BLOCKDAEMON

Incorporating Institutional Ethereum Staking Into Your Fund

A technical guide from Blockdaemon

We power the blockchain economy.

Blockdaemon is the largest independent blockchain infrastructure platform connecting institutions and developers to leading networks.

99%	60+	#1	150k+
Uptime	Protocols Supported	Infrastructure solution for transactions & staking	Nodes Launched and Managed

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INTRODUCTION:

Why are we writing this guide now?

Following the approval of ten US Spot Bitcoin (BTC) ETFs on January 10th this year, the next big deadline for crypto exchange traded products in the United States will be May 23rd. This is the last date by which the Securities and Exchange Commission (SEC) must consider Ethereum (ETH) ETF applications from VanEck and ARK 21Shares, while decisions on Hashdex and Grayscale's applications are due less than a week later. Moreover, later in the summer rulings on five further funds will also be due, as shown in Figure 1 below.

Issuer	Ticker	Company	19b-4 filed	First Deadline	Second Deadline	Third Deadline	Final Deadline
VanEck Ethereum ETF	N/A	VanEck	09.06.23	11.10.23	12.25.23	03.24.24	05.23.24
ARK 21Shares Ethereum ETF	N/A	21Shares	09.26.23	11.11.23	12.26.23	03.25.24	05.24.24
Hashdex Nasdaq Ethereum ETF	N/A	Hashdex	09.20.23	11.17.23	01.01.24	03.31.24	05.30.24
Grayscale Ethereum Futures Trust	ETH	Grayscale	09.19.23	11.17.23	01.01.24	03.31.24	05.30.24
Grayscale Ethereum Trust	ETHE	Grayscale	10.02.23	12.06.23	01.20.24	04.19.24	06.18.24
Invesco Galaxy Ethereum ETF	N/A	Invesco & Galaxy	10.20.23	12.23.23	02.06.24	05.05.24	07.05.24
iShares Ethereum Trust	N/A	BlackRock	11.21.23	01.25.24	03.10.24	06.08.24	08.07.24
Fidelity Ethereum Fund	N/A	Fidelity	11.17.23	01.21.24	03.10.24	06.03.24	08.02.24
Franklin Ethereum Trust*	N/A	Franklin Templeton	02.12.24	04.11.24	05.23.24	08.22.24	10.24.24

Note: Dates are estimates and are subject to change. Red Dates have already been delayed / denied.

Source: Bloomberg Intelligence, SEC.gov
*Dates are estimated

Figure 1 - ETH ETF applications to the SEC and their respective Final Deadlines

However, it would be short-sighted to isolate this well-documented American ETF story as a standalone narrative. It is part of a much broader, global trend in crypto fund launches, which incorporates multiple different product structures. For example, Crypto Exchange Traded Notes and Products have long existed in Europe, while new issuers are also emerging in APAC, in particular Hong Kong, now that greater regulatory clarity exists. Moreover, Private Funds and Alternative Investment Funds (AIFs) also have the optionality of adding digital assets to their portfolio and, while less widely publicized, are starting to increase their allocations accordingly.

Yes? So what? What does this have to do with staking? Well, it is pertinent to note that certain ETF applications (namely, ARK 21Shares, Fidelity and Franklin Templeton) have included language related to staking as part of their filings. To quote from Franklin Templeton's filing:

"The Sponsor may, from time to time, stake a portion of the Fund's assets through one or more trusted Staking Providers, which may include an affiliate of the Sponsor. In consideration for any staking activity in which the Fund may engage, the Fund would receive certain staking rewards of ether tokens, which may be treated as income to the Fund".
Franklin Templeton filing, 12th February, 2024

At the time of writing the combined Assets Under Management (AUM) of the Spot BTC ETFs stands at $59.2bn, and is virtually increasing every day. To that end, while it must be acknowledged that there are important regulatory processes to complete, it is not inconceivable to envisage a scenario where these new ETH ETFs also attract billions of dollars. Using the market share percentages of the existing BTC ETFs, while leveraging the Grayscale Ethereum Trust's current AUM, Blockdaemon estimates the ETH ETF launches could generate between $19.1 BN and $31.7 BN in AUM after the first three months of their launch, dependent on prevailing market conditions (Figure 2). This ETH, or at least a portion of it, could in theory be staked. Indeed, one could argue the European landscape provides a potential roadmap for what to expect in APAC and the US, where certain issuers are already offering Staked-ETH products, namely 21Shares, ETC Group and Coinshares.

Issuer	BTC AUM	BTC Market Share	ETH AUM (Flat)	ETH AUM (Bull case +25%)	ETH AUM (Bear case -25%)
Grayscale	$22,957	39.6%	$10,278	$12,847	$7,708
BlackRock	$17,635	30.4%	$7,889	$9,862	$5,917
Fidelity	$10,085	17.4%	$4,512	$5,640	$3,384
ARK/21Shares	$3,096	5.3%	$1,385	$1,731	$1,039
Bitwise	$2,198	3.8%	N/A	N/A	N/A
VanEck	$2,198	1.0%	$983	$1,229	$737
Valkyrie	$579	0.9%	N/A	N/A	N/A
Invesco/Galaxy	$80	0.9%	$231	$288	$173
Franklin Templeton	$336	0.6%	$150	$188	$113
WisdomTree	$80	0.1%	N/A	N/A	N/A
Total	$59,242	100.0%	$25,428	$31,784	$19,071

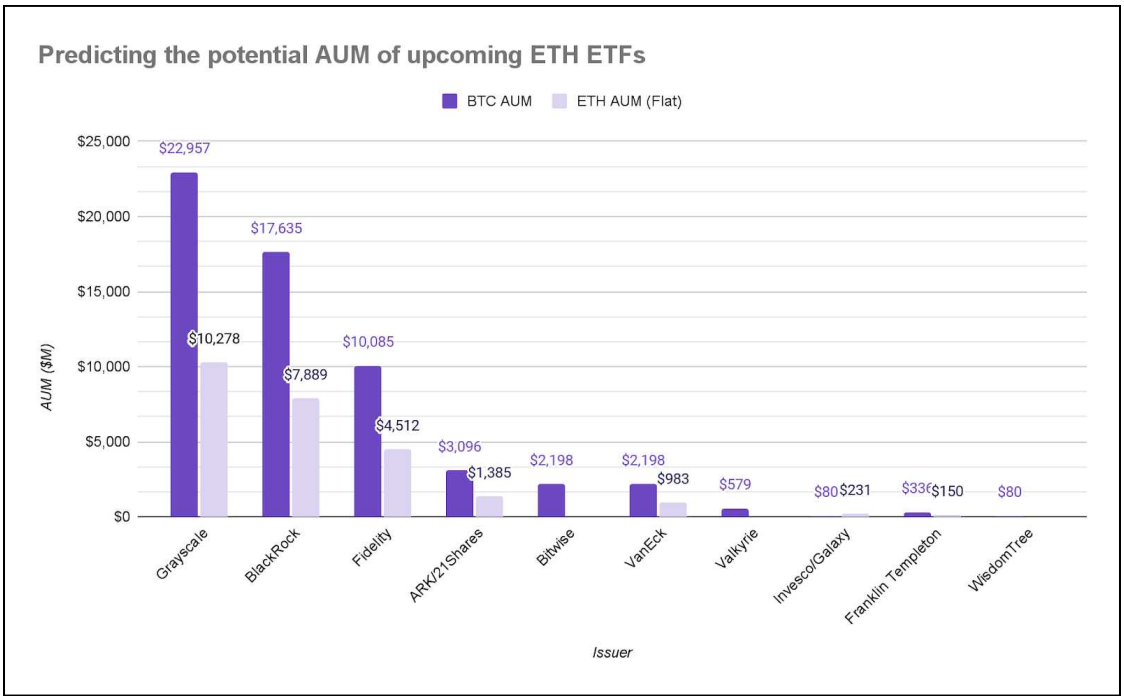


Figure 2 - Predicting the potential AUM of upcoming ETH ETFs

With that understood, it is crucial that issuers and investors alike receive a thorough and transparent education into what staking is, why token holders partake, and what the key operational and risk considerations are. This guide seeks to do that - we hope you find it valuable and welcome any questions.

2 STAKING: What and Why?

THE WHAT

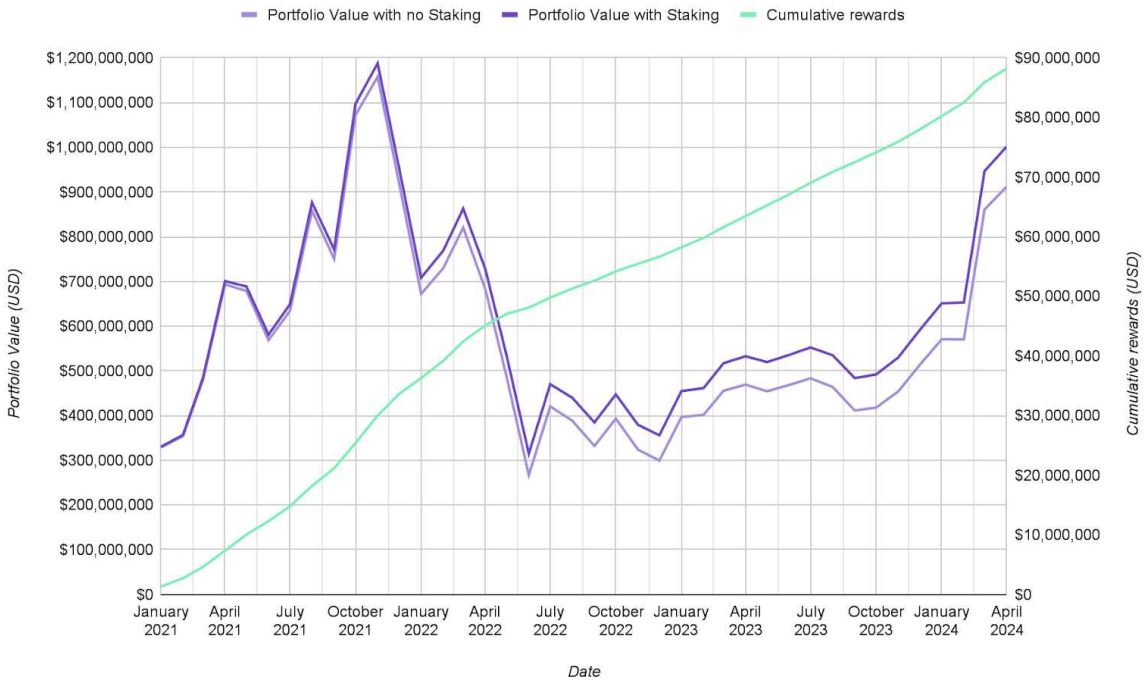
Most digital asset investors have heard of crypto “mining”, the process whereby high-powered computers solve mathematical problems in order to produce blocks on a proof-of-work (PoW) blockchain. BTC being the principal example.

However, proof-of-stake (PoS) protocols, and the act of staking, is the main alternative to this. Rather than deploying energy intensive computers, staking involves committing the PoS token back onto the chain in order to contribute to the block proposal process and help secure the network. Different PoS protocols will deploy different staking criteria, but in the case of the Ethereum network participants who want to become “validators” must commit 32 ETH at a time. Just as BTC miners will earn rewards for validating blocks, stakers have the opportunity to generate additional tokens as rewards when pledging their PoS assets. It is this impartial process that allows distributed ledger technology (DLT) to facilitate peer-to-peer transactions without the need for a central intermediary.

Despite often being misunderstood as the comparable activities, it is important to clarify from the outset that crypto staking and crypto lending are not the same. As described above, staking is the act of pledging your assets to a blockchain network in order to secure its transactions in exchange for rewards for this support provided. Alternatively, lending involves the holder of a cryptocurrency agreeing to loan their assets for a given period of time in return for interest payments to compensate for the counterparty risk and temporary lack of access to their assets. Both staking and lending can generate passive returns on your digital asset holdings, but their associated risks and rewards can be markedly different.

THE WHY

Aside from helping to secure the network, staking offers token holders the ability to receive rewards for helping to secure the protocol as an ongoing revenue stream, which includes benefiting from any potential token appreciation. Potential token appreciation is part of the reward incentive provided to help secure the protocol. To use an illustrative example, consider an ETH fund that launched on the 1st January, 2021, holding 250,000 tokens. Without staking, the fund’s value will have grown from $328M in 2021 to $912M today, an impressive 178% increase. However, if the fund had staked its ETH throughout this time period it would now be worth north of $1BN, a delta of $90M, or 10%, from its non-staking counterpart (Figure 3).



	January 2021	January 2022	January 2023	January 2024	Present Day
Portfolio Value without Staking	$328,747,500	$672,070,000	$396,635,000	$570,545,000	$912,032,500
Portfolio Value with Staking	$330,048,792	$708,362,167	$454,851,930	$653,041,743	$1,001,547,071
Gross $ Difference	**$1,3101,292**	**$36,292,167**	**$58,216,930**	**$82,496,743**	**$89,514,571**
% Difference	0%	5%	15%	14%	10%

*Please note: Analysis assumes a historical APR of 5%, as well as a 5% commission rate paid to the staking provider.

Figure 3 - Staking scenario analysis for a 250,000 ETH fund

Experience from the European landscape, where certain ETH funds already stake a portion of their AUM, has shown that fund managers use these additional returns in a variety of ways. Some pass the rewards back to the underlying investors, while others have taken the opportunity to reduce their management fees to 0% and attract inflows this way. Regardless, adding staking to a fund's prospectus provides managers a way to differentiate themselves from other offerings in what is becoming a very competitive and commoditized market.

TECHNICAL FLOWS:

3 Non-Custodial vs. Custodial

When considering whether to stake a fund's ETH, issuers must choose to follow either a non-custodial or custodial model. Given their highly regulated nature, Blockdaemon anticipates all fund structures will follow the custodial route, however for the purpose of completeness below we run through the technicalities of both these respective solutions. Please see Section 7 on page 14 for a Glossary of associated terms.

NON-CUSTODIAL STAKING

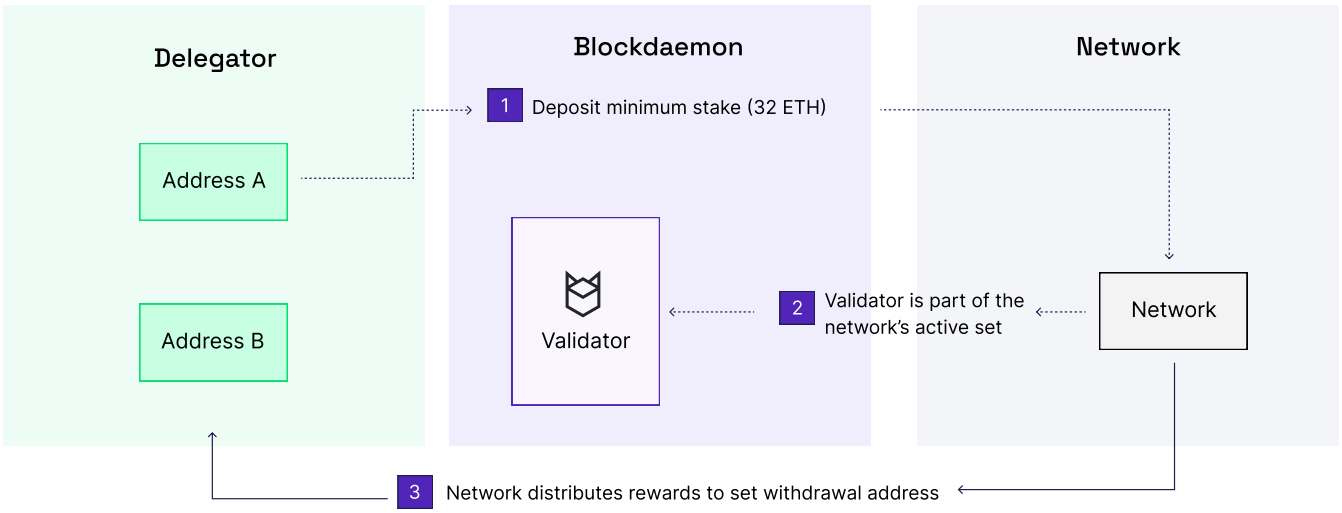


Figure 4 : Non-Custodial Staking Flow

1. Prerequisites prior to on-chain actions and setup:
   - The Delegator provides its public address (Address-A) to the Staking Provider (for instance, Blockdaemon), who derives public keys used as the public validator identities (used as part of deposit file generation).
   - The Delegator provides the Staking Provider with a Withdrawal address (Address-B) that is set as a parameter on the validator. Only the public address is provided. The Withdrawal address cannot be changed once on-chain Step 1 (below) is completed.
   - Address-A and Address-B can be, and often are, the same address.

2. Onchain actions:
   - The Delegator deposits the minimum stake per validator of 32 ETH through a smart contract interaction, using the deposit files generated by the Staking Provider. The Staking Provider never has custody of the deposited funds.

- Validators are not added to the activation queue until the delegator deposits the minimum stake.
- Validators are part of the blockchain Network, acting as shared infrastructure for batching and validating transactions which form the next block in the chain. The Delegators stake or delegate their tokens to the validators but never lose custody or control of their assets.
- The Staking Provider's public address acts as an identity on the Network.
- Rewards are determined and distributed by the blockchain Network on a normal cadence (usually once per epoch - or validation of a new block) to the Delegators directly from the Network.
- How Rewards are determined varies per Network, however factors normally include:
  - The Validator's performance (block production, signing).
  - Proportion of tokens staked compared to the entire Network.
  - Proportion of tokens staked compared to total on specific Validator.

3. Off-chain actions:
   - The Staking Provider invoices Delegators monthly for the Commission Fee as a percentage of Rewards earned or a flat USD fee, for operating the validator.

4. Exit:
   - The Staking Provider provides unsigned exit transactions to the Delegator to exit validators. The Delegator exits their validator through a supported UI or directly with the Network through smart contracts and the exit transaction provided.
   - When this is done, the validators enter the withdrawal queue, queue length is determined by the Network given only a certain number of Validators can exit per epoch.
   - The principal stake and any earned rewards are made available to the Withdrawal address set after the withdrawal sweep.

CUSTODIAL STAKING

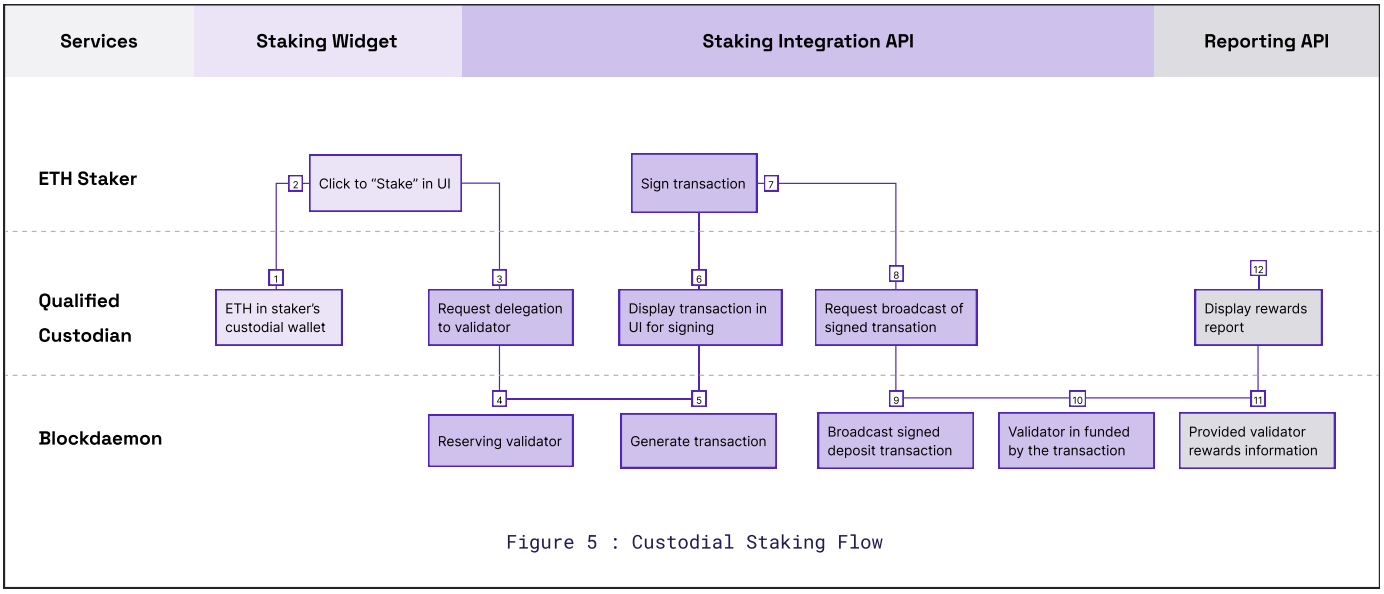


Figure 5 : Custodial Staking Flow

1. The ETH asset is funded by the custodian's digital wallet.
2. The ETH staker initiates a staking request via the custodian or custodian partner's widget UI, providing the amount of ETH, and optionally the validator withdrawal and fee recipient addresses.
3. The custodian service relays the staking request to Blockdaemon's Stake API including the amount, withdrawal and fee recipient addresses.
4. Blockdaemon reserves a validator key for every 32 ETH, from its pool of Ethereum nodes. It automatically deploys additional Ethereum nodes if necessary.
5. Blockdaemon's staking service generates the batched validator deposit transaction data and sends it back unsigned to the custodian service.
6. The custodian service presents this unsigned deposit transaction to the ETH staker for signing approval.
7. Once approved, the custodian service signs the request using the staker's digital wallet
8. The signed batch validator deposit is then sent to Blockdaemon to be broadcast to the Ethereum network.
9. Blockdaemon broadcasts the signed transaction to the Ethereum network.
10. Blockdaemon monitors the validator addresses for activation and funding status on-chain.
11. Blockdaemon observes and records on-chain validator events and rewards for reporting.
12. The custodian service retrieves reward information for each validator from Blockdaemon for reporting purposes.

Blockdaemon operates a strictly non-custodial staking offering, meaning we never touch your private keys and the assets remain in the safety of your preferred custodial or non-custodial wallet provider. In the instance of regulated fund products, where a qualified digital asset custodian will be required, Blockdaemon is already connected to the world's largest digital asset custodians (see Figure 6 below) to enable clients to stake through their preferred infrastructure.

Figure 6 : Blockdaemon Custodial Partners

BENCHMARKING:

Not always so simple

As with any asset management product, any fund that stakes its assets must benchmark the performance against an index. This not only applies to the price of the underlying token, be that ETH, DOT or SOL, but also the Annual Percentage Rewards (APR) that are distributed as a result of the staking activity.

Price indices for a variety of cryptocurrencies are well-established and widely available through multiple data providers, including Bloomberg, Nasdaq or S&P. Spot price data is abundant and methodologies are largely uniform leading to reliable, commoditized offerings.

However, finding a benchmark to accurately track a token's staking performance is somewhat more challenging. Different staking providers perform to different levels depending on a number of factors, such as: their validator's uptime, ability to capture MEV rewards, as well as the smoothing of reward randomness at scale. To that end, it is very possible one fund may achieve a 4.3% APR with one staking provider, but only a 4.1% APR with another.

Accordingly, the often widely held notion that there is an "ETH staking market rate" is arguably a myth, given issuers will find basis point variance between different providers. That being said, certain crypto index companies (namely CF Benchmarks, CESR, CCData and Compass) have done an excellent job partnering with a combination of staking partners to construct ETH Staking Indices that almost perfectly track the market's most reputable and high-performing validators.

5 RISK: What to Consider

When deciding whether or not to stake assets, it is essential to fully understand all the associated risks, both regarding the process itself, as well as the different players and their respective roles within it. Below we outline the key risk considerations which any fund needs to address and understand before progressing with their staking journey.

SLASHING RISK

Slashing refers to when there is a deviation from protocol rules by the validator, which then results in a penalty or loss of staking rewards, or both. While staking providers specialize in running this infrastructure, it is possible that these errors occur, albeit they are exceptionally rare. Indeed, since its founding in 2017 Blockdaemon has never experienced an Ethereum staking related slashing event. Regardless of that fact, Blockdaemon guarantees 100% reimbursement from, as a result of Blockdaemon's action:

- A slashing event where contractual penalties are imposed or seized by a blockchain network because of a protocol violation.
- A double-signing event where the validation of two or more different blocks at the same section of a particular blockchain network results in liability.

BONDING AND UNBONDING RISK

As described in Section 3a, most PoS blockchains impose a "waiting period" or "queue" before assets can be a) staked or "bonded" to the network and, b) unstaked or "unbonded" and returned to the withdrawal address. These time periods can vary from day-to-day depending on the market's demand to un/stake, current queue capacity, etc. With this understood, it is important to consider a portion of any funds' assets be held unstaked and liquid to ensure that client redemptions can be honored and processed in a timely manner regardless of the market's underlying liquidity conditions.

CONCENTRATION RISK

It is important to recognize that if the global fund market reaches a point whereby multiple funds begin to stake their ETH, the network's consensus mechanism could be faced with concentration risk. This is because ETH's PoS consensus mechanism requires two-thirds of validators to confirm each new block on the chain. Therefore, if more than a third of validators are inactive or act with malicious intent the network could be under threat of not being able to finalize new blocks or transactions.

Accordingly, if a single entity or decentralized protocol reached a point whereby it controlled more than 33% of the network's validators, this could expose considerable portions and participants of the network to potential inactivity or malicious collusion. If the potential forthcoming ETH ETF approvals follow a similar pattern to their BTC counterparts with regard to vendor choice, the market could be faced with this reality.

Accordingly, issuers and the wider industry should consider how central the need for diversification across the fund lifecycle is. Indeed, this applies to all stages in the fund journey, from the selection of authorized participants to market makers to custodians to staking providers. Within traditional financial markets different market infrastructure is segregated, by design, into different roles. While no two products or asset classes are identical, digital asset markets would be well-advised to follow this example of diversification closely and ensure proper delineation of infrastructure responsibilities.

PROVIDER RISK

In light of risk III, "Concentration Risk", it is also pertinent to closely scrutinize every element of a staking provider's business. Whether it be their level of financial stability, past audit reports, KYC standards, infrastructure management or client service processes, ensuring any provider is able to pass the rigorous standards the fund sets is critical.

Blockdaemon is the only ISO 27001 certified independent staking provider. Our certification recognizes the implementation of a gold-standard information security system across the entire Blockdaemon platform. We are also currently in the process of obtaining an SOC2 license in 2024.

Get in Touch

We hope this guide has proven to be informative. If you are interested in learning more about Blockdaemon's staking offering for ETH, or any other protocol, please do not hesitate to contact us:

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7 Glossary of Terms

Delegator
Holders of the Network's token who choose to stake these tokens to the protocol in order to participate in the network's consensus mechanism.. At all times throughout the staking process, the Delegator maintains control of the private keys associated with this address and has full control of the movement of tokens in and out of that address, subject to any bonding period set by the protocol.

Validator
A node, configured with the protocol's software, that operates as the primary method for producing new blocks of the Network. It does this by selecting and ordering the transactions to be included in the next block of the chain and creates that block per the protocol rules, in order to keep consensus on the blockchain.
Validator nodes act as access points for delegators to participate in the protocol's consensus mechanism, but they do not control access. A delegator can choose to simply undelegate from a specific validator and re-delegate through another validator.
Validators can be made up of multiple machine node types, a single machine node, or multiple validators on a single machine. The exact configuration of a validator node is dependent on the processing power required by a particular protocol.

Validator Keys
A Validator typically has a keypair - public and private. Public keys are the Validator's onchain identity, and the private key is used to control that identity on chain (ie. set the validator to active or inactive, set parameters like Commission Fee rate or plain text name). The actions the Validator can perform are set by the Network.
Validator Keys are NOT able to control Delegator's funds. Please note that the Validator Keys are different to the public-private key pair controlling the delegator's wallet address.
Depending on the network, a Validator may have one keypair (Public and Private), or there are multiple keys that control and operate various functions.
Tokens required on the Validator keys are typically the minimum self-stake required for the Validator to be activated, which is separate from the Delegator's staked funds. The Network sets the minimum self-stake a Validator is required to have, and can sometimes be as little as 1 Token.

Epoch
A set period of time on a blockchain Network, set in the Network parameters. The Network uses this as a set period of time for events to happen on the Network, like block production assignments and reward distribution.

Rewards
Token distributions made by the protocol if a Validator Node is chosen to validate transactions. These rewards subsidize the cost and risks of Network participation. Every Network has a specific way it calculates Rewards that can include Network state and Validator performance. The Rewards are entirely controlled and calculated by the protocol.

Commission Fee
Fees the Validator operator charges the Delegators who choose to stake their tokens to the protocol via the Validator operator infrastructure. This fee is charged as a % of any rewards distributed by the protocol to that Validator.
Commission fees help to cover operating costs of running the machine(s) and the Network bandwidth that is required to effectively operate the Validator in accordance with the Network's requirements.
Validator operators set the Commission Fee %, but are only able to change it in accordance with limitations set by the Network. The Commission Fee is public information published on the Network, accessible by any participants including Delegators.

Stake / Unstake (Bond / Unbond)
The tokens that are staked to the Network are usually locked up ("bonded") for a specified period of time. The length of time differs from protocol to protocol and is entirely controlled by the protocol.
During this period, the protocol has temporarily removed the ability for the Delegator to remove tokens from the address that is being used to stake and the tokens must remain in the address that is on the blockchain ledger.
Once the time period has elapsed, the tokens can be transferred back to the origin address ("unbonded"). Subject to any bonding period that is set by the protocol, the Delegator has full control of the movement of tokens.
A Delegator also has the ability to undelegate/unbond from a specific Validator, and re-delegate to another Validator without requiring permission from either the Validator operator or the protocol.

Slashing
To guarantee the integrity of the Network, the protocol imposes a penalty on any participant who violates the protocol's rules. This is referred to as a slashing event. These rules usually relate to signing or double-signing blocks or extreme downtime. These penalties are in place to disincentivise deliberate attempts or negligent Validator operators from harming the network.
Slashing is applied at the Validator level and is implemented by taking a set percentage from staked tokens.