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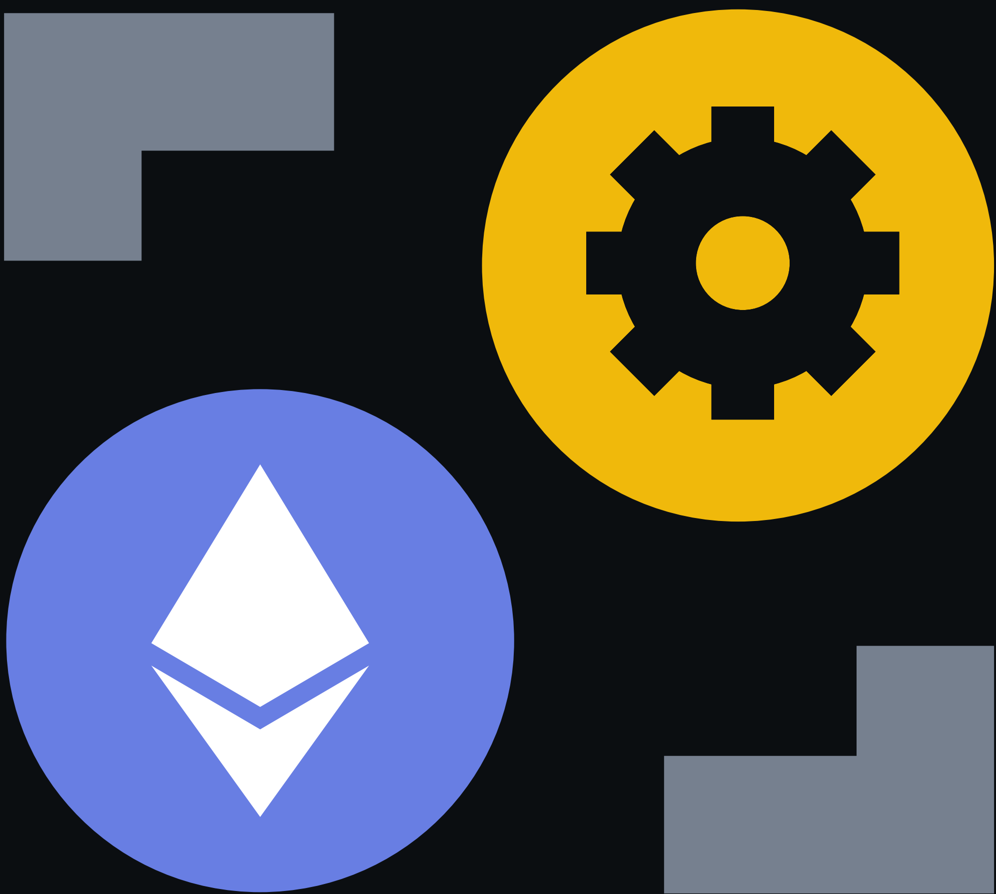
Pectra & Fusaka Upgrades: What Does It Mean For Ethereum?

APRIL 2025



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01 / Key Takeaways

- **Ethereum's dominance is under threat**. Solana and BNB Smart Chain are closing the gap in terms of DEX volumes and fees generated. Contributing factors include slow and expensive transactions, fragmented developer mindshare and liquidity, and reduced value accrual to the L1 due to the rise of L2s.

- **Pectra and Fusaka upgrades aimed at scaling L2s.** The upcoming Pectra and Fusaka upgrades are scheduled to go live on mainnet in May 2025 and late 2025 respectively. Notably, no code changes are aimed at strengthening ETH as "ultrasound money", nor improving Ethereum as a more censorship-resistant blockchain.

- **Pectra will center around staking, blobs and account abstraction improvements.**

    - Staking: EIP-7251 will raise maximum effective balance for staking from 32 ETH to 2,048 ETH to address increasing network strain from a large validator size of over 1 million today
    - Blobs: EIP-7691 will increase target and maximum blob capacity from 3 to 6 and 6 to 9 respectively to enable more data to be posted to the L1 while retaining low costs
    - Account Abstraction: EIP-7702 will transform Externally Owned Accounts (EOAs) into a smart contract wallet that can benefit from features such as bundled transactions, gas sponsorship, social recovery etc.
- **Fusaka will center around scaling Ethereum as a data availability layer and potentially upgrading the Ethereum Virtual Machine.**

    - Road to Full Danksharding: PeerDAS, to be introduced in EIP-7594, will be a stepping stone towards full data availability sampling
    - Upgrading the EVM: the Ethereum Object Format will result in a more structured approach to contract creation while reducing runtime overheads, which should improve developer experience and user safety

- **Commitment to L2 scaling is a double-edged sword.** There are concerns regarding Ethereum's competitiveness as a data availability layer in this vision, and the sustainability of value accrual to Ethereum the asset.

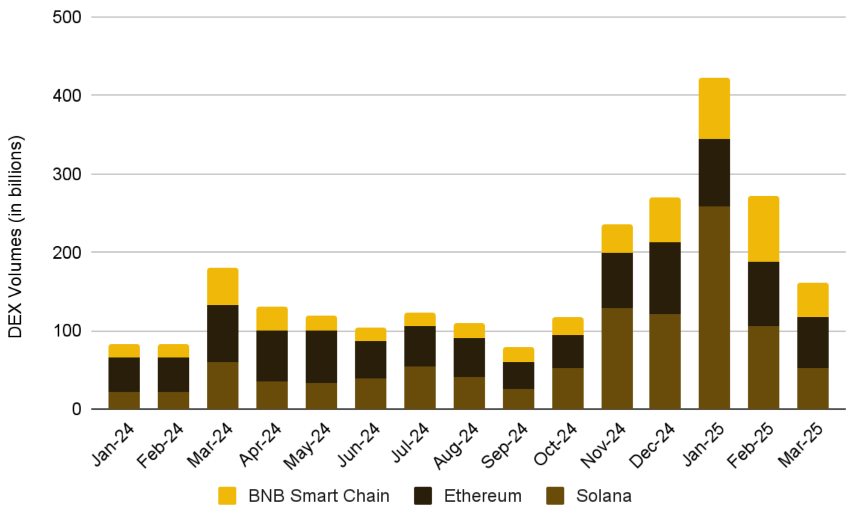
- **Competition is strong on the data availability front.** Ethereum with full danksharding remains behind the likes of Celestia, EigenDA and NearDA in terms of raw data throughput and cost efficiency. However, Ethereum remains the most secure blockchain which might be the key consideration for data availability.

- **Path to sustained ETH value accrual remains a topic of active exploration.** Suggestions such as repricing the blob market might push L2s to cheaper alternatives, while expecting L2s to support ETH with some percentage of fees is too subjective. Based roll ups support value accrual the most, but is not a priority on the roadmap at the moment.

02 / Introduction

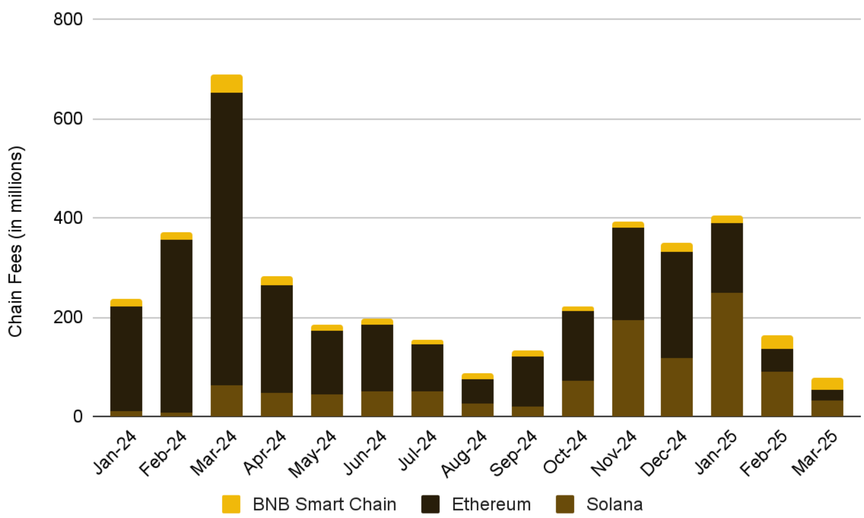
Ethereum's long standing position as the dominant Layer 1 (L1) has come under intense competition from the likes of Solana and BNB Smart Chain in recent months (*see figure 1 & 2*). Solana has outperformed Ethereum in terms of DEX activity and fees generated from the chain on occasion, while BNB Smart Chain has been closing the gap throughout 2025.

Figure 1: Ethereum has been losing ground in terms of total DEX volumes to Solana and BNB Smart Chain since late 2024



Source: DefiLlama, Binance Research

Figure 2: Ethereum remains the most consistent chain in terms of chain fees but there is increasing competition from Solana and BNB Smart Chain



Source: DefiLlama, Binance Research

Some reasons for Ethereum losing ground include **slow and expensive transaction costs** on the L1 which increases user friction, **fragmented developer mindshare and liquidity** due to the popularity of Layer 2s (L2s), and **less value accrual to the L1** after offloading execution to the L2s. While the current roadmap consists of various upgrades for the L1 aimed at providing (a) cheaper transactions, (b) extra security, (c) better user experience and (d) future proofing, there is a more immediate focus on scaling data availability on the L1 to accommodate more L2s.

In this report, we will be covering the upcoming upgrades Pectra and Fusaka which are expected to go live on mainnet in May 2025 and late 2025 respectively. Notably, both Pectra and Fusaka have no code changes aimed at strengthening the narrative of ETH as "ultrasound money", nor improving Ethereum as a more censorship-resistant blockchain. Instead, both upgrades are aimed at fulfilling the L2 scaling vision. We then end off the report by discussing Ethereum's future role as a data availability layer, and how value accrual could look like.

03 / The Pectra Upgrade

Pectra was originally scheduled to go live in March 2025, with 11 different EIPs which would have made it the largest hard fork since Dencun in 2024. However Ethereum developers have since agreed to split it up due to the size of the scope, with the second upgrade, Fusaka, pushed to late 2025. Moreover, testnet issues with Holesky and Sepolia meant that the original release for Pectra had to be pushed back. Holesky was later replaced by Hoodi, which has since performed reliably and all the upgrade features of Pectra achieved full finalization on 26 March. Pectra is now anticipated to go live on mainnet on 7 May, 2025.

What is in the Pectra upgrade?

The key improvements from Pectra (*see figure 3*) will center around staking, blobs and account abstraction, with an eye on future proofing Ethereum with regards to zero knowledge cryptography and stateless clients.

Figure 3: Finalised list of EIPs to be included in the Pectra Upgrade

EIP	Description	Area of Improvement
EIP-7251	Increase Maximum Effective Balance For Validator Stake	Staking
EIP-6110	Supply Validator Deposits on Chain	Staking
EIP-7002	Execution Layer Triggerable Withdrawals	Staking
EIP-7549	Move Committee Index Outside Attestation	Staking

EIP-7685	General Purpose Execution Layer Requests	Staking
EIP-7691	Increase Blob Target and Max to 6 / 9 Respectively	Blobs
EIP-7840	Add Blob Schedule to Execution Layer	Blobs
EIP-7623	Increase Calldata Cost	Blobs
EIP-7702	Set EOA Account Code	Account Abstraction
EIP-2537	Precompile for BLS12-381 Curve Operations	Zero Knowledge
EIP-2935	Save Historical Block Hashes in State	Stateless Clients

Source: Binance Research

Staking

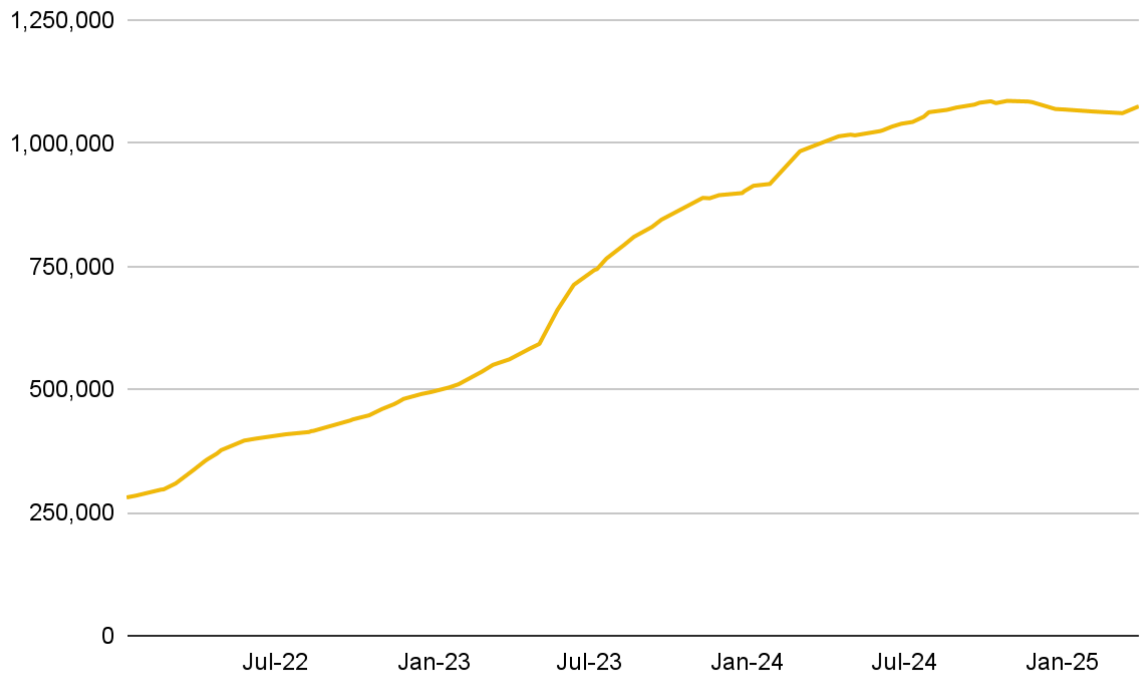
Associated EIPs: 6110, 7002, 7251, 7685

The most significant code upgrade involves **EIP-7251**, which aims to raise the maximum effective balance (MaxEB) for staking from 32 ETH to 2,048 ETH. Under the previous limit of 32 ETH, any rewards exceeding this threshold were automatically transferred to the execution layer address specified in the validator's withdrawal credentials at each block. More importantly, the minimum balance required to operate a validator will stay at 32 ETH to encourage solo staking.

Why is this upgrade necessary?

The previous 32 ETH cap meant that entities with substantial amounts of stake, such as staking pools and centralized exchanges, had to deploy multiple validators to optimize their staking rewards. As of April 1, 2025, there are over 1.06m validators on the Ethereum mainnet, which has been steadily increasing (*see figure 4*) ever since Ethereum switched to proof-of-stake consensus. While a higher number of validators might suggest increased participation, the underlying stake distribution remains concentrated among a few entities, limiting the true extent of decentralization.

Figure 4: Number of validators on the beacon chain has been steadily increasing since the switch to proof of stake consensus



Source: Dune Analytics (@hildobby), Binance Research, as of 31 March, 2025

A large validator size can impose significant strain on the P2P networking layer, potentially leading to node failures. As the number of active validators increases, the volume of messages required for the network to reach consensus on its current state also rises. Block attestations are the most frequently propagated messages, which validators perform to earn rewards. However, the attestation aggregation process becomes increasingly complex with more validators since there are more BLS signatures involved. The net result could be lower rewards for validators, given that attestation rewards decline the longer it takes a validator to propagate their attestations.

Bandwidth requirements are also becoming prohibitive for solo stakers. Geth, an official Ethereum client, recommends a download speed of at least 25MB/s and an unlimited data cap, which is approximately 50% of the average household bandwidth of 53.5MB/s.

A large validator set can also create technical debt, complicating future upgrades, such as single slot finality. High validator participation is essential for immediate chain finality under single slot finality, where any delay would mean a delay in transaction execution. A large set of validators means a large number of validator attestations that need to be aggregated per epoch, increasing the possibility of a delay in chain finality.

As such, there is a necessity to reduce the size of the validator set. While EIP-7514 was introduced as part of the Dencun upgrade, where the number of validators per epoch was capped at 8 to slow down the growth of validators, EIP-7251 will be another step in addressing the problem of a large validator set.

Who are the winners and losers from this change?

The Ethereum mainnet will be the biggest winner. The goal of increasing MaxEB is to encourage entities with large amounts of stake to start consolidating their existing validators. Should the top 20 entities by stake consolidate their validators, we could see a reduction of 785,302 validators (*see figure 5*), which should free up bandwidth across the network so it runs more smoothly. Typical stakers will also be able to stake more with their trusted validator.

Figure 5: A potential reduction of 782,450 validators is possible post EIP-7251 should the top 20 entities, by stake, consolidate their validators

Entity	No. of Validators (Before MaxEB)	Potential No. of Validators (Post MaxEB)	Change
Lido	292,313	4,568	-287,745
Coinbase	85,990	1,344	-84,646
Binance	70,281	1,099	-69,182
ether.fi	62,866	983	-61,883
Kiln	45,043	704	-44,339
Kraken	31,117	487	-30,630
Figment	29,691	464	-29,227
Rocket Pool	20,874	327	-20,547
Everstake	20,534	321	-20,213
OKX	16,717	262	-16,455
Bitcoin Suisse	15,797	247	-15,550
Staked.us	15,247	239	-15,008
Upbit	15,234	239	-14,995
Blockdaemon	15,199	238	-14,961
stakefish	13,280	208	-13,072
Mantle	11,911	187	-11,724
P2P.org	10,380	163	-10,217
StakeWise	8,474	133	-8,341
DARMA Capital	7,482	117	-7,365
Bitstamp	6,451	101	-6,350
Total	**794,881**	**12,431**	**-782,450**

Source: Dune Analytics (@hildobby), Binance Research, as of 11 April, 2025

On the flipside, the change will be additional development overhead for staking pools. While consolidating validators may streamline operational efficiency, it also increases the maximum penalty in the case of slashing. Moreover, some choices such as ideal bond sizes for node operators to join staking pools were made with a MaxEB of 32 ETH in mind, and may require a rethink with the new MaxEB being introduced.

Other EIPs that target staking improvements

EIP-6110, Supply validator deposits on chain

This code change transfers the responsibility of validating new staked ETH deposits from the Consensus Layer (CL) to the Execution Layer (EL). By doing so, developers can enhance the security of deposits, simplify the protocol complexity in CL clients, and improve the staking user experience by reducing the delay between making a deposit on the EL and activating a new validator on the CL.

EIP-7002, Execution layer triggerable withdrawals

A stateful precompile, which is a mechanism to modify the Ethereum Virtual Machine (EVM) state, will be introduced for validator withdrawals. Currently, validators can only exit through the validator withdrawal key owner, typically the validator operator. With EIP-7002, smart contracts will be able to own validator withdrawal credentials and use them to trigger validator exits without manual intervention by the validator operator. This change aims to enable more trustless designs for staking applications and remove trust assumptions about the honest behavior of validator node operators.

EIP-7685, General purpose execution layer requests

This code change establishes a general-purpose framework for storing smart contract-triggered requests to the CL. Given the increasing popularity of smart contract-based staking pools, there is a need to allow smart contracts to directly trigger validator withdrawals (EIP-7002) and consolidations (EIP-7251) on the CL.

Blobs

Associated EIPs: 7840, 7691, 7623

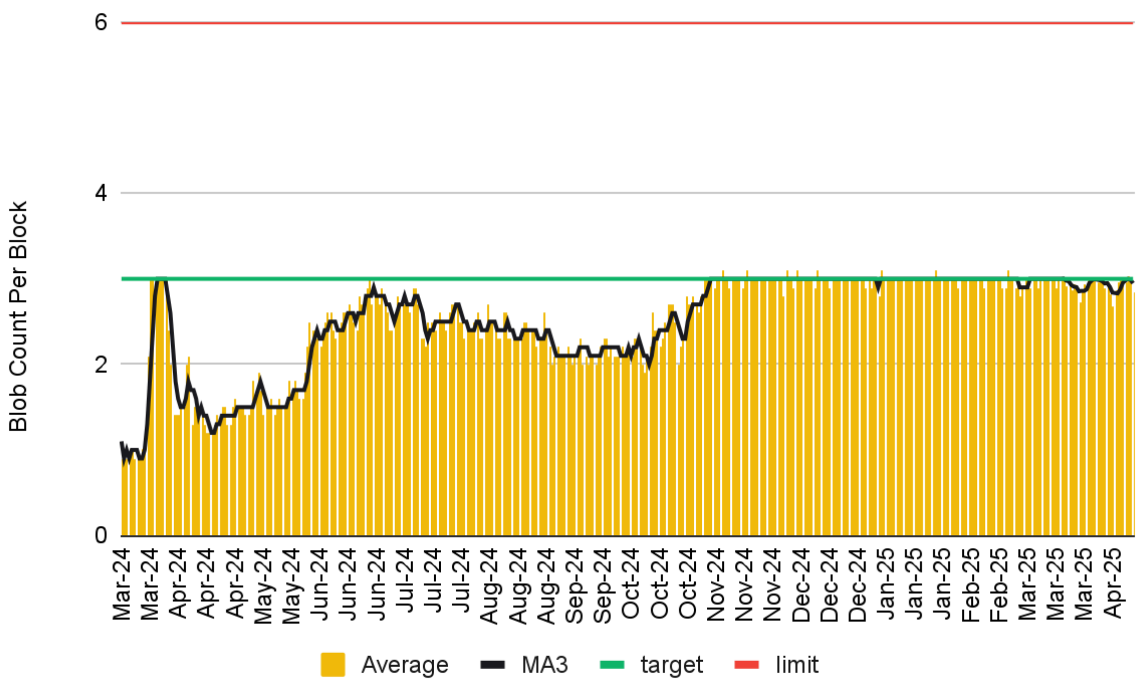
The concept of blobs was introduced in EIP-4844, as part of the Dencun upgrade, as a cheaper way for L2s to post data onto Ethereum mainnet. The major change to blobs will come in the form of **EIP-7691** as part of the Pectra upgrade, where target and maximum blob capacity will be increased from 3 to 6 and 6 to 9 respectively.

Why is the upgrade necessary?

L2 solutions require an affordable method to post data onto the Ethereum L1 to guarantee data availability. For optimistic rollups (e.g., Optimism, Arbitrum), data availability is crucial for constructing fraud proofs. Users depend on the transaction data stored on Ethereum to validate transitions and detect any fraudulent activity. For Zero Knowledge (ZK) rollups (e.g., ZkSync Era, Scroll), data availability ensures the presence of cryptographic proofs to validate state transitions without needing to post all transaction data.

Before EIP-4844, the *calldata* function was used to post data. Now, rollups can use blobs, which enhance scalability and efficiency. Blobs today are priced dynamically based on blob congestion. When blob usage reaches a target limit of 50%, a base fee is introduced to regulate demand usage by all L2s. For each increase in blob usage above the 50% limit, base fees are further increased by 12.5%.

Figure 6: Average blob count per block has peaked at its target since the Dencun upgrade, indicating an unwillingness for L2s to pay more for data availability in times of congestion



Source: Dune Analytics (@hildobby), Binance Research

As we can see from *figure 6*, average blob count has been at the target, and an undesirable effect is that L2s delay when they choose to post data back to the L1 to avoid the increase in blob costs, thereby weakening security guarantees for the end user.

Therefore, increasing the target and maximum blob count as part of the upcoming upgrade should address these concerns. Moving forward, Vitalik also mentioned that his ideal target is a target of 48 and maximum of 72 blob count by the next major upgrade (Fusaka), and plans to run the testnet to such specifications once Pectra goes live.

Who are the winners and losers from this change?

L2 solutions are the primary beneficiaries of this change. The increase in blob target and maximum count translates to greater capacity for L2s to post data, which should result in lower costs for posting data onto the Ethereum L1. Consequently, users will also benefit from reduced transaction fees.

However, the reduction in data costs for L2s also means fewer fees accruing to the L1, which could negatively impact the value accrual to Ethereum as an asset. Despite this, there are concerns that focusing too heavily on ETH's value as an asset could risk user and developer migration to cheaper alternatives. Therefore, they are focusing on the L2 roadmap for Ethereum execution by scaling blob space to ensure long-term growth and sustainability.

Other EIPs that target blob improvements

EIP-7623, Increase call data costs

Prior to EIP-4844, L2 solutions used *calldata* to store data on Ethereum in a less efficient but permanent manner. While L2s are encouraged to post blobs, there are instances when *calldata* can still be cheaper than blobs. EIP-7623 aims to increase calldata pricing to encourage L2s to use blobs exclusively, thereby offsetting the computational cost of the network handling new blob data.

EIP-7840, Add blob schedule to EL config files

This change introduces a new field to execution layer client configuration. It allows for dynamic settings of target and maximum blob counts per block, as well as blob fee adjustments. By directly defining these configurations, clients can avoid the complexity of exchanging this information via the Engine API, streamlining the process.

Account Abstraction

Pectra will introduce **EIP-7702**, a refinement of ERC-4337, to enhance account abstraction. This proposal will allow standard Ethereum addresses to bundle transactions, sponsor gas fees, and utilize advanced authentication methods such as pass keys. Additionally, users will be able to set spending limits and employ social recovery mechanisms to regain control of their wallet in case of lost keys.

By enabling Externally Owned Accounts (EOAs) to temporarily set a smart contract code for the wallet that is executable only during the transaction, it provides all the aforementioned benefits without requiring the delegation of transaction control to smart contracts or the migration of the EOA to a smart contract account.

Why is this change necessary?

Account Abstraction represents a vision for the future development of Ethereum. Currently, Ethereum distinguishes between two main types of accounts: externally owned accounts (EOAs) and smart contract accounts. EOAs are controlled by private keys and can hold ETH but cannot execute code, whereas contract accounts can execute code when triggered by a transaction signed by an EOA. The ultimate goal is to eliminate this distinction by allowing all accounts to execute code.

While ERC-4337 exists as Ethereum's Account Abstraction standard, it requires the creation of new wallets and is not backwards compatible with EOAs. This could pose problems in certain situations, such as giving up soulbound tokens, on-chain reputation tied to the EOA, increased costs to move assets out of the EOA or even tax implications on positions held in the EOA. EIP-7702, on the other hand, will be complementary with ERC-4337 and extend account abstraction features to users.

Who are the winners and losers from this change?

Users stand to benefit the most from EIP-7702, as it will provide a smoother wallet experience that is more welcoming to newcomers. This proposal will eliminate the inertia for users who want to utilize account abstraction features but were previously held back by the need to make a long-term decision on which smart contract wallet to use.

With the wallet address decoupled from a policy engine, developers will be able to upgrade an EOA into a smart contract account while keeping the same address. This means that applications can start incorporating user experience improvements such as gas sponsorship, session keys, and social recovery, all without requiring users to switch wallets or create new ones.

The key counterargument to EIP-7702 is that it may delay the ultimate goal of achieving true account abstraction on Ethereum. Furthermore, the delay in transitioning to full account abstraction will mean it is more challenging for smart contract wallet companies to find product-market fit.

Other Upgrades

EIP-2935, Serve historical block hashes from state

This code change to the execution layer (EL) allows proofs of historical blocks to be generated from the state. It provides additional functionality for smart contract developers, enabling them to access information about Ethereum's state from prior blocks. This is a step towards the future of stateless clients.

EIP-2537, Precompile for BLS12-381 curve operations

This upgrade adds new functions to efficiently perform operations over the BLS12-381 curve, an algebraic structure widely used in zero-knowledge cryptography. This will benefit applications and rollups built on Ethereum that already utilize zero-knowledge proof systems or are looking to integrate such systems into their operations.

EIP-7549, Move committee index outside attestation

This code change introduces a refactoring of validator attestation messages, which is expected to reduce the networking load on validator nodes.

04 / The Fusaka Upgrade

The Fusaka testnet will start after Pectra goes live, and the full upgrade is expected to happen by the end of 2025. While the scope of upgrades is still under discussion, there is consensus that the key focus of Fusaka will be PeerDAS (Data Availability Sampling) and Ethereum Object Format (EOF).

PeerDAS

Fusaka will introduce PeerDAS as part of EIP-7594 as a stepping stone towards full data availability sampling. PeerDAS is a networking protocol designed to enable beacon nodes to perform data availability sampling (DAS), ensuring that blob data is available while allowing nodes to download only a subset of the data.

Blobs will be converted into an extended matrix through a technique called one-dimensional erasure coding extension, which encodes the data and generates KZG proofs for each cell in the matrix. Nodes are then responsible for sampling columns, which are formed by collecting cells at a specific index associated with specific gossip subnets. The entire data matrix can be reconstructed if nodes acquire at least 50% of the columns, otherwise they would have to request missing columns from other nodes.

In PeerDAS, each node will store a significant fraction of all blob data, and maintain connections to many peers in the P2P network. When a node needs to sample for a particular piece of data, it asks one of the peers that it knows is responsible for storing that piece. If each node only needs to download ⅛ of all data, then PeerDAS theoretically scales blobs by 8x, but most likely only 4x in practice given 2x will be lost to the redundancy of erasure coding.

Why is this upgrade necessary?

Currently, ETH nodes must download all the data in each block, which significantly slows down the network and raises the bar for anyone who wishes to run a node. This full data download requirement makes it resource-intensive and less accessible for individuals to participate in the network, otherwise known as the data availability problem.

With PeerDAS, each node only needs to download a small part of the data and uses cryptographic checks to confirm the full data set is still there. This reduces the amount of data each node needs to store and share, making the network more efficient. Additionally, providing additional data availability helps scale Ethereum, especially for L2 systems called "roll-ups," which rely on L1 data availability. By making it easier to run a node, PeerDAS encourages more people to participate, increasing the network's decentralization and overall robustness.

EOF

The Ethereum Object Format will be an overhaul of the existing EVM execution environment. EOF introduces several key improvements such as:

- **Modularity:** Separates code and state, enhancing organization and readability.
- **Enhanced Validation**: Implements stricter checks during contract deployment to prevent vulnerabilities.
- **Gas Efficiency:** Optimizes bytecode to reduce gas costs.
- **Control Flow:** Provides new mechanisms for more efficient control flow management.

The exact scope of implementation is still under discussion, given the focus is still on shipping PeerDAS.

Why is this upgrade necessary?

Currently, on-chain deployed EVM bytecode lacks a predefined structure, resulting in inefficiencies and challenges. Each time code is executed, it must be validated, which adds overhead and complicates the introduction of new features or the deprecation of old ones.

EOF addresses this by validating code during the contract creation process, enabling code versioning without requiring an additional version field in the account. Versioning is crucial for managing the lifecycle of features, especially when implementing significant changes like modifications to control flow or introducing features such as account abstraction. This structured approach simplifies the process, reduces runtime overhead, and facilitates the evolution of the Ethereum Virtual Machine (EVM).

Overall, developer experience and user safety should improve. Smart contracts will become safer and easier to write, helping developers avoid common errors and vulnerabilities, thereby benefiting the end user.

05 / What Does The Future Hold For Ethereum?

*"**One possible shortcut for scaling is to give up on L2s, and do everything through L1 with a much higher gas limit (either across many shards, or on one shard). However, this approach compromises too much of the benefits of Ethereum's current social structure**, which has been so effective at getting the benefits of different forms of research, development and ecosystem-building culture at the same time. Hence, instead **we should stay the course, continue to scale primarily through L2s, but make sure that L2s actually fulfill the promise that they were meant to fulfill.**"*

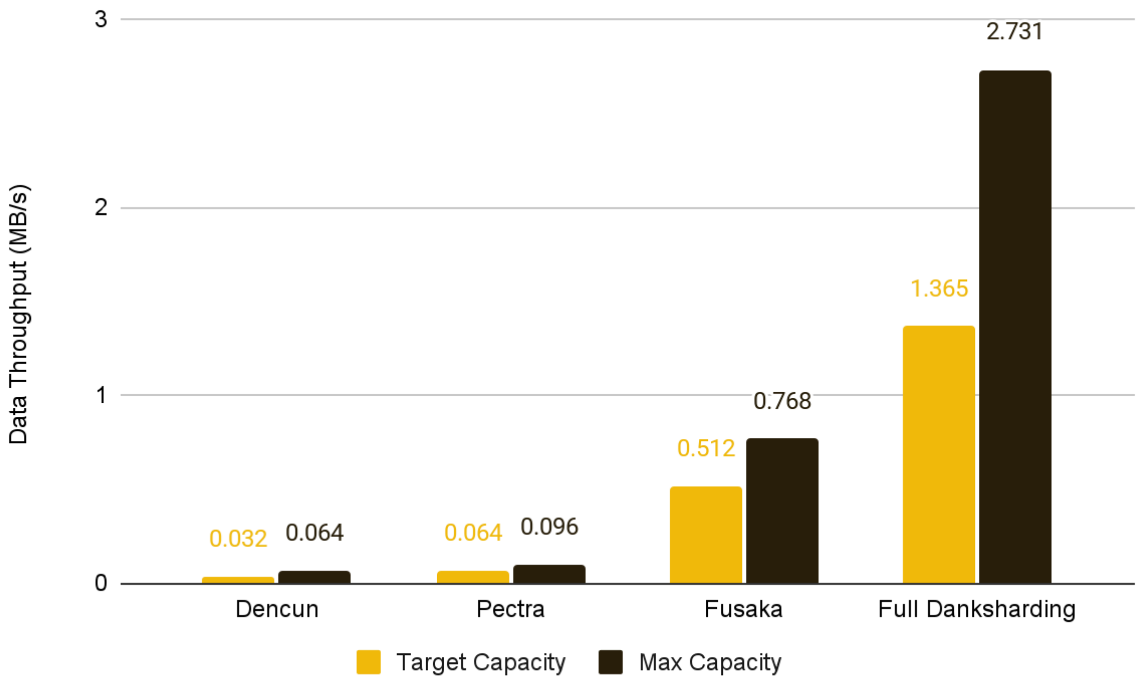
– Vitalik on scaling Ethereum L1 and L2s in 2025 and beyond

With Ethereum committed to the L2 scaling road map as discussed above, this raises questions around Ethereum's long-term competitiveness as a data availability layer, and its path towards sustainable value accrual.

Ethereum as a Data Availability Layer

With Ethereum committed to the roll-up centric road map where execution is off loaded to L2s, Ethereum's capabilities as a data availability layer is crucial for data correctness. EIP-4844 introduced the idea of separate data availability blobs which the EVM does not have access to, enabling blobs to be broadcasted and verified separately from a block.

Figure 7: Ethereum will scale its target data capacity to 1.365MB/s through planned upgrades



Source: Binance Research

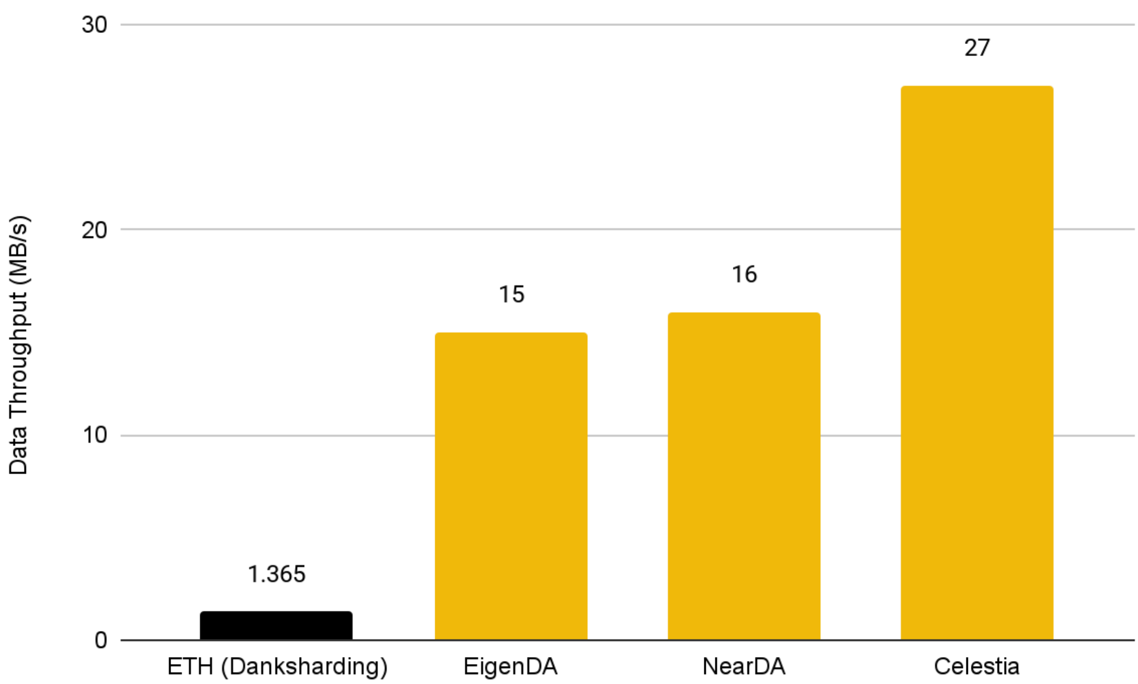
Ethereum's target capacity, shared by all L2s, is at 32KB/s today and pretty much at capacity. Roll ups are having to batch several blob updates together to reduce consumption and fees, hence why Pectra will help alleviate this by pushing target DA capacity to 64KB/s. Further upgrades in Fusaka will push Ethereum to 0.5 MB/s with an eye towards full danksharding to reach the eventual target of 1.365MB/s.

Is Full Danksharding Enough?

Eclipse, the largest data availability consumer with 901.92GB of data posted in the last 30 days, as of 13 Apr, 2025, uses Celestia for its data availability needs. As a comparison, Base, the largest data availability consumer for Ethereum at 38.29% of market share, posted just 25.29GB in the same time period.

Moreover, upcoming high throughput L2 MegaETH which is targeting over 100k transactions per second (TPS) have opted for EigenDA, possibly for greater Ethereum alignment. Competition on the data availability front is fierce and competitors are able to move faster, partly due to fewer constraints around scale and security as compared to Ethereum.

Figure 8: Ethereum data throughput vs Competitors



Source: Binance Research, as of 11 April, 2025

Celestia is anticipating data throughput of 27 MB/s with its Mammoth mini upgrade, and has consistently scaled throughput since its mainnet launch in October 2023. The Ginger consensus upgrade saw a 2x increase in data throughput by reducing block times from 12s to 6s and the Shwap upgrade made data availability sampling 12x faster and reduced storage requirements by 16.5x to enable bigger blocks and smaller nodes. The eventual goal is to achieve 1GB/s in data throughput.

The NEAR Data Availability Layer (NEAR DA) is integrated with Polygon CDK, enabling developers to create custom L2 chains while benefitting from cheaper data availability costs. Near DA can process up to 16MB/s today, at a cost up to 85,000x cheaper than posting blob submissions on Ethereum and 30x cheaper than doing the same on Celestia. Near DA is utilized by Frax Finance and Particle Network today, and can also be selected as a data availability solution in Rollups as a Service companies such as Altlayer, Caldera.

EigenDA launched with an industry leading 15mb/s data capacity with 170 active operators on EigenLayer as an Actively Validated Service (AVS) with 4.52M ETH in backing. The benefit of using EigenDA lies in native settlement onto Ethereum, which means L2s do not need to rely on another chain's bridge for safety or liveness. The eventual goal is also to achieve 1GB/s in data throughput.

Does this mean that Ethereum cannot compete?

However, this does not mean that Ethereum cannot be competitive as a data availability layer. Security remains an important consideration when it comes to data correctness. Ethereum has over 1m+ nodes, as compared to Celestia at 100 and EigenDA at 170, making it the most decentralized network. While critiques point towards full node dependency on Ethereum, it is set to be addressed first with PeerDAS in the Fusaka upgrade before full data availability sampling in the future.

Moreover, there is also a case to be made that there might not be a need for such high data throughput considering the real world demand does not match up with the theoretical throughput that L2s are aiming for.

Value Accrual for Ethereum

In Vitalik's post on scaling Ethereum in 2025 and beyond, he mentioned some strategies for Ethereum to retain and accrue value:

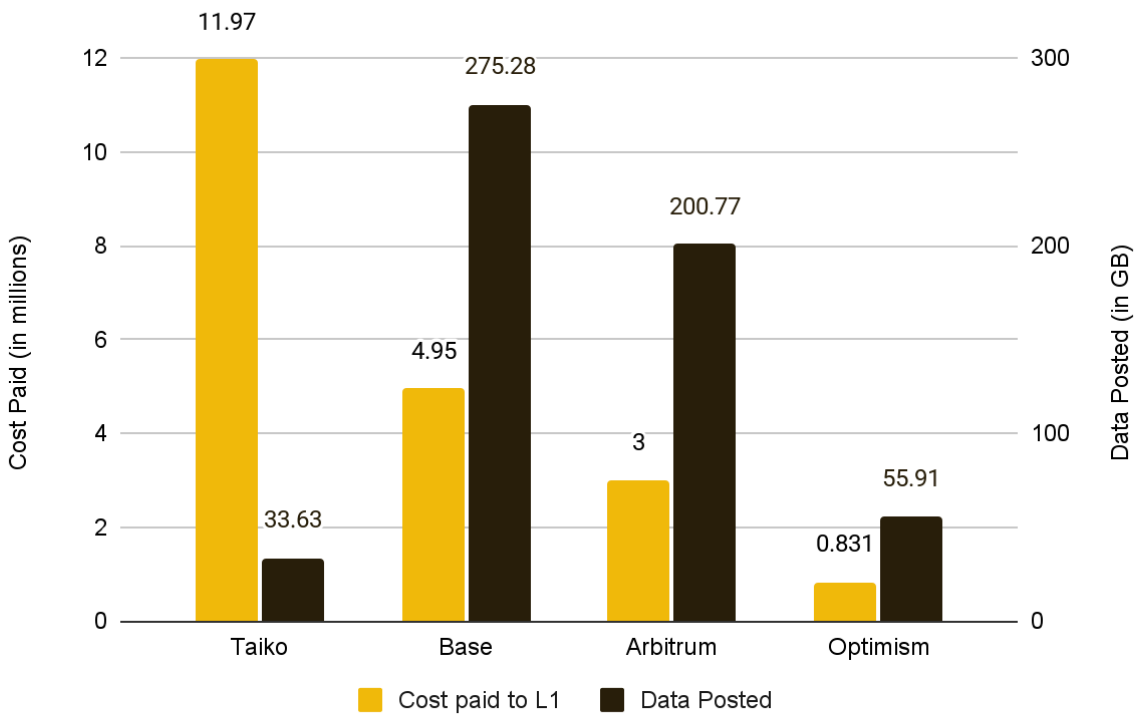
1. Ethereum the asset has to be cemented as the primary asset across L1 and L2
2. L2s should be encouraged to support ETH with with some percentage of fees
3. Raising the blob count and consider repricing of the blob market
4. Support based roll ups for Ethereum L1 to capture value through MEV

In our view, (1) and (2) would require buy in from L2s who have to take the stance of being Ethereum aligned. Therefore, it is beyond Ethereum's control as to how L2s want to contribute back to the L1 beyond data availability fees. In the case of (1), while Ethereum remains pristine collateral besides Bitcoin today and is widely used across all L2s, we think it is a function of Lindy Effect and it being the second largest crypto asset by market capitalization. However, if Ethereum value accrual continues to decline, and the market begins to reprice Ethereum the asset, the effects could be reflexive where it starts to lose its position as pristine collateral.

On (3), Ethereum's choice to commit to the L2 scaling roadmap has been a huge success, with a scale factor of 15.95x as of 4 April, 2025. However, this has meant much less fees on the Ethereum L1, and Ethereum the asset has turned inflationary since the introduction of blobs in EIP-4844. In other words, L2s are scaling Ethereum too well, but at too low a cost. Therefore, there is scope to reprice the blob fee market, while continuing to scale the blob counts towards full danksharding. However, given L2s are rational businesses, they might be price sensitive and move towards cheaper alternatives should minimum blob fees be too high.

Based roll ups proposed in (4) should benefit the Ethereum L1 in terms of value accrual theoretically, given fees from sequencing activities and associated Maximable Extractable Revenue (MEV), can be captured by the L1. Examples of based roll ups today include Taiko, Surge by the Nethermind team, and UniFi by the Puffer Finance team, which are both forks of Taiko. The long term success of this option of value accrual depends on (a) the number of based roll ups that will exist and (b) the volume and type of transactions the L1 will be sequencing.

Figure 9: Based roll up Taiko pays more fees to Ethereum L1 than Base, Arbitrum and Optimism combined, despite posting much less data



Source: L2BEAT, Binance Research, as of 9 April, 2025

Looking at *Figure 9*, Taiko contributed $11.97m in fees over the past year with just 33.63 GB of data posted. In contrast, Base contributed just $4.95m in fees to the Ethereum L1 despite posting over 275.28GB in data, with similar trends observed for Arbitrum and Optimism. Therefore we can see the benefits in terms of fee contribution from a based roll up, albeit a small sample size still.

However, it is important to note that L1 scaling via based roll ups is not a top priority at the moment, with only PeerDAS and EOF penciled in for the Fusaka upgrade expected at the end of this year.

Overall, faces challenges in capturing value at the L1 under its current scaling approach. By embarking on the L2 scaling vision, much of the fees and MEV activity was shifted to the L2 sequencers that were not obliged to pass any of the value back to the L1.Ethereum gave up a huge amount of fees and MEV activity to the sequencers that are not obliged to pass any of the value back to the L1. While data availability fees may be tweaked to accrue more value back to the L1, it is largely a commodity and prone to competition from the likes of Celestia, NearDA and EigenDA as mentioned above.

06/ Parting Thoughts

Fundamentally, Ethereum remains the largest smart contract platform with over US$45.8 billion in Total Value Secured, and possesses the most vibrant developer ecosystem of over 6,000 developers. In a way, Ethereum has been a victim of its own success.

With a huge responsibility towards a diverse bunch of stakeholders, Ethereum has not been able to move as quickly as other alternate Layer 1 competitors, given the amount of capital and trust at stake.

Regardless of what the future holds, there is no doubt that Ethereum has paved the way for all smart contract platforms, and has seen groundbreaking innovation such as DeFi, NFTs and gaming etc. From the proof-of-stake transition to the Shapella upgrade and now the upcoming Pectra and Fusaka upgrades, it is remarkable what Ethereum has managed to achieve as an open-source, decentralized network.

07 / New Binance Research Reports

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An analysis of recent tariff-driven macro trends and how crypto fits into a protectionist world

Monthly Market Insights - April 2025 **Link**
A summary of the most important market developments, interesting charts and upcoming events

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Binance Research is the research arm of Binance, the world's leading cryptocurrency exchange. The team is committed to delivering objective, independent, and comprehensive analysis and aims to be the thought leader in the crypto space. Our analysts publish insightful thought pieces regularly on topics related but not limited to, the crypto ecosystem, blockchain technologies, and the latest market themes.

Resources

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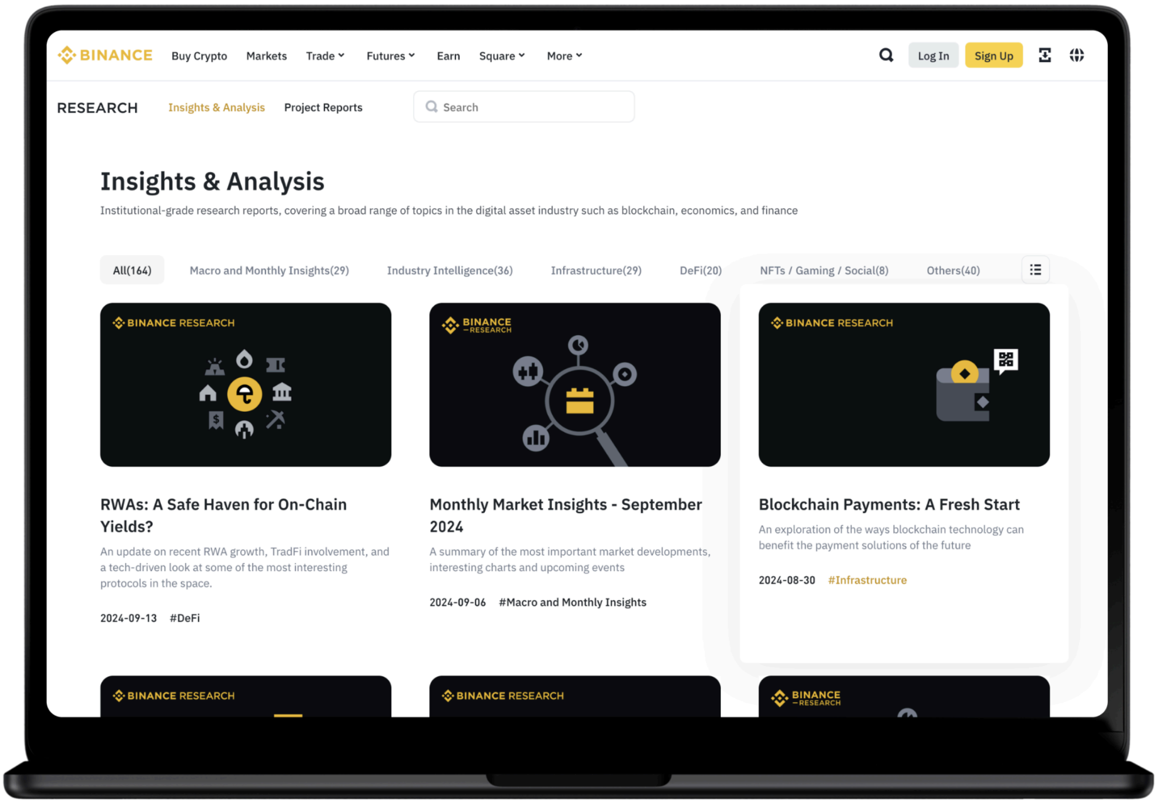

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