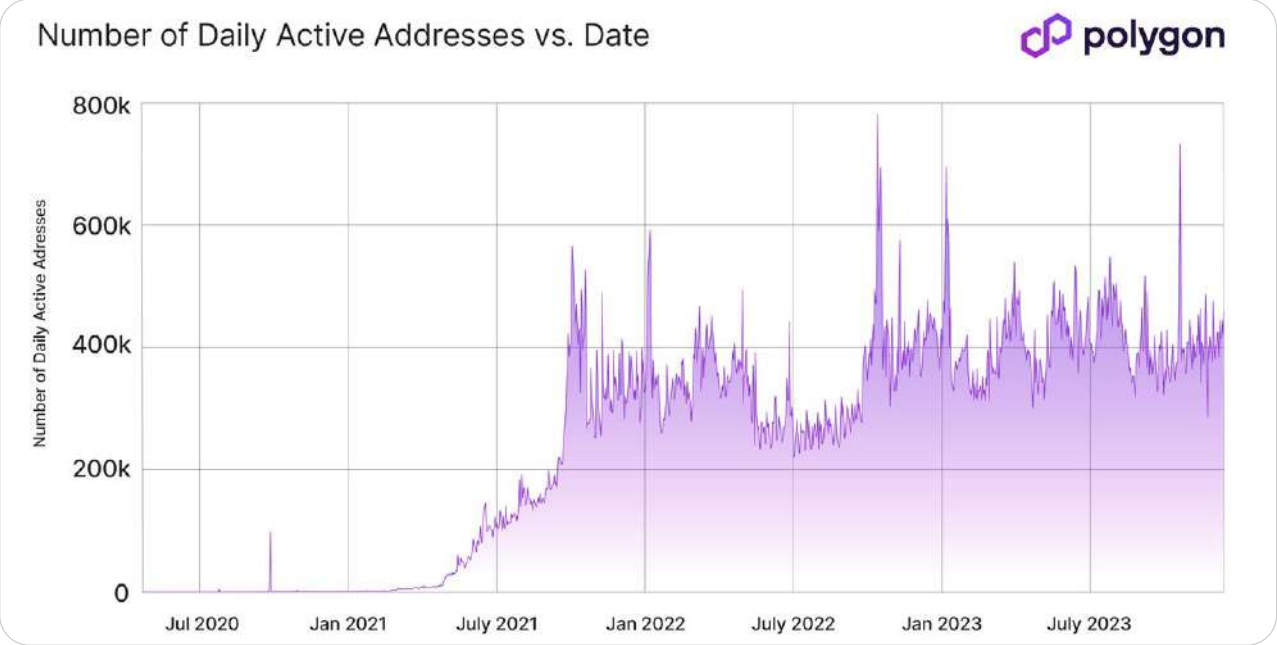
The user-friendliness of Polygon

Polygon has been making significant strides in enhancing user experience on its network, with a focus on ease of use, cost-effectiveness, and technical innovations. With over 100 decentralized applications and service providers, it has created a thriving ecosystem. This widespread adoption is a testament to the network's focus on creating an environment beneficial for both developers and end users. Its position as one of the leading ecosystem networks is further solidified by its impressive TVL growth to $854.11M.[5]

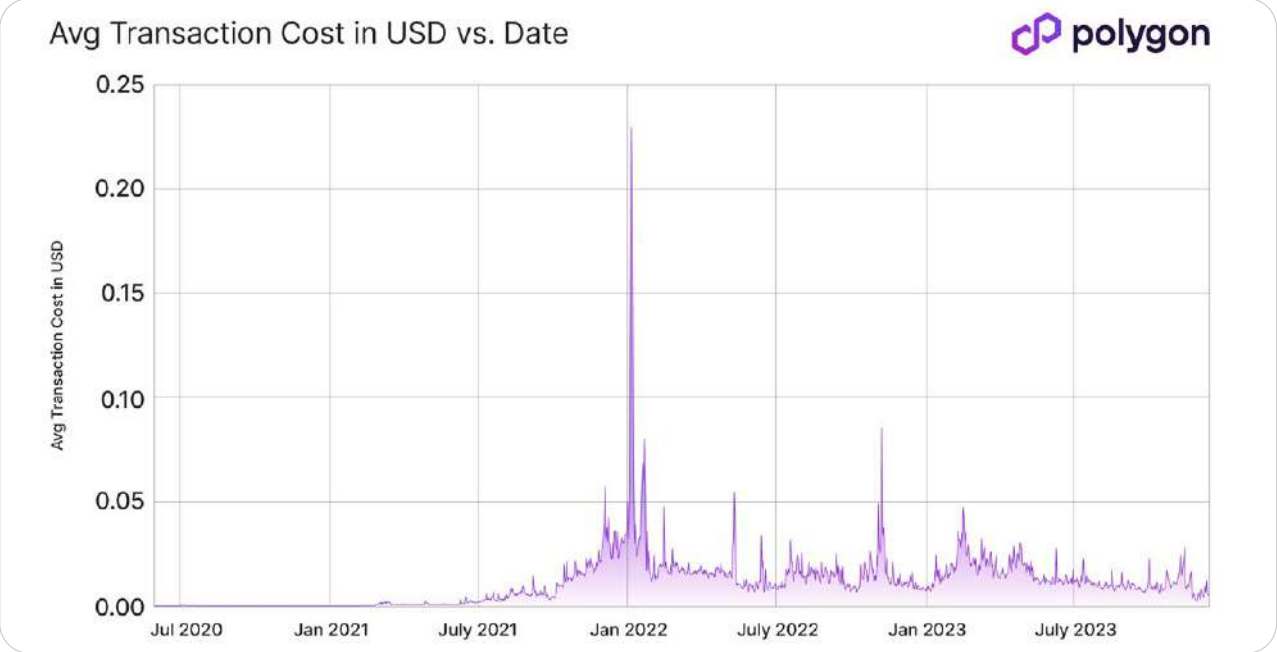
[5] https://defillama.com/chain/Polygon

This is evident in several areas:

Daily active addresses: Polygon's network activity indicates its high user engagement. Regular updates, technical improvements, and a focus on user-centric features contribute to maintaining and growing its active user base. The network has been consistently improving its infrastructure to handle a high volume of transactions, catering to a diverse range of applications from gaming to DeFi.

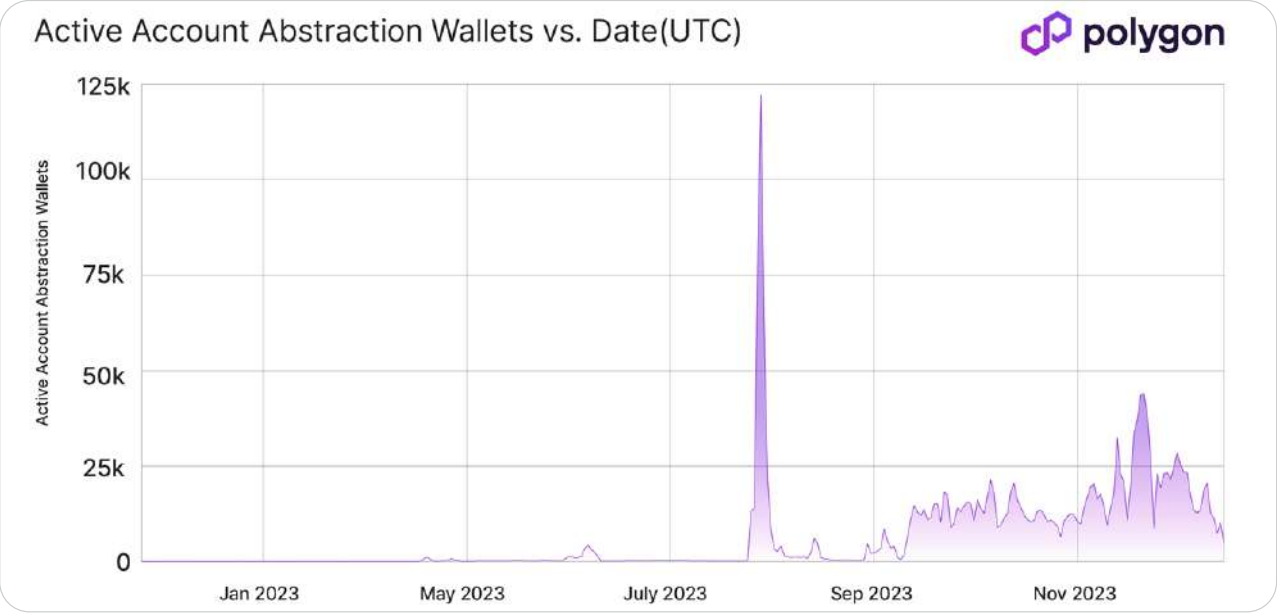


Transaction costs: One of the key advantages of Polygon is its cost-effectiveness. The network has been successful in maintaining transaction costs significantly lower than other chains, often up to 10 times lower. This aspect is crucial for users and developers, especially in a market where high gas fees on networks like Ethereum can be a barrier to entry and usage.



Technical innovations – account abstraction (EIP-4337): Polygon's integration of EIP-4337 is a major step forward in enhancing user experience. EIP-4337, also known as account abstraction, allows for more flexible management of Ethereum accounts. It enables the creation of smart contract wallets, which can improve security, flexibility, and user-friendliness.

These wallets can support features like batch transactions, flexible security rules, account recovery without seed phrases, multi-factor authentication, and automatic payments. Importantly, EIP-4337 doesn't require alterations to the Ethereum core protocol, making it a favored approach within the community.



In summary, Polygon's focus on user experience is backed by its low transaction costs, technical innovations like the adoption of EIP-4337, a growing number of active users and transactions, and its ongoing efforts to enhance the network through community engagement and openness to innovation. These factors collectively contribute to Polygon's position as a user-friendly and efficient Layer 2 solution.

"During the 2021-2022 cycle, a lot of venture capital investment went into the infrastructure space. That influx of capital paved the way for a highly competitive landscape where tens of infrastructure providers are pushing the boundaries of blockchain usability and removing as many roadblocks as possible from developers' building journey.

These infrastructure providers tend to start their journey on Ethereum but very quickly make their way to the Polygon ecosystem, which provides them with a substantial developer base coupled with cheap transaction fees. For example, the Polygon Pos chain has established itself as the go-to chain for account abstraction providers. Thanks to the prevalence of such cutting-edge infrastructure providers supporting Polygon protocols, developers are empowered to build real-life use cases that drive adoption." - Osman Sarman, Polygon Labs Enablement Team

BNB Chain

Build N Build (BNB) Chain is a network consisting of several chains designed for specific purposes. While BNB Beacon Chain is a layer intended for staking, voting, and governance, BNB Smart Chain is intended for dapp development.

BNB Smart Chain is based on the Proof-of-Authority consensus mechanism. It's EVM compatible, bringing easy Ethereum tool portability, with hubs to multichain networks. The chain also boasts fast block finality, native interoperability, and programmability functionalities.

zkBNB and opBNB are also components of the BNB Chain ecosystem, both of which are focused on scaling BNB Smart Chain. While based on different types of rollup technology, zkBNB and opBNB handle transactions off-chain, bundle them together, and submit them to BNB Smart Chain.

These BNB scaling solutions help reduce the cost of transaction execution and increase transaction throughputs on BNB Smart Chain. However, this difference also leads to the same issue of different tools being supported on different BNB network types, decreasing developer portability.

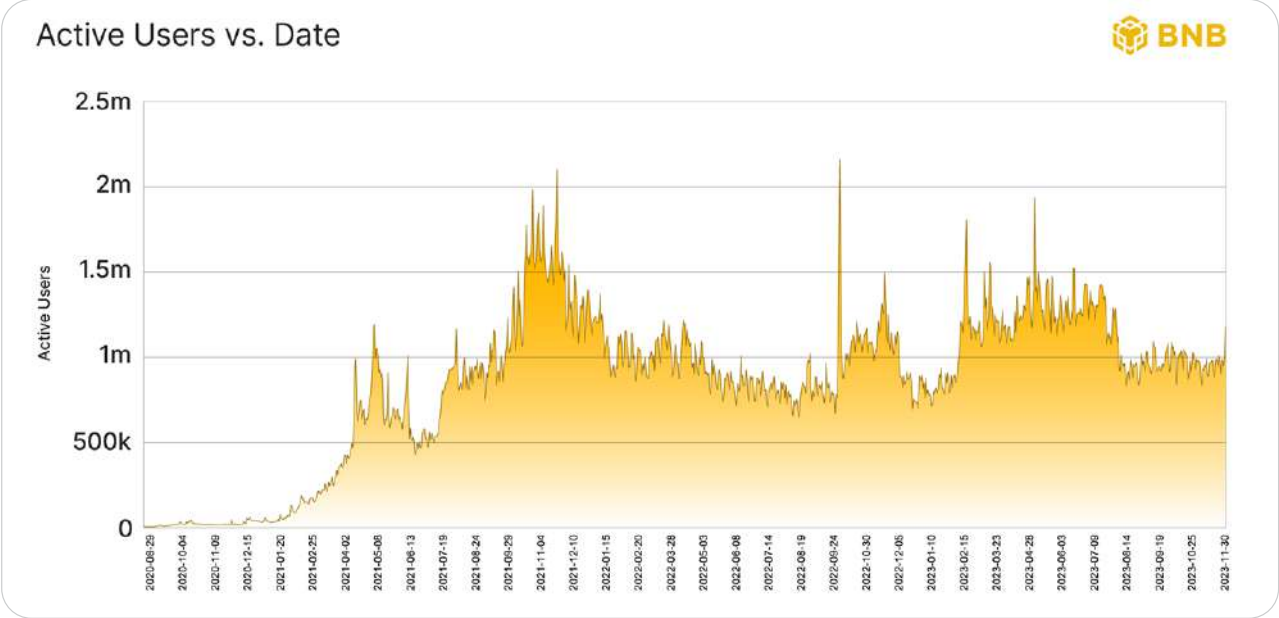
Finally, BNB Greenfield is a decentralized data storage network for the BNB Smart Chain. Built on two separate layers, BNB Greenfield facilitates the access to and management of on-chain data, with the ultimate goal of transforming the data economy in Web3.

BNB Chain's capacity for high-volume activity

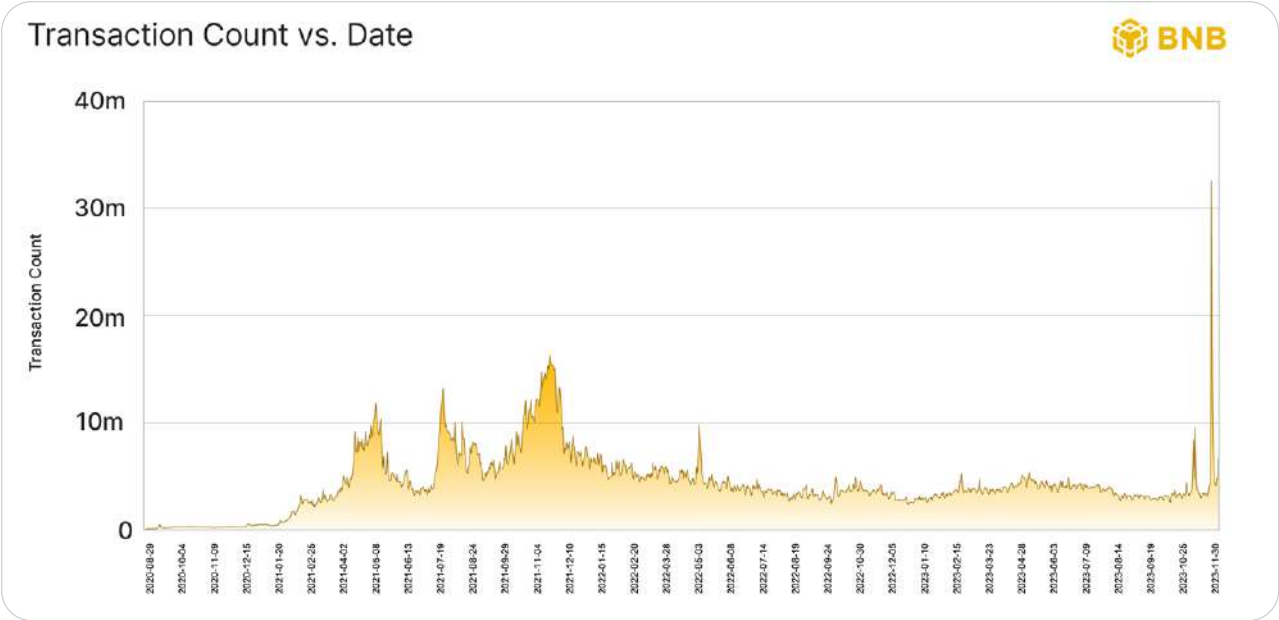
BNB Chain can handle high-volume on-chain activities, such as processing a high throughput of transactions. Several key metrics reflect its performance and user engagement:

High number of active wallets: The BNB Chain has a significant capacity for user engagement, with daily active wallets peaking at over 2 million. Over the past few

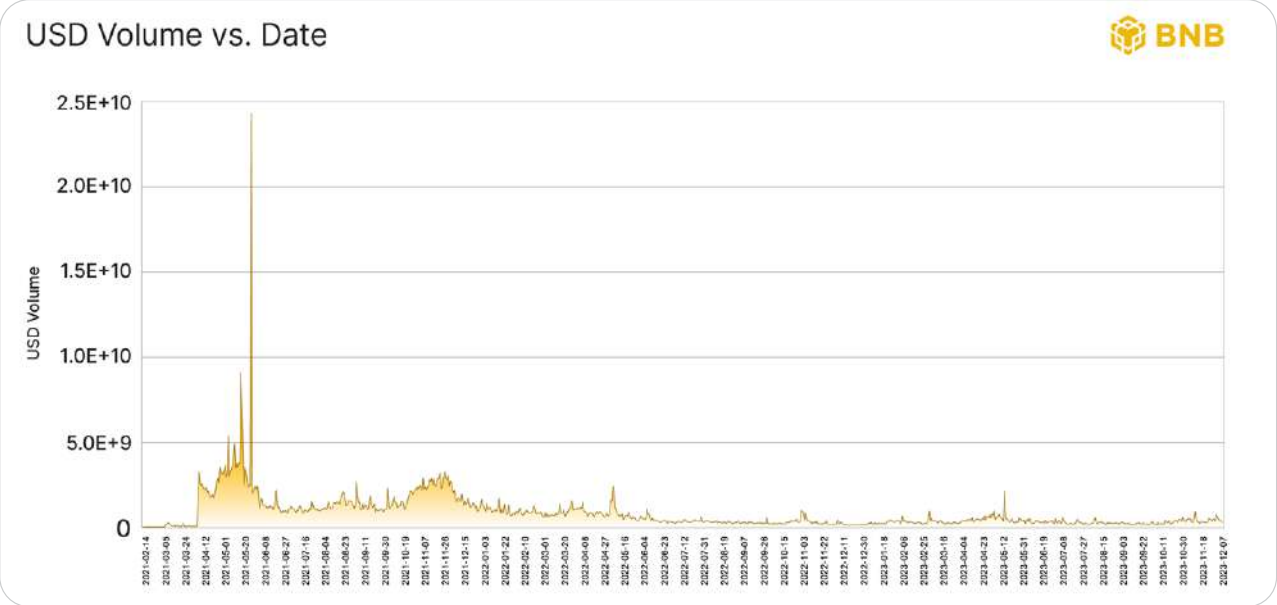
months, the network has consistently averaged around 1 million active daily users. This significant level of active participation indicates a thriving ecosystem that successfully caters to a large and diverse user base.



Capability for high transaction volume: Recently, the BNB Chain reached a milestone of over 32 million transactions in a single day. Such a high transaction count indicates the network's robust infrastructure, supporting a vast number of transactions efficiently. Additionally, this metric also demonstrates its scalability and ability to handle large volumes of activity without compromising performance.



Growing DEX volume: The volume of decentralized exchanges (DEXs) within the BNB Chain has been experiencing growth recently. This increase in DEX volume reflects not only the growing interest and trust in DeFi services but also the network's capacity to support high-volume, complex financial activities. The rise in DEX activity is a positive sign of the network's health and its appeal to both traders and developers in the DeFi space.



Avalanche

Avalanche is a network of separate chains with near-instant transaction finality, relying on the Avalanche consensus mechanism. The Avalanche ecosystem consists of Avalanche Mainnet, the production-ready primary network for smart contract and transaction execution, and its subnets, independent sub-networks.

The primary network runs three independent chains: C-Chain, P-Chain, and X-Chain. Each of these chains has its dedicated purpose. The C-Chain handles smart contract deployment and execution, P-Chain validator and Subnet operations, and X-Chain digital smart asset operations.

To support Ethereum and ecosystem scalability, Avalanche enables developers to create their appchains using Avalanche Subnets, addressing the specific use cases of their users.

The integrative role of Avalanche

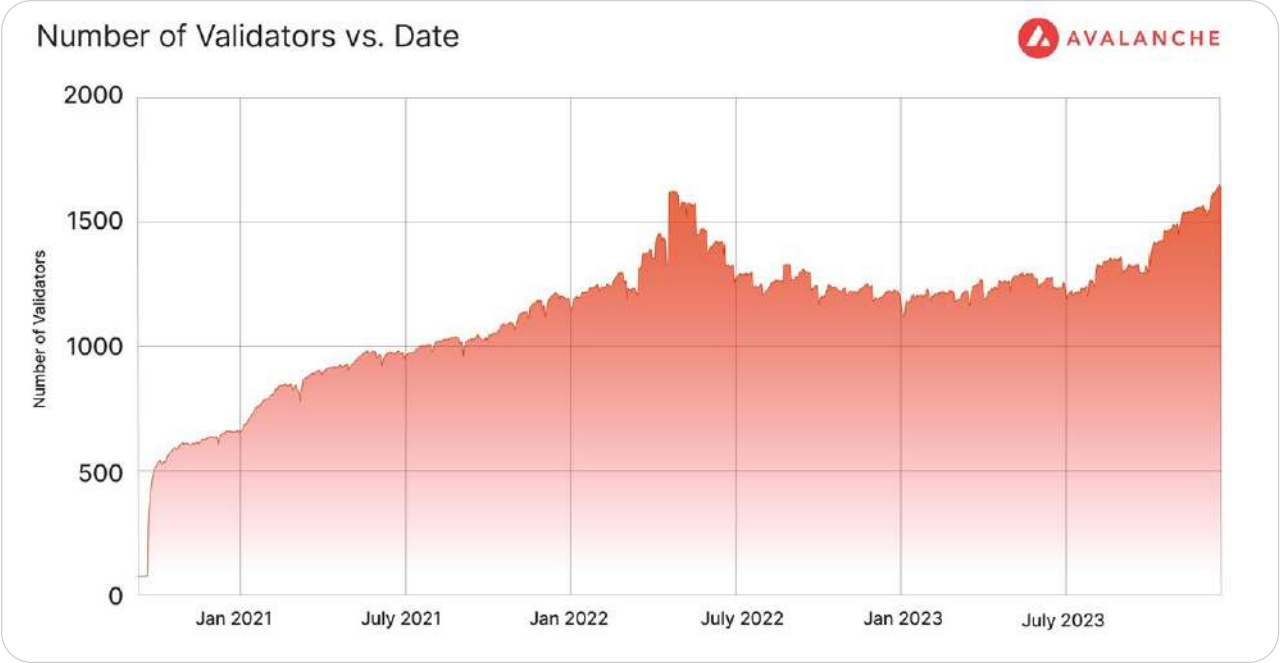
Avalanche has emerged as an integrative network that plays an important role in aiding Web2 companies in their transition to Web3 technologies. The network appeals to a broad spectrum of users, including traditional enterprises.

Additionally, Avalanche's framework and performance metrics throughout the year indicate a blockchain that's growing in technical capacity. It has shown significant growth in its infrastructure and network activity, marking its position as a facilitator for businesses transitioning into the decentralized space.

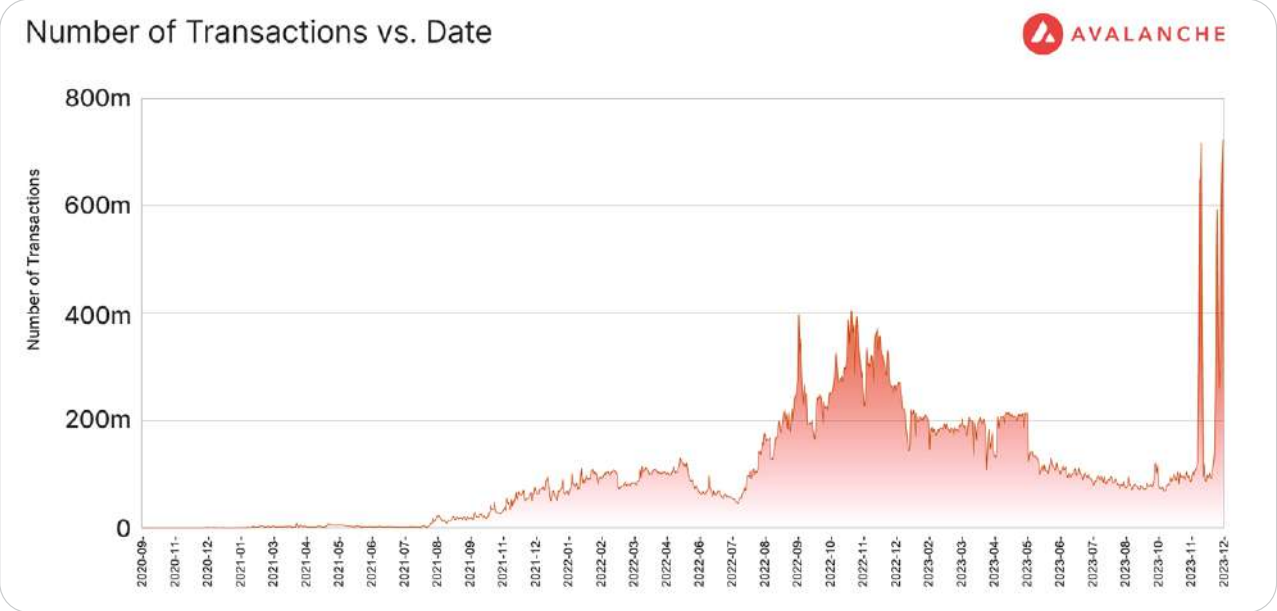
Here are a few highlights that summarize Avalanche's progress:

Increase in block processing: Avalanche has seen a 2.5x increase in the number of processed blocks over the year. This significant rise indicates a higher network usage and demand, reflecting an expanding ecosystem and greater adoption.

Growth in validator participation: The network has experienced a notable increase in the number of active validators participating in its consensus mechanism. This growth is not just a sign of the network's enhanced security and decentralization, but it also signifies growing trust and investment in the platform's stability and future.



Transaction throughput: There has been a substantial increase in transaction throughput, especially in the last month. This metric is crucial as it represents the network's ability to handle a high volume of transactions efficiently, a key factor for enterprises looking for scalable blockchain solutions.



These metrics collectively demonstrate Avalanche's robust and evolving infrastructure, making it a popular solution for companies looking to take advantage of the benefits of blockchain technology. Avalanche's ongoing developments and its focus on creating an environment suitable for both traditional businesses and innovative Web3 applications underscore its commitment to supporting blockchain integration and adoption..

Up and coming: Base

Despite being a fairly new solution, Base Network is an L2 ecosystem network built using the OP Stack that has gained much popularity in the developer community. The chain is EVM-compatible with low transaction fees, focusing on security, scalability, and stability.

Base is currently incubated by Coinbase, enabling the seamless integration of Coinbase products and easy access to its ecosystem. As an open-source, interoperable network, Base also strives to achieve decentralization in the coming years and bring global cryptoeconomy on-chain.

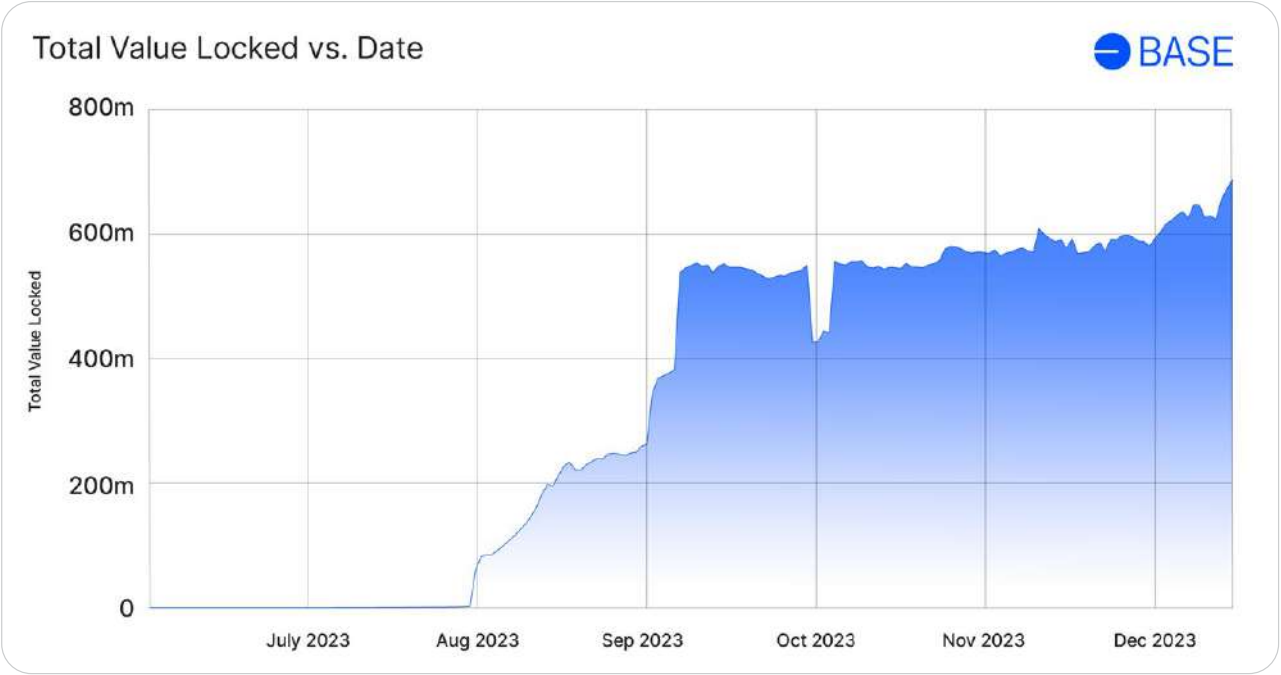
With its underlying technology relying on the OP Stack codebase, Base shares the multichain vision with Optimism. The network will be a part of the Optimism Superchain, a network of independent, yet composable and interoperable L2 solutions within a single ecosystem.

Base's emerging role in the L2 ecosystem

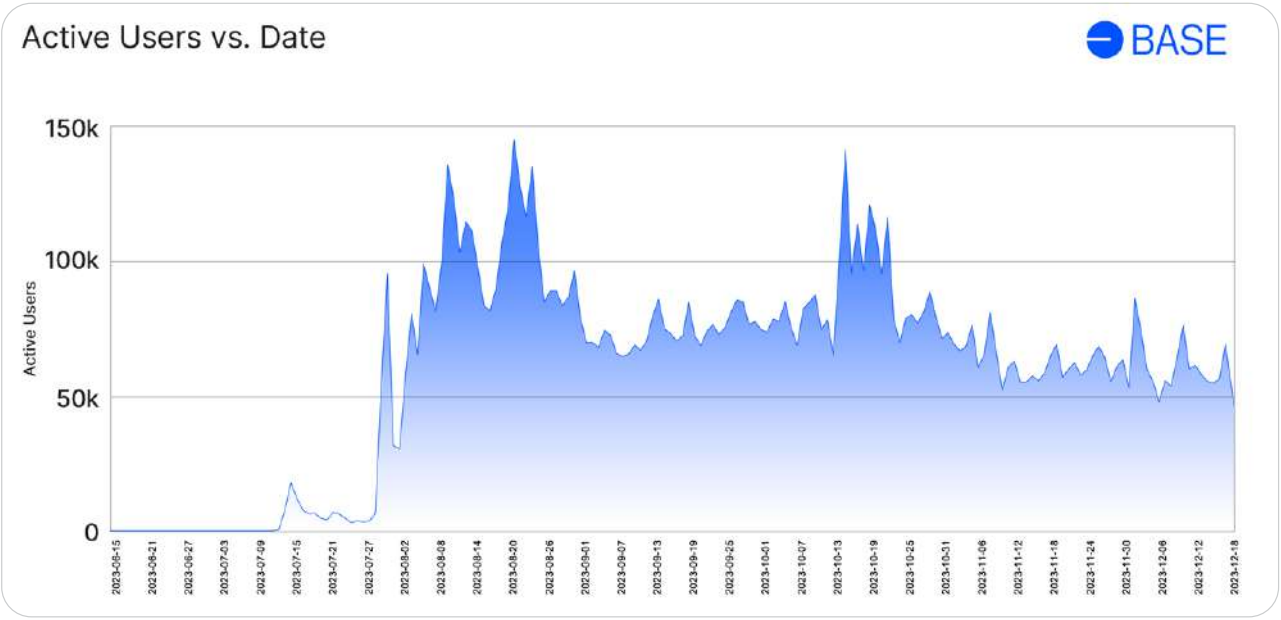
Base Network, a promising Ethereum-focused Layer 2 solution, has rapidly emerged as a significant player in the blockchain ecosystem. Its swift traction and robust development highlight its potential as a leading network in DeFi and the broader Web3 space.

Here are a few indicators of Base's significant growth:

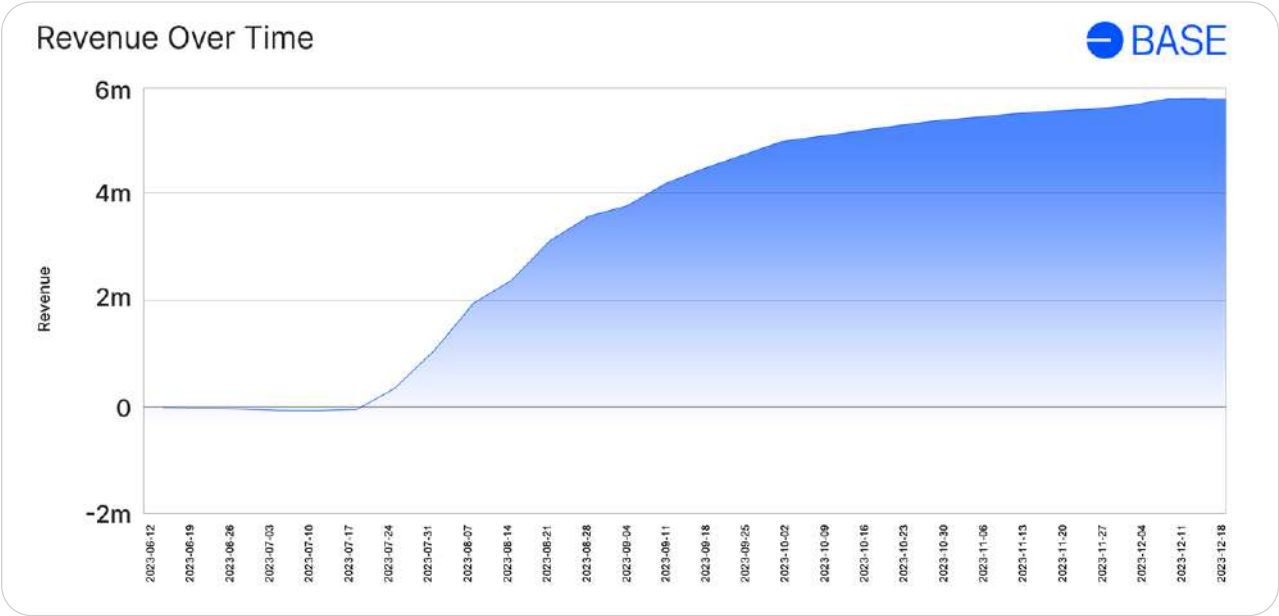
Total Value Locked (TVL): Base's TVL amounts to $705 million and shows a consistent upward trend. A high TVL is indicative of a substantial pool of assets being used in the network's ecosystem. In return, this points to strong market confidence and the network's capability to support a variety of decentralized applications and financial protocols.



User base retention: This metric reflects the platform's usability, features, and overall appeal. The steady influx of new users, coupled with high retention rates, demonstrates Base's ability to meet and adapt to user needs, contributing to its sustainability and long-term growth. This growing user base is an indication of the network's potential to expand and remain a key player in the industry.



Financial performance: With a profit margin of around 49% and a cumulative revenue exceeding $11 million, Base stands out as one of the most profitable networks. Aside from demonstrating the network's current success, these financial metrics also show its operational efficiency and the effectiveness of its business model. High profitability and substantial revenue are clear indicators of a well-implemented strategy.



In conclusion, Base Network's significant TVL, expanding and committed user base, along with its impressive financial health, highlight its status as an emerging leader in the Layer 2 landscape. The network's rapid growth, coupled with its effective operational strategies, positions it as one of the crucial players in Web3. As Base continues to evolve and expand its offerings, it shows great potential to shape the future of the industry.

→ Chapter 03

Tooling availability for the ecosystem networks

These ecosystem networks already have thriving developer communities, specific use cases, and a diverse set of tools in place. Seamless tooling availability and portability between these chains help overcome the fragmentation typical of blockchain development that's even more obvious in the multichain landscape.

With the same or at least a similar set of tools on these networks, dapp developers can navigate the multichain ecosystem more easily. Whether launching new products or porting existing dapps to a new chain, extensive tooling support facilitates innovation on these listed ecosystem networks.

Here's an overview of the tooling and infrastructure components with their support availability on the selected chains. The chart comes with an editable sheet that will be regularly updated to reflect the most recent industry data.

SHEET FOR ALL NETWORKS→

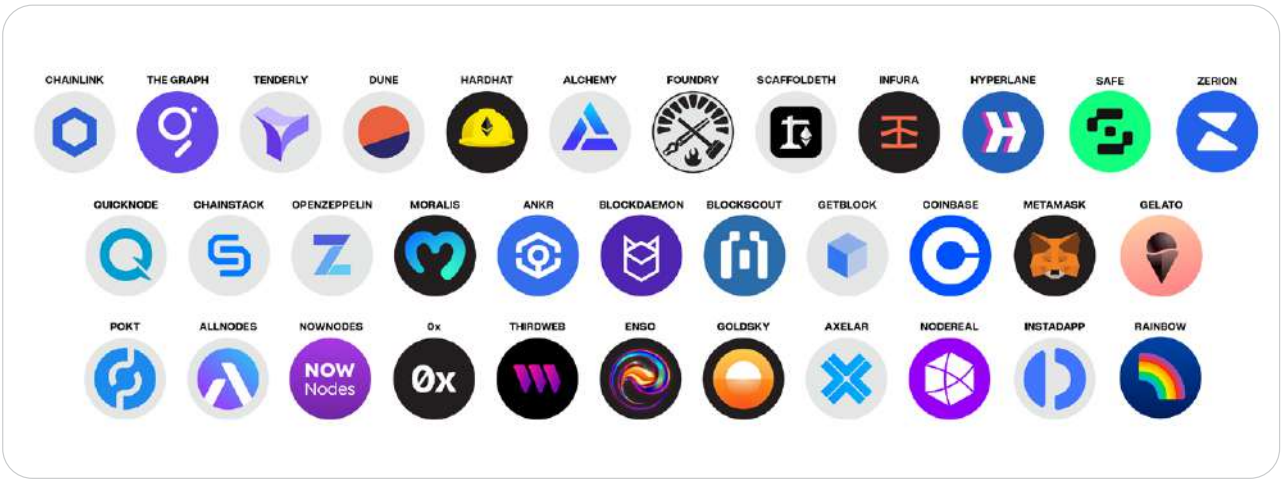
	OPTIMISM	ARBITRUM	polygon	AVALANCHE	BNB	BASE	OP STACK	polygon zkEVM	SUBNETS
CHAINLINK	●	●	●	●	●	●	●	●	×
THE GRAPH	●	●	●	●	●	●	×*	×*	×
TENDERLY	●	●	●	●	●	●	●	×	×
DUNE	●	●	●	●	●	●	●	●	×
HARDHAT	●	●	●	●	●	●	●	●	●
ALCHEMY	●	●	●	●	×	●	●	●	●
FOUNDRY	●	●	●	●	●	●	●	●	●
SCAFFOLDETH	●	●	●	●	●	●	●	●	●
INFURA	●	●	●	●	●	●**	●	×	×
QUICKNODE	●	●	●	●	●	●	×	●	×
CHAINSTACK	●	●	●	●	●	●	×	●	×
OPENZEPPELIN	●	●	●	●	●	●	●	●	×
MORALIS	●	●	●	●	●	●	×	×	×
ANKR	●	●	●	●	●	●	●	●	×
BLOCKDAEMON	●	×	●	●	●	●	●	×	×
BLOCKSCOUT	●	●	●	●	×	●	●	●	×
BLOCKJOY	×	●	×	●	●	×	×	●	×
GETBLOCK	●	●	●	●	●	●	●	×	×
POKT	●	●	●	●	●	×	×	●	×
ALLNODES	●	●	●	●	●	●	×	×	×
NOWNODES	●	●	●	●	●	●	●	×	×
0x	●	●	●	●	●	●	●	×	×
THIRDWEB	●	●	●	●	●	●	●	●	●
ENSO	●	●	●	●	●	●	×	×	×
GOLDSKY	●	●	●	●	●	●	●	●	×
AXELAR	●	●	●	●	●	●	●	×	×
NODEREAL	●	●	●	●	●	●	●	●	×
HYPERLANE	●	●	●	●	●	●	●	●	×
COINBASE	●	●	●	●	●	●	●	×	×
INSTADAPP	●	●	●	●	×	●	●	×	×
RAINBOW	●	●	●	×	●	●	●	×	×
METAMASK	●	●	●	●	●	●	●	●	●
SAFE	●	●	●	●	●	●	●	●	×
PHANTOM	×	×	●	×	×	×	×	×	×
ZERION	●	●	●	●	●	●	●	×	×
GELATO	●	●	●	●	●	●	●	●	×

* Coverage was determined based on the providers' technical capability, deployment procedure, and willingness to support a new network out of the box.

** Base is only available privately to a limited number of customers.

Optimism

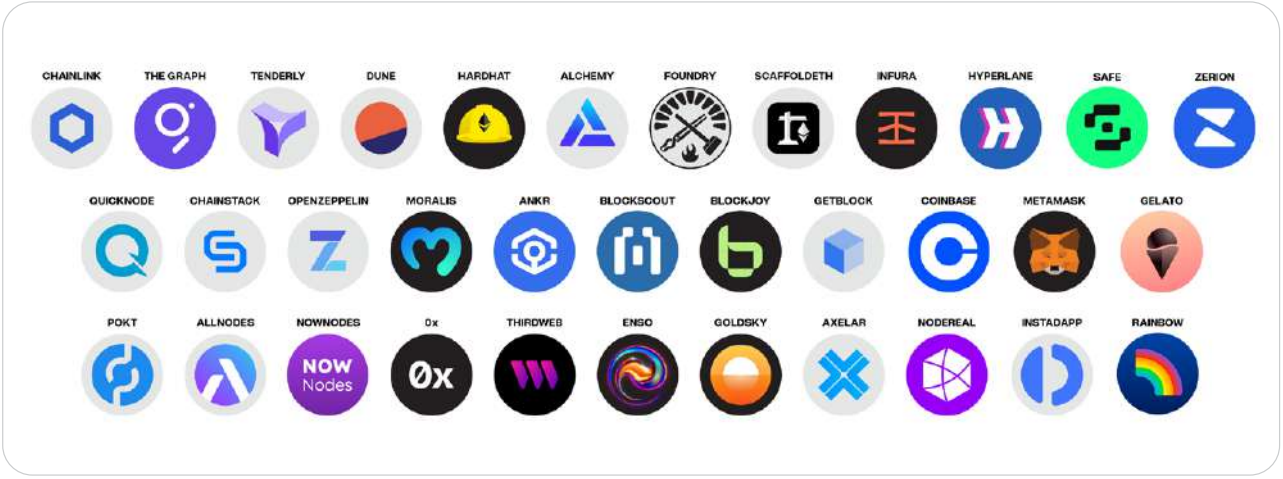
The list of tooling and infrastructure providers on Optimism includes the following:



Some of the most widely used solutions on OP Mainnet include Tenderly, QuickNode, Ankr, Blockscout, Zerion, The Graph, Goldsky, ThirdWeb, and Gelato. These tools also expressed an interest and willingness to support the Superchain, supporting Optimism on its path toward a multichain future.

Arbitrum

The following providers offer support and availability on Arbitrum:

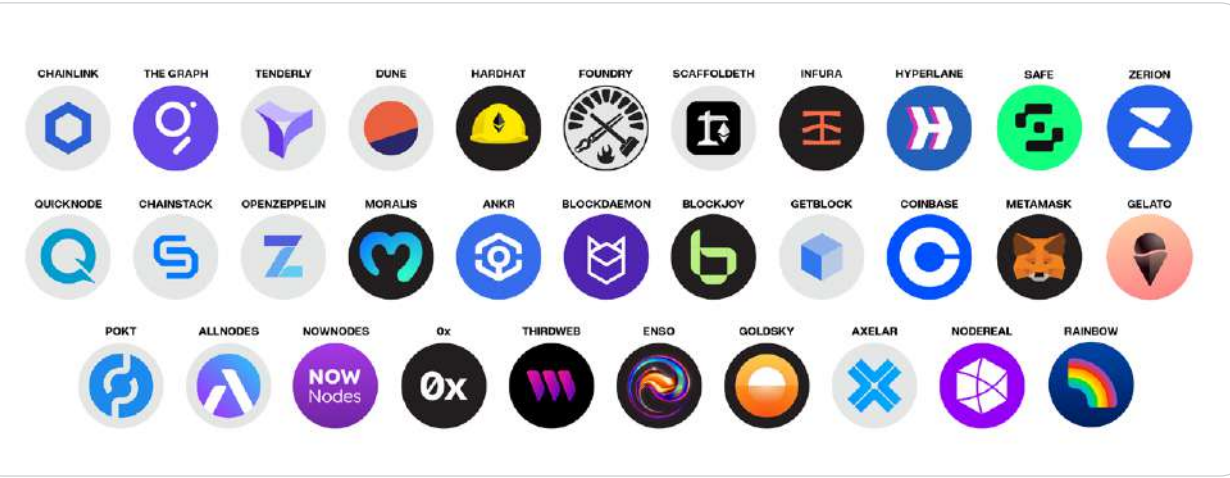


Polygon

The following tools and infrastructure components are available on Polygon:

BNB Chain

The BNB Chain ecosystem of tooling and infrastructure providers contains the following:

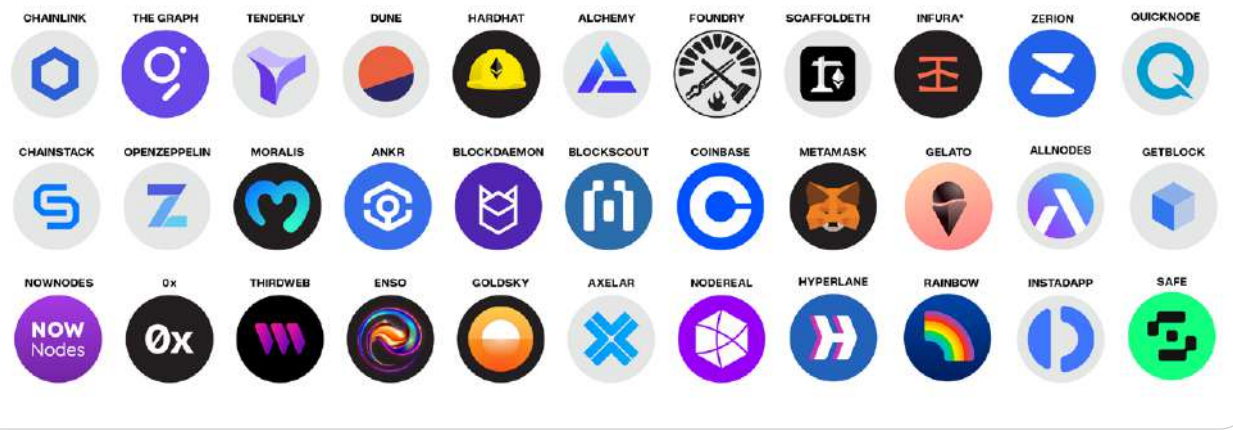


Avalanche

The current list of providers supporting the Avalanche C-Chain includes:

Up and coming: Base

The Base ecosystem also has a diverse set of supported tools and infrastructure components:



*Base is only available privately to a limited number of customers.

→ Chapter 04

The leading stacks for L2s and appchains

Easy, quick, and frictionless deployment of new networks is essential for growing the multichain ecosystem. Enabling network developers to launch L2 ecosystem networks or application-specific blockchains with already integrated tooling and infrastructure can accelerate time to market and support the adoption of new networks.

As the three most widely used tech stacks for launching new chains, OP Stack, Polygon zkEVM, together with its CDK, and Avalanche Subnets offer ready-made but customizable components that allow network developers to create new scalable chains in a streamlined way.

OP Stack

The OP Stack is a standardized and open-source development stack consisting of various software components and tools. It's widely used across Ethereum and Optimism ecosystems to power environment and application-specific chains.

Thanks to its modular components, the OP Stack is highly scalable, simplifying the creation of new chains. It emphasizes simplicity, scalability, and security so developers can extend and build upon the existing code instead of creating everything from scratch.

The OP Stack also lays the foundation for the development of the Optimism Superchain ecosystem. Enabling the creation of production-ready optimistic rollups, the stack will also allow for maximum composability and interoperability between the created chains. With integrated message-passing infrastructure, the OP-Stack-powered chains will be able to seamlessly communicate yet maintain their sovereignty.

Many different projects use the OP Stack, including Manta Pacific, an optimistic rollup chain ($31.50M TVL), Aevo Open Mainnet, a decentralized options exchange ($11.85M TVL), and Zora, an L2 appchain that supports artistic expression on-chain ($9.21M TVL).

New projects using the OP Stack are also upcoming. These include Lyra, an L2 solution for the Lyra protocol, Metal, an L2 solution by Metallicus, and Mode Network, an L2 made for users and builders.[6]

[6] https://l2beat.com/scaling/summary#active

Polygon zkEVM

Polygon zkEVM is another popular scaling solution in the ecosystem that inherits security from Ethereum Mainnet. It offers reduced transaction costs and increased transaction throughputs thanks to the use of zk-proofs. Aside from ensuring the validity of the executed transactions, the underlying zk-rollup technology reduces costs, protects funds, and ensures a better experience for the end user.

Polygon's zkEVM allows developers to easily port the existing Ethereum tooling and infrastructure components to a new L2 solution, without making significant code changes. Ultimately, Polygon zkEVM aims to achieve full EVM equivalence along with overall better performance.

To launch new networks based on the zkEVM, developers can use the Polygon Chain Development Kit (CDK). With open-source, modular software components, Polygon CDK enables the launch of scalable L2 solutions with customizable chain architecture tailored to their specific requirements. While these chains currently have limited interoperability, an interoperability layer is in development and will enable atomic L2<>L2 transactions.

"Polygon CDK is designed to simplify the launch of zk-powered L2 chains on Ethereum. There is a new category of infrastructure providers whose objective is to enhance the scalability enabled by the Polygon CDK tech even a step further. Roll-up-as-a-Service providers (RaaS) can help developers build their Polygon CDK-developed chains more rapidly and securely. Working with RaaS providers, companies or builders who previously did not have protocol engineering capabilities can launch, maintain, and enhance CDK-developed chains customized for their own use case or project." – Osman Sarman, Polygon Labs Enablement Team.

As for the projects built using zkEVM, some of the upcoming ones include Astar zkEVM, an Ethereum Layer-2 scaling solution, Canto, an L1 chain migrating to L2, Capx, a sector-specific L2 for token distribution and trading. Immutable zkEVM is another chain powered by Polygon zkEVM intended for gaming applications.

Avalanche Subnets

Avalanche Subnets are sovereign networks with a dynamic subset of validators that secure and validate Subnet chains. Subnet-powered chains can have their own rulesets, execution logic, security, state maintenance, and fee systems.

Subnets enable network developers to create chains with custom EVMs. However, they can also be deployed with Subnet EVM, which is EVM-compatible and supports existing Ethereum smart contracts and tooling.

Since Subnets are independent, the performance of an individual Subnet doesn't depend on the performance of other Subnets. However, seamless and native communication is available across all Subnet-powered chains thanks to the Avalanche Warp Messaging mechanism.

Using Avalanche Subnets, developers can launch both private and public networks for specific use cases. Private Subnets can be suitable for organizations that would like to keep their data private as it can be limited to pre-approved validators.

Some of the Subnet-powered projects include Beam Subnet, a chain built specifically for gaming use case, Cloudverse Subnet, a network containing all the Cloudverse enterprise metaverse data, and DFK Subnet, a network striving to become a go-to solution for GameFi and other blockchain gaming applications.[7]

[7] https://subnets.avax.network/subnets/

→ Chapter 05

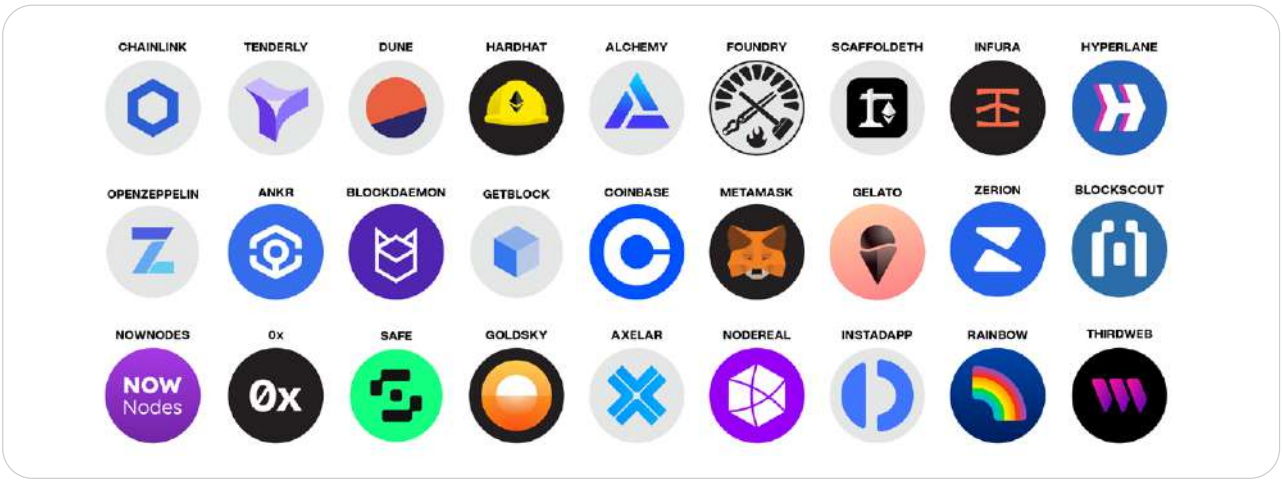
Tooling support for rollup and appchain tech stacks

Given the widespread use of the three listed tech stacks, a great number of providers enable support for new networks and appchains built on top of them.

This extensive support allows network developers to launch new solutions with already familiar tools and infrastructure components, facilitating developers' onboarding to new networks and their adoption.

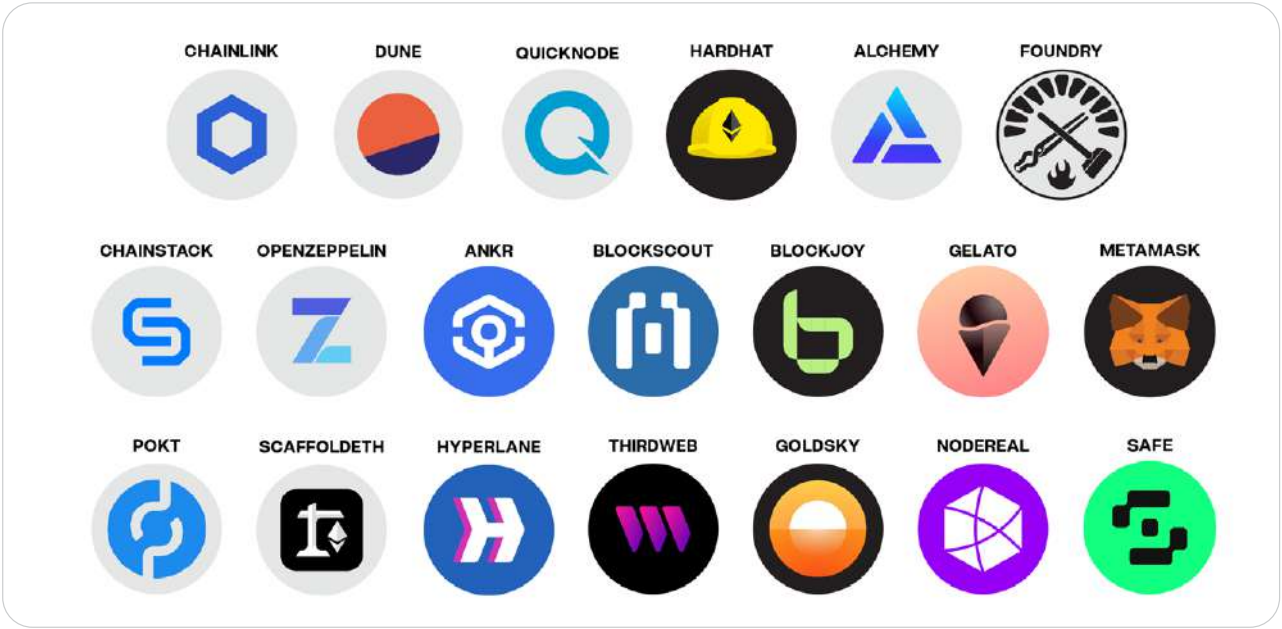
OP Stack

The following list of providers can support chains built using the OP Stack:



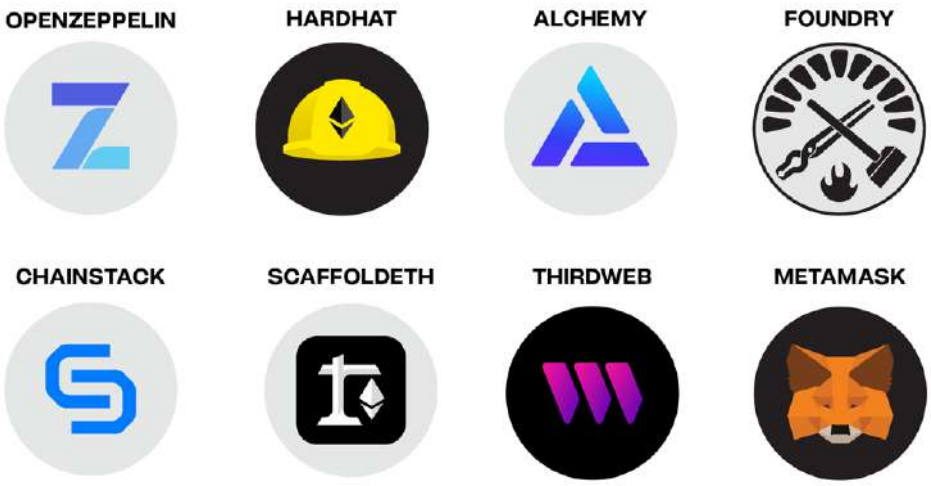
Polygon zkEVM

The currently available support for chains built on top of Polygon's zkEVM includes the following:



Avalanche Subnets

The infrastructure and tooling providers currently supporting chains built using Avalanche Subnets are listed below:



→ Chapter 06

Tooling providers' insights about the multichain future

A great number of tooling and infrastructure providers support multiple chains as their users build dapps that enable cross-chain interactions. They play a crucial role in supporting the adoption of new networks and onboarding dapp developers. Tooling portability across different chains can help developers overcome fragmentation and facilitate their development.

With familiar tools available across different networks, developers can easily transition or expand to new networks with minimal disruption to their flows. Consequently, having familiar tools will help developers onboard onto new networks and appchains as they continue to emerge.

In this chapter, several providers share their thoughts on the multichain future.

Note: The information featured in this section was supplied by the tooling providers.

0x

As a provider of a fully integrated suite of APIs, 0x enables developers to build products for seamless crypto swaps and trading across different chains. With over 63M transactions and more than 7M unique wallets, 0x boasts $137B+ in trading volume.

0x APIs support a diverse set of networks, with their Swap API & Tx Relay APIs available across nine and two networks respectively. The majority of projects support multi-chain swap capabilities (53.6% of the 578 projects active in Q3).

While Ethereum does dominate volume share (81%), most trades occur on Polygon (30%) and BNB (25%). The networks with the most activity include Polygon (304 projects, 52.6% of active projects), followed by BSC (259 projects, 44.8% of active projects), Arbitrum (202 projects, 34.9% of active projects), and Ethereum (177 projects, 30.6%).

Arbitrum is the leading L2 in terms of active projects (202, 34.9%), followed by Optimism (140 projects, 24.2% of active projects). 0x also saw growth in trading activity on Base (75 projects, 24.2% of active projects).

"The exponential growth of EVM networks since 2015 can be attributed to a mature ecosystem of developer tools and significantly lower barriers to entry for aspiring developers. Tools like Tenderly have made it remarkably simple to confidently deploy applications across multiple EVM blockchains while being able to monitor, diagnose, and resolve issues in a cost-effective manner. The increased market demand for cross-chain EVM applications has also increased the demands of developers. Platforms like Tenderly and 0x API allow developers to ship more with less effort and have propelled industry growth." – Amir Bandeali, co-founder & co-CEO of 0x.

Blockscout

As a go-to, open-source explorer in the rapidly evolving L2 and rollup landscape, Blockscout enables easy and quick integration and deployment. It includes advanced features that rival closed-source explorers such as an integration with Tenderly for transaction verification.

Both EVM chains and rollup providers can use Blockscout as their block explorer. Over 600 networks use Blockscout, including L2s, zk and optimistic rollups, institutional networks, and other customized EVM-compatible chains. The list of supported networks includes Ethereum, Optimism, OP Stack, Arbitrum, Base, Polkadot, Cosmos, Avalanche, Polygon CDK, and Solana, as well as a growing list of L1s, L2s, and rollups.

Additionally, Blockscout is typically offered as a default explorer option for new chains. With RaaS (Rollup-as-a-Service) providers becoming more prominent in the Web3 space, new chain deployment has become significantly easier, with essential infrastructure included with each deployment. This already-integrated infrastructure helps create a functional chain environment, facilitating the deployment and customization of new chains.

Since Blockscout is the primary explorer supporting OP Stack chains, it has become an explorer of choice for the installations of new rollup chains that rely on this tech stack. If more support is needed, rollup providers can work with Blockscout to provide an additional level of customization, hosting, and more.

"Deploying a blockchain has never been easier. We're seeing exciting new chains pop up daily - gaming chains, institutional rollups, finance-focused chains – the list goes on. To serve this expanding ecosystem, we need transparent, cross-chain tools to tie everything together and create a consistent developer experience. Developers shouldn't be spending time learning new tools for every new chain, they should be using the tools they know and trust to create the next killer app." – Blockscout

Chainstack

Chainstack is a Web3 development stack to build applications for every scale, powering applications in DeFi, NFT, gaming, analytics, and everything in between. From startups to large enterprises, Chainstack enables thousands of companies to cut down the time to market, costs, and risks associated with creating and scaling decentralized applications. By offering fast, reliable, and easy-to-use infrastructure solutions distributed globally, Chainstack makes sure innovators can focus on what's important.

Chainstack provides unified access to multichain node and data APIs, distributed compute and storage, and the ever-expanding list of services and tools to build amazing applications across all prominent Web3 protocols. With an expanding list of blockchain networks and new protocols, it enables the building of cross-chain applications.

Chainstack node users are distributed across different protocols on multiple chains, including BNB Smart Chain (27.6K), Ethereum (25.4K), Polygon (11.7K), Arbitrum (8.80K), Solana (6.92K), Avalanche (4.67K), Base (1.73K), and Optimism (1.45K).

Aside from supporting the ecosystem networks, Chainstack also provides support for new network deployments using Avalanche Subnets. After the initial setup, Chainstack handles infrastructure and tooling deployment for network developers.

"Our study on Ethereum Layer 2 solutions highlights the transformative impact of EVM networks and tools. Chainstack plays a pivotal role in this transformation by providing streamlined, reliable access to the L2 ecosystem. With Layer 2 solutions, we see significant reductions in gas prices, transaction costs, and processing times, enhancing the Web3 user experience. At Chainstack, our focus is to make these advanced technologies accessible and easy to use, allowing builders to effortlessly tap into the benefits of faster and more cost-effective blockchain applications." - Eugene Aseev, CTO & Co-Founder, Chainstack

Dune

As an established data platform in the blockchain industry, Dune strives to make crypto data accessible. By using Dune, developers can get organized, decoded, and human-readable data across 14+ chains and 1.5M+ datasets. Teams can use the Dune platform to access on-chain data quickly through front-end, query engine, API, or Data Export/Shares.

With more than 550,000 active users and data experts, Dune processes 750,000 queries and 100,000 dashboards. Additionally, it features the most comprehensive dataset on the market, with 500TB+ of datasets across 14+ EVM and non-EVM chains, full historical data, and 3TB of daily added data, ensuring up-to-date information with most blockchains updated in under 2 minutes.

Having comprehensive, yet organized and human-readable data will become even more important for developers navigating several blockchains. By providing such data across multiple chains, Dune will continue to provide developers with access to on-chain data quickly, helping them navigate the complexities of a multichain environment.

Enso Finance

Enso Finance enables developers to interact with all DeFi projects through one API across multiple networks. Instead of building their own integrations, developers can use the Enso API suite to easily launch new DeFi integrations and go to market faster.

Teams can use a suite of Enso's APIs, including Bundle, Route, Protocol, and Opportunities APIs on different chains. The list of supported networks includes numerous L1 and L2 chains, such as Ethereum, Avalanche, Polygon, Arbitrum, Optimism, BNB Smart Chain, Base, and others. This way, with a unified gateway to different DeFi protocols on multiple EVM chains, the Enso team makes development easier in the multichain environment.

"The tooling throughout the ecosystem is vital to the growth of the EVM chain landscape. Developers should have the ability to plug and play tools for building their products rather than building everything in-house". – Enso

Goldsky

By offering real-time data indexing, high-performance subgraphs, and data streaming pipelines, Goldsky enables developers to work with on-chain data with ease. Supporting over 70 chains, and with more being added to the list, Goldsky strives to unlock the potential of Web3 data. It also indexes major OP Stack chains, offering subgraph support for OP Mainnet, Base, Mantle, Zora, Manta, PGN, opBNB, and Kroma.

Goldsky Mirror enables developers to sync on-chain data directly to their backend infrastructure, bringing them a more flexible developer experience. Therefore, by simplifying the access to and use of on-chain data across different chains, Goldsky provides developers with a streamlined way to innovate in a multichain environment.

"For a long time, Web3 developers had to run their own nodes to build within the EVM landscape. Then simple API services came along, which gave developers more accessibility to blockchain data, but with some limitations. We're now seeing the next phase of the blockchain data revolution with more flexible tools for developers, such as Goldsky, to define fully end-to-end pipelines for on-chain data. Ultimately, we're moving toward greater control and flexibility, but without the headaches of needing to build out all of the infrastructure yourself."

Hyperlane

As a permissionless and universal interoperability layer, Hyperlane offers a modular architecture that allows developers to connect chains with security while keeping their sovereignty. Network developers launching new chains or rollups, as well as rollup providers, can use Hyperlane to easily connect separate chains and control different aspects of the integration. Additionally, Hyperlane also facilitates cross-chain interoperability of decentralized applications that are available on more than one chain.

Hyperlane supports all major EVMs, including Ethereum, Arbitrum, Optimism, Avalanche, Polygon, and Base. Their list also consists of Cosmwasm networks such as Neutron and even Solana.

Recently, Hyperlane has seen growth in EVM-based rollups thanks to Optimism's OP Stack and Arbitrum's Orbit, as well as rollup-focused companies such as Caldera or Altlayer. Therefore, Hyperlane expects this trend to continue as new chains and companies enter the space.

Infura

As one of the industry node providers, Infura offers easy-to-use RPC services to Web3 developers building applications on Ethereum and other L1 and L2 networks, including Polygon, Avalanche, Optimism, and Arbitrum.

Providing multichain support also brought a certain level of complexity, requiring the Infura team to run a complex tech stack, develop protocol-specific knowledge, and make ongoing investments in their operations and infrastructure. With this in mind, Infura decided to build a Decentralized Infrastructure Network (DIN).

This approach will enable Infura to offer its full suite of services while partnering with other node providers to give users failover access to any supported network in the DIN ecosystem. Such a collaborative approach can potentially mitigate the fragmentation challenges of a multichain environment, supporting its growth through an uninterrupted infrastructure offering.

MetaMask

With thousands of projects across an increasingly diverse number of networks, MetaMask is one of the most widely used wallet solutions in the Web3 space. Supporting all EVM networks, MetaMask facilitates the interaction with different blockchains. It's also constantly expanding its list, adding support for non-EVM networks with MetaMas Snaps.

Aside from some of its go-to functionalities, MetaMask also offers advanced services available on networks with high on-chain activity. These services include indexers for asset detection, spam/malicious contract detection and insights, transaction simulators, gas estimation, and others.

"Multichain support is increasingly important across the wallet and tooling landscape. As a result, providing paths for extensibility is also essential to allow emerging solutions to thrive. This is why we introduced MetaMask Snaps. DIN (Decentralized Infrastructure Network) also supports this aspect from an infrastructure perspective."
– Vandan Parikh, product lead, MetaMask Developer Experience

Nodereal

As a blockchain infrastructure provider, Nodereal offers a diverse set of RPCs and APIs for 15 chains, including Ethereum, BNB Chain, Polygon, Optimism, and Arbitrum. Striving to support developers in an evolving multichain ecosystem, Nodereal keeps expanding its list of supported networks, most recently adding Sui and Aptos chains.

High-performance infrastructure is the main focus for the Nodereal team, as they strive to provide high-quality service and comprehensive solutions. Supporting large-scale dapps and handling spikes in traffic, Nodereal offers reliable and scalable service in a multichain ecosystem.

Additionally, Nodereal is one of the core contributors to BNB Chain, recently launching opBNB and BNB Greenfield support while also preparing for the launch of Combo, another L2 on BNB Chain. As opBNB is built using the OP Stack, the Nodereal team also strives to contribute back to OP. This way, they continue to support the developer community through reliable infrastructure in the evolving multichain landscape.

The Graph

The Graph is a data indexing protocol enabling developers of all sizes to build performant, reliable, and scalable dapps without having to maintain costly infrastructure. It enables use cases across different Web3 applications, such as NFTs, governance, gaming, social, and more.

The Graph supports over 40 chains, including Ethereum, Polygon, Arbitrum One, Avalanche, Fantom, Gnosis Chain, and Celo, and several testnets. Additionally, developers can also run Graph Node to index any EVM-compatible network that's not supported on the Graph's decentralized network.

"*As EVM network ecosystems grow and evolve, The Graph is here to support the scaling journey of every chain, every builder, and every dapp within those ecosystems. The Graph is the protocol that introduced and standardized subgraphs as the data indexing and access paradigm across the majority of today's most widely used chains. Looking ahead to the future, with the development of new data services like SQL and LLMs, The Graph will be a one-stop-shop for EVM data needs of all kinds.*" – Tegan Kline, CEO & Co-founder, Edge & Node

→ Chapter 07

Final thoughts: Launching L2s and appchains

The multichain future is already happening. Based on the 2023 EVM Network Landscape Report, it's evident that there's a steady increase in on-chain activity on some of the leading ecosystem networks and L2 solutions in the ecosystem. Additionally, the data indicates that the technology stacks for the creation of L2 solutions and appchains show significant adoption rates, with an increasing number of chains and projects relying on them.

Therefore, L2 networks and appchains are a clear path forward for scaling Ethereum. Widespread tooling availability also indicates the providers' efforts to support the growing developer communities on these networks.

The challenges of building in a multichain environment

However, a multichain system also brings an additional level of complexity and fragmentation. With scattered resources across different chains, network and dapp developers face significant challenges when building on multiple networks.

Interoperability of different technology stacks and seamless deployment in different ecosystems are the main components needed for L2s to become the backbone of a new internet. Therefore, tackling this problem should be considered crucial.

Ensuring EVM tooling compatibility and portability is essential for streamlining the launching of new networks and development processes, especially as new chains continue to emerge. Providing a clear set of essential tools and infrastructure components will enable network developers to set up new chains in a frictionless way that supports their communities.

Additionally, launching a new network with a standard set of tools used throughout the ecosystem enables network developers to achieve a much bigger network effect and project impact. Similar tooling availability enables better interaction with other networks, reducing friction points in onboarding new developers.

Finally, such tooling support will enable dapp developers to quickly launch or port their dapps to multiple networks. With complete and easily accessible solutions, they would be able to focus on their products rather than piecing together the infrastructure and navigating a multichain environment.

Overcoming the challenges together

In this multichain ecosystem, rollup providers will have a major role in streamlining this entire process and scaling Ethereum. By offering rollup solutions with native tooling support, they will enable Web2 and Web3 innovators to create new chains with essential infrastructure already in place.

Additionally, while the inherent fragmentation of the blockchain ecosystem might pose a challenge, it also brings the members of the community closer together. Network developers, rollup providers, tooling vendors, and infrastructure providers are all working toward the same goal: realizing the potential of blockchain technology.

In these efforts, all involved parties will find new ways to work together to overcome the challenges of fragmentation and achieve the shared goal.

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