



hydrate

A refreshing way to stake

1 ABSTRACT

An actively managed liquid staking service and validator information hub for Radix DLT

Radix DLT employs Delegated Proof of Stake (DPoS) to ensure a secure consensus among validator nodes responsible for processing transactions and confirming the ledger state. DPoS, a more energy-efficient alternative to the Proof of Work (PoW) consensus method used by Bitcoin (and others), requires validators to commit (stake) resources in the form of XRD (the Radix native token) to participate in consensus. Validators receive rewards in the form of XRD for ensuring consensus, known as staking rewards.

The "Delegated" part of DPoS means that XRD token holders can allocate some of their XRD to a validator (or validators) to participate in securing the network and share in the staking rewards.

For DPoS to work efficiently and securely, the following conditions are essential:

1. As many validators as possible (increased decentralization and security)
2. As equal a distribution of stake among validators as possible (increased security)
3. Validators to be as independent from each other as possible (increased decentralization and security)
4. As much XRD staked as possible (increased security)
5. A "waiting" period between unstaking from a validator and receiving XRD (increased security)

In a DPoS system, the majority of stake usually comes from non-validator-running token holders staking to their chosen validators (referred to as "stakers" in the rest of the paper). Many stakers aim to earn extra tokens through staking rewards, prioritizing returns over network security. Managing allocations to a large number of validators can be labour-intensive for those interested in improving network security. Consequently, a concentration of stake often occurs in a few validators, negatively impacting network security and discouraging new validators from joining.

The challenge Radix (and other DPoS networks) faces is that, to maximize network security, stakers must actively manage their staking allocations. However, in reality, stakers lack the will and time to do so effectively.

This is the issue that Hydrate aims to address. It seeks to provide stakers the hassle free experience of having their stake actively managed on their behalf to maximise their staking rewards and enhance the security of the Radix network.



BENEFITS OF HYDRATE FOR USERS

1

AUTOMATIC LIQUID STAKING

Automatic and diversified liquid staking minimizes risk by spreading your investment across various validators.

2

MAXIMISE STAKING BENEFITS

Prioritization of validators balances security and rewards for optimal performance.

3

ACTIVE MANAGEMENT

Automated management ensures balance and divestment from underperforming validators.

4

HASSLE FREE

Seamless integration allows for effortless staking with new validators.

5

FLEXIBLE OPTIONS

Offers flexibility with reduced lock-in periods and options for reward types (capital gains or income).

BENEFITS OF HYDRATE FOR THE RADIX NETWORK

1

NATIVE LIQUID STAKING

Maintains the flexibility provided by native liquid staking.

2

INCREASES NETWORK SECURITY

Disperses stake widely across numerous validators.

3

EASY ONBOARDING

Provides an easy avenue for new stakers to contribute to network security and earn rewards, encouraging more people to stake and increase their stakes.

In the subsequent sections of this paper, we will delve into the details of how Hydrate aims to achieve these benefits, relying on two key innovations:

- a. A validator ranking system that is easy to maintain and comprehend, determining the stake allocated to each validator at any given time to maximize staking returns for users with minimal effort.
- b. A pooled vehicle where stakers can allocate tokens, which will then stake with different validators based on the Hydrate ranking system mentioned above. This pooled vehicle will also distribute staking rewards to the stakers.

Finally, we believe that introducing Hydrate would not be complete without highlighting the guiding principles we aim to follow in its development:

- Complete transparency: We prioritize transparency because we believe it builds trust and provides information for better decision-making.
- Community-driven: Our goal is for Hydrate to primarily serve the Radix community and contribute to building Radix as a leading DLT that powers the future of finance.

UNDERSTANDING DELEGATED PROOF OF STAKE (DPOS) ON RADIX

Note: In this section, we won't delve extensively into the details of Radix's long-term roadmap and consensus mechanics. We will cover only what is essential to comprehend the discussions in the remaining sections of this paper. For a more in-depth exploration of Radix's consensus mechanics, we recommend reading the official Cerberus White Paper or the more accessible Cerberus Infographic Series with additional visuals.

Radix DLT employs Delegated Proof of Stake (DPoS) to ensure a secure consensus among validator nodes responsible for processing transactions and confirming the ledger state. DPoS stands out as a significantly more energy-efficient alternative to the Proof of Work (PoW) consensus method used by Bitcoin (and others). In DPoS, validators commit (stake) resources in the form of XRD (the Radix native token) to participate in consensus and receive XRD rewards for achieving consensus, known as staking rewards.

The "Delegated" aspect of DPoS means that XRD token holders, not interested in running a validator node themselves, can allocate some of their XRD to an existing validator (or validators) to contribute to securing the network and, in turn, share in the staking rewards.

Consequently, the total stake assigned to a validator comprises the stake assigned by the validator node runner, referred to as "owner stake," and the stake assigned to that validator by other stakers, termed "delegated stake."

$$\text{total validator stake} = \text{Owner Stake} + \text{Delegated Stake}$$

The utilization of the stake amount in the consensus mechanism varies across different PoS systems. Specifically on Radix, the stake amount determines the "voting power" of a validator in achieving consensus. The more stake allocated to a validator, the greater the influence of that validator's vote. Radix achieves consensus when at least $\frac{2}{3}$ (or 66.67%) of the total voting power agrees on the next ledger state.

Consensus on Radix is not determined by the number of validators voting to agree but rather by the voting power (allocated stake) of the validators.

SECURING DPOS ON RADIX: STRATEGIES FOR ENHANCEMENT

Given the foundational explanation of how DPoS operates on Radix, several methods can be employed to elevate the decentralization and security of the Radix network.

1. Equalize Stake Distribution Among Validators:

We've established that stake determines the "voting power" of a validator, and consensus occurs when at least $\frac{2}{3}$ of the total voting power agrees on the next ledger state. To enhance security, avoiding excessive concentration of stake on a few validators is crucial. An uneven distribution may empower a small number of validators disproportionately, making it easier for them to collaborate maliciously and influence network consensus.

Thus, a more balanced distribution of stake among validators should bolster security on the Radix network.

2. Increase the Number of Validators:

Assuming a more equitable distribution of stake, enhancing the system's security involves increasing the number of validators participating in consensus. A larger total validator count raises the threshold for a malicious actor to achieve $\frac{2}{3}$ of the voting power, as they would need to convince a greater number of validators to cooperate. In theory, the more validators there are, the more challenging it becomes for a malicious actor to sway consensus.

Consequently, a greater number of validators generally contributes to heightened security on the Radix network.

3. Diversify Validators' Server Providers and Geographic Locations:

A potential threat to a PoS network's security is the manipulation of "good" validators' participation in consensus voting. If a substantial number of validators can be prevented from voting, a malicious actor could gain undue influence. This risk is mitigated by having validators operate in dispersed geographical locations and utilize a diverse range of server providers, reducing the likelihood of a coordinated outage affecting a significant number of validators simultaneously.

Thus, geographically dispersed validators using varied server providers contribute to increased security on the Radix network.

4. Increase the Total Amount of XRD Staked:

Elevating the security of a PoS network can be achieved by increasing the total amount of tokens staked. A larger staked amount raises the barrier for malicious actors, as they would need to commit more tokens to attempt to gain significant voting power. This also magnifies the potential losses through slashing if malicious behavior is detected.

Consequently, a higher total stake amount correlates with increased security on a PoS network.

5. Implement a Waiting Period for Unstaked XRD:

Promptly determining the validity of a consensus vote can be challenging. To allow adequate time for investigation and confirmation before slashing a validator's stake, unstaking XRD goes through a waiting period (approximately one week on Radix). This precaution prevents a validator from immediately removing stake after committing it to push through a malicious transaction, thus ensuring the stake is available for slashing in case of malicious behavior.

Hence, the waiting period enhances the security of the Radix network by preserving stake for potential slashing in response to malicious actions.

THE CURRENT STATE OF STAKING ON RADIX

How to Stake and Unstake:

Staking on Radix can be accomplished using either the official Radix dashboard or third-party developed apps.

Staking to Validators:

To allocate new stake to a validator, users need to specify the validator address and the amount of XRD they wish to stake. The minimum staking amount is 100 XRD, but there is no minimum for increasing existing stake. Staked XRD begins earning rewards from the start of the following epoch. Users can stake to any registered validator, but only the top 100 validators by stake participate in consensus and earn rewards. Once staked, users receive Liquid Stake Units (LSUs) representing the staked XRD value. Note: Although the LSU amount in your wallet remains static, the redeemable value of XRD increases over time with staking rewards.

Earning Staking Rewards:

Rewards are earned at the end of each epoch and are automatically restaked with the validator, allowing for compounding without the need for continuous stake emission. Only the top 100 validators by stake amount participate in consensus and earn rewards. Users with stake in validators outside the top 100 do not earn rewards. Assuming similar fees and performance, staking to a validator at the top or near the bottom of the 100 validators yields the same staking rewards.

Unstaking from Validators:

The process to unstake is similar to staking, requiring the user to specify the validator's address and the XRD amount to unstake. There is no limit on the unstaking amount, but for security reasons, there is a roughly 7-day waiting period before unstaked tokens become available for use again.

How to Track and Report Staking Rewards:

Users can track their total staked XRD at any point using the official Radix wallet or third-party apps. However, historic staking rewards reporting for users is currently limited. To monitor whether their validators are still earning staking rewards, users must manually check in the apps.

Radix staking stats*

Stake Percentages

Total Issued XRD:	Total staked XRD:	Staked/Issued XRD:
12,797M	3,850M	30.00%

Number of validators

Number of registered Validators:	Number of validators taking part in consensus:	Number of unregistered validators:
193	100	56

"Dead" stake (stake not earning any rewards)

Total staked XRD to registered validators outside of top 100:	Total staked XRD allocated to unregistered validators:	Total staked XRD allocated to inactive validators:
15.9M	8.5M	24.4M

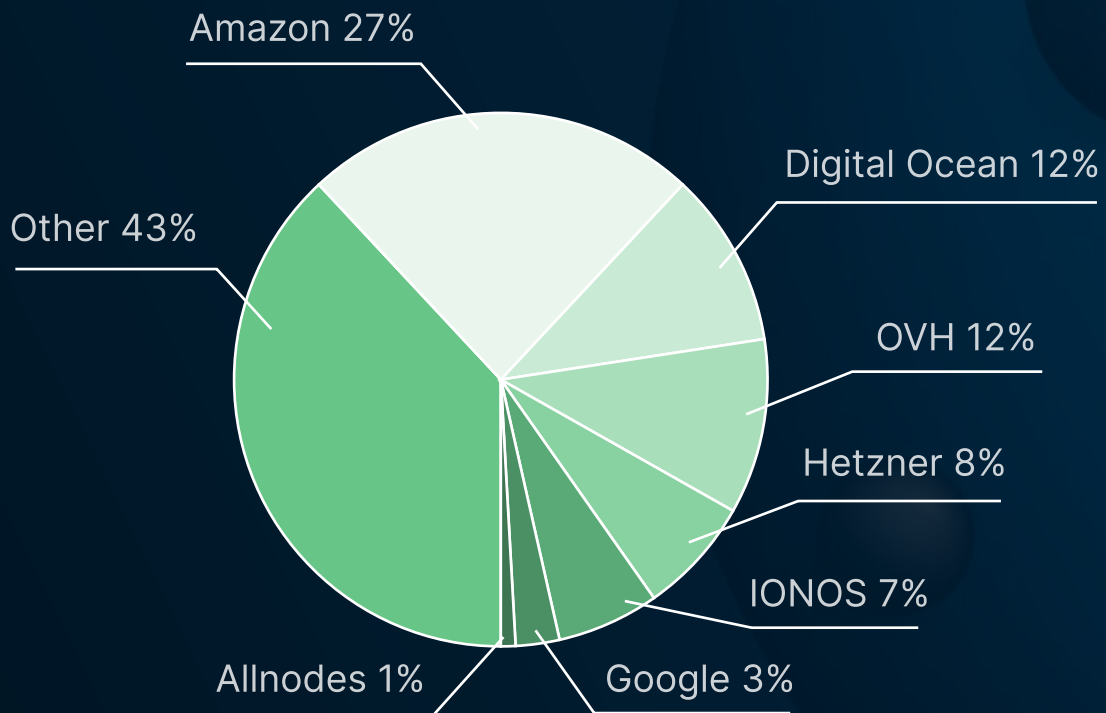
Stake concentration

% of stake allocated to top 10 validators:	% of stake allocated to top 50 validators:	Minimum number of validators needed for 2/3 of voting power:
30.60%	95%	33%

- Stake allocation is highly concentrated, with $\frac{2}{3}$ of all stake allocated to just 34 validators
- The top 50 validators hold 93% of the total stake
- There is more than 24M XRD staked to validators that do not earn any staking rewards

BREAKDOWN OF STAKE DISTRIBUTION ACROSS SERVER PROVIDERS

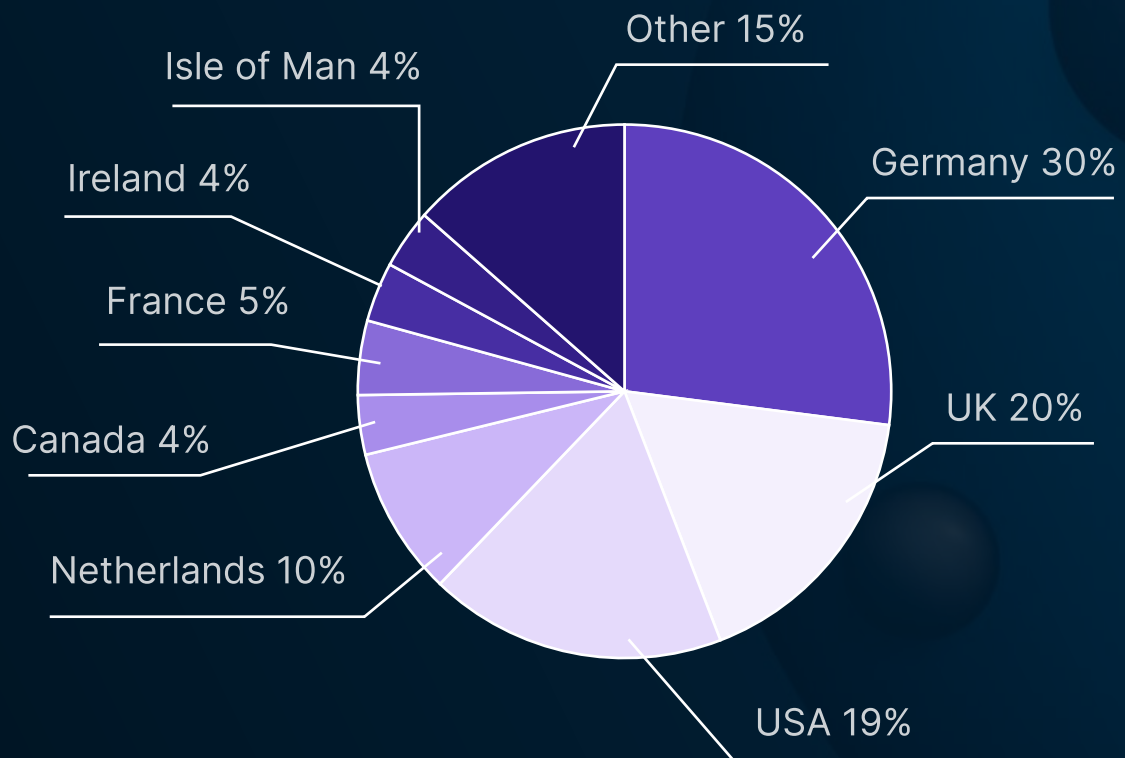
The following statistics were extracted from the data held on the Radix network validator set on 7th May 2024



41% of stake is concentrated on 3 server providers

BREAKDOWN OF STAKE DISTRIBUTION ACROSS GEOGRAPHIC LOCATION

The following statistics were extracted from the data held on the Radix network validator set on 7th May 2024



69% of voting power is concentrated in only 3 countries

THOUGHTS ON SUBOPTIMAL STAKE ALLOCATION ON RADIX

Disclaimer: The following reflections are solely based on our opinions derived from personal staking experiences and interactions within the Radix community. We present these potential reasons in this paper to elucidate why we developed Hydrate and to address certain issues we believe the app can resolve for many users.

Lack of Understanding of Security Implications:

Many users do not fully comprehend the security implications of their staking decisions. There is a general lack of awareness regarding how these decisions impact the network's security and the essential factors to consider when making such choices. For most users, staking is primarily seen as a means to earn extra XRD.

Influence on Validator Choice:

Users often allocate stake to specific validators based on factors such as low fees, popularity to support community projects, or the expectation of airdrops in addition to staking rewards. The decision-making process is not solely focused on network security.

Time Constraints on Monitoring and Management:

The manual monitoring and management required for staking allocations are time-consuming. Many users either cannot or do not wish to invest the necessary time, resulting in infrequent changes to validators or a preference for a small number of validators to simplify monitoring and management.

Lack of Information for Informed Decisions:

Users often lack easily accessible information to optimally manage their staking allocations. The need to consult multiple websites for various details, coupled with the absence of a central store or standard format for validator information, hampers the ability to make informed decisions. Users must manually track selected validators and gather detailed research data.

Concerns About Missing Staking Rewards During Unstake Waiting Period:

Users are hesitant to move stake between validators due to the unstaking waiting period, during which they earn no staking rewards. This reluctance limits the flexibility of users to adjust their stake allocation based on changing circumstances.

THE PROBLEM IS LIKELY TO EXACERBATE:

Currently, Radix limits validators to 100, but after the Xi'an update, the number of validators is expected to increase significantly, potentially reaching millions. This expansion intensifies the challenge for users to manually select and manage their staking allocations, reducing the likelihood of making decisions that prioritize network safety. Moreover, the growing validator set could face challenges attracting stake in a crowded environment, particularly if users are still expected to manually manage their allocations. This scenario might impede the growth and decentralization of the Radix network.

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INTRODUCING HYDRATE

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A streamlined and managed 'set and forget' staking experience to not only earn you the best bang for your buck, but also further provide the network with a healthy and secure stake distribution? No brainer!

James Wylie, Founder, XRD Domains

WHY CHOOSE HYDRATE?

From the initial part of this paper, it's evident that the staking experience and outcomes on the Radix network have room for improvement. Hydrate aims to address the identified shortcomings, offering users a simplified staking process. The goal is to provide users with desired staking rewards and information while ensuring optimal allocation of their staked XRD to enhance the security of the Radix network.



UNDERSTANDING HYDRATE



Hydrate introduces a pooled and actively managed liquid staking service, allowing users to delegate their staking decisions to Hydrate. The platform manages staked tokens based on predetermined rules, balancing the need to maximize returns for stakers and enhance the security of the Radix network. Additionally, Hydrate serves as a centralized source of information on all Radix validators and staking statistics, assisting stakers in making well-informed decisions..

INFORMATION PROVIDED BY HYDRATE

Hydrate focuses on delivering information about Radix validators and staking to empower users on the Radix network in making informed decisions. A comprehensive list of proposed data available on the Hydrate website is outlined in Appendix 1. At a glance, the website will feature:

- Radix network and Hydrate live staking statistics.
- Historic validator data changes (e.g., fee adjustments, name changes).
- A sortable validator list, including a Hydrate Score for each validator (details about the score are provided below).
- Detailed information pages for each validator, encompassing general validator information, historical changes, and full validator history for fields changing every epoch.
- Information about Hydrate accounts and transactions.

UNDERSTANDING THE HYDRATE SCORE

The Hydrate Score is a singular measure assigned to each validator, indicating the "optimal" allocation of stake to that validator. A higher score suggests greater optimality for stake allocation, and vice versa. This score, used by Hydrate for staking allocation decisions, is also accessible to all Radix stakers to aid in their own decision-making. The Hydrate Score considers various criteria impactning optimal stake allocation, with individual scores for each criterion contributing to the overall Hydrate Score for a validator.


HYDRATE SCORE CRITERIA AND POINTS

Validator Percentage of Total Stake on Network (Stake Points)

As previously discussed, maintaining a balance in stake distribution is crucial for network security and decentralization. The Hydrate Score allocates points based on the percentage of total stake held by a validator.

Total Stake %	>2%	1%-2%	0.5%-1%	<1%
Points	0	1	2	3

Validator Uptime (Uptime Points)

 As previously discussed, maintaining a balance in stake distribution is crucial for network security and decentralization. The Hydrate Score allocates points based on the percentage of total stake held by a validator.

Total Stake %	>2%	1%-2%	0.5%-1%	<1%
Points	0	1	2	3

Validator Fees (Fee Points)



As previously discussed, maintaining a balance in stake distribution is crucial for network security and decentralization. The Hydrate Score allocates points based on the percentage of total stake held by a validator.

Fees	>2%	1%-2%	0.5%-1%	<1%
Points	0	1	2	3


Hosting Provider (Provider Points)



As previously discussed, maintaining a balance in stake distribution is crucial for network security and decentralization. The Hydrate Score allocates points based on the percentage of total stake held by a validator.

Provider %	>2%	1%-2%	0.5%-1%	<1%
Points	0	1	2	3

Geographic Location of Validator (Location Points)


 As previously discussed, maintaining a balance in stake distribution is crucial for network security and decentralization. The Hydrate Score allocates points based on the percentage of total stake held by a validator.


Location %	>2%	1%-2%	0.5%-1%	<1%
Points	0	1	2	3

Calculating the Hydrate Score:

The Hydrate score for a validator is the product of points allocated for each criterion, updated at the end of every epoch.

Validator Hydrate score =

 Stake points X Uptime points X Fee points X Provider points X Location points.


The Hydrate score for all validators will be updated at the end of every epoch.. 

It is important to note that because the Hydrate score is the product of all criteria points, a validator will receive a 0 (zero) Hydrate score if it gets 0 points for any of the criteria where 0 points can be allocated (Stake, Uptime and Fee).

Using the Hydrate score to determine the Hydrate allocation to a validator

A validator's Hydrate score will be used to determine the stake allocation it will receive from Hydrate stakers as follows:

Hydrate validator target allocation % =

 $\text{validator Hydrate score} / \text{total Hydrate score of all validators}$

The target allocation per validator will be limited to a maximum of $2 \times 100 / (\text{number of validators with positive Hydrate Score} > 0)$ % (e.g if there are 100 validators with a Hydrate score of more than 0, then the maximum allocation to a validator will be 2% ($2 \times 100 / 100$)).

3 STAKING ON HYDRATE

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Lorem Ipsum - Lorem Ipsum

Instead of allocating stake to individual validators, users can deposit XRD or existing validator Liquid Staking Units (LSUs) to the Hydrate Component through the Hydrate app or other third-party apps. The component then allocates their contribution to various validators based on their Hydrate scores. Users receive a Hydrate staking unit (equivalent to a validator LSU), allowing them to monitor the value of their staked units. Unlike validator LSUs, users might be able to receive XRD immediately upon unstaking from Hydrate. The Hydrate app also enables users to monitor and report on their staking awards over time.

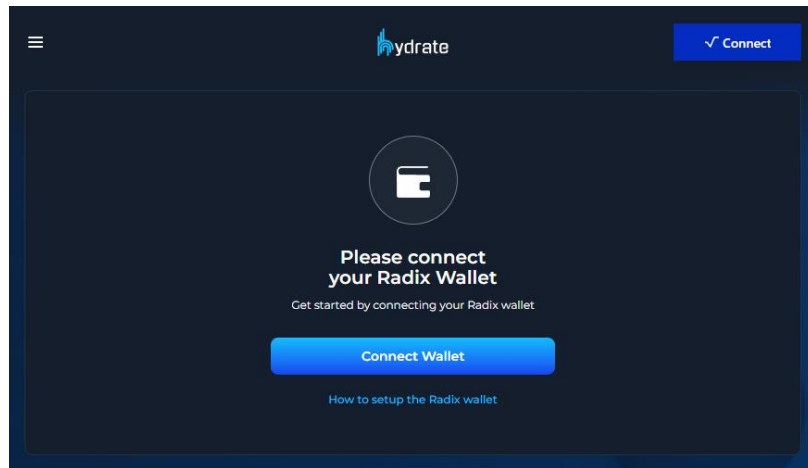
Now, let's delve into each step of the process in more detail.



THE CURRENT STATE OF STAKING ON RADIX

1. User Connects to the Hydrate App:

Users connect to the Hydrate (or third-party) app using a Radix wallet. To transact with the Hydrate Component, users need a Radix wallet capable of sending and signing transactions on the Radix network. Hydrate does not retain any personal information about the user.



2. User Stakes XRD on Hydrate:

Similar to validators, users can stake XRD in the Hydrate component. Using the Hydrate (or third-party) app, users choose the amount of XRD to stake. The app creates a transaction manifest, sending the selected XRD amount to the Hydrate component. The "stake" function is called, and users see a transfer of XRD to the Hydrate component, receiving Hydrate staking units representing their ownership in the Hydrate staking pool.

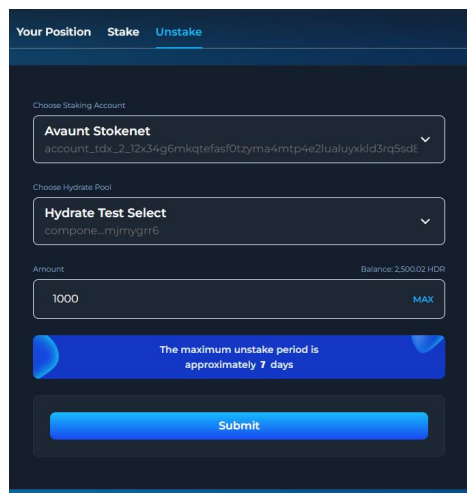
THE CURRENT STATE OF STAKING ON RADIX

3. User Stakes Other Validator LSUs on Hydrate:

To facilitate a smooth transition from staking directly with validators to staking with Hydrate, users can stake using existing validator LSUs. The Hydrate app determines the XRD value of the LSU and returns an equivalent amount of Hydrate staking units to the user.

4. User Requests Unstake from Hydrate:

Users can request to unstake from Hydrate at any time by sending Hydrate staking units back to the Hydrate component. The component immediately returns as much XRD as available. If insufficient XRD is available, the component returns a Hydrate claim NFT. The NFT includes pending and available amounts, updated as XRD becomes available. Users can claim available XRD at any time through the Hydrate (or third-party) app.



5. User Claims Available XRD from Previous Unstake from Hydrate:

Users can claim available XRD from a previous unstake transaction from the Hydrate component at any time using their Hydrate claim NFT. The component prioritizes older pending unstakes, allocating available XRD on a first-come-first-served basis.

HANDLING VALIDATOR AIRDROPS

 Hydrate will receive airdrops from validators, and strategies for handling them include selling tokens in the market for XRD, donating or not accepting airdropped tokens, redistributing tokens to Hydrate stakers (fairly determined), or implementing a separate claim component where stakers can lock up tokens temporarily to qualify for airdropped tokens, receiving them at the end of the lock-up period. The chosen strategy will be determined based on community discussions and consensus.

References: [[What are Proof of Stake and Delegated Proof of Stake](#)]