

Stake Accounts

A stake account on Solana can be used to delegate tokens to validators on the network to potentially earn rewards for the owner of the stake account. Stake accounts are created and managed differently than a traditional wallet address, known as a system account. A system account is only able to send and receive SOL from other accounts on the network, whereas a stake account supports more complex operations needed to manage a delegation of tokens.

Stake accounts on Solana also work differently than those of other Proof-of-Stake blockchain networks that you may be familiar with. This document describes the high-level structure and functions of a Solana stake account.

Account Address#

Each stake account has a unique address which can be used to look up the account information in the command line or in any network explorer tools. However, unlike a wallet address in which the holder of the address's keypair controls the wallet, the keypair associated with a stake account address does not necessarily have any control over the account. In fact, a keypair or private key may not even exist for a stake account's address.

The only time a stake account's address has a keypair file is when [creating a stake account using the command line tools](#). A new keypair file is created first only to ensure that the stake account's address is new and unique.

Understanding Account Authorities#

Certain types of accounts may have one or more signing authorities associated with a given account. An account authority is used to sign certain transactions for the account it controls. This is different from some other blockchain networks where the holder of the keypair associated with the account's address controls all of the account's activity.

Each stake account has two signing authorities specified by their respective address, each of which is authorized to perform certain operations on the stake account.

The stake authority is used to sign transactions for the following operations:

- Delegating stake
- Deactivating the stake delegation
- Splitting the stake account, creating a new stake account with a portion of the funds in the first account
- Merging two stake accounts into one
- Setting a new stake authority

The withdraw authority signs transactions for the following:

- Withdrawing un-delegated stake into a wallet address
- Setting a new withdraw authority
- Setting a new stake authority

The stake authority and withdraw authority are set when the stake account is created, and they can be changed to authorize a new signing address at any time. The stake and withdraw authority can be the same address or two different addresses.

The withdraw authority keypair holds more control over the account as it is needed to liquidate the tokens in the stake account, and can be used to reset the stake authority if the stake authority keypair becomes lost or compromised.

Securing the withdraw authority against loss or theft is of utmost importance when managing a stake account.

Multiple Delegations#

Each stake account may only be used to delegate to one validator at a time. All of the tokens in the account are either delegated or un-delegated, or in the process of becoming delegated or un-delegated. To delegate a fraction of your tokens to a validator, or to delegate to multiple validators, you must create multiple stake accounts.

This can be accomplished by creating multiple stake accounts from a wallet address containing some tokens, or by creating a single large stake account and using the stake authority to split the account into multiple accounts with token balances of your choosing.

The same stake and withdraw authorities can be assigned to multiple stake accounts.

Merging stake accounts#

Two stake accounts that have the same authorities and lockup can be merged into a single resulting stake account. A merge is possible between two stakes in the following states with no additional conditions:

- two deactivated stakes
- an inactive stake into an activating stake during its activation epoch

For the following cases, the voter pubkey and vote credits observed must match:

- two activated stakes
- two activating accounts that share an activation epoch, during the activation epoch

All other combinations of stake states will fail to merge, including all "transient" states, where a stake is activating or deactivating with a non-zero effective stake.

Delegation Warmup and Cooldown#

When a stake account is delegated, or a delegation is deactivated, the operation does not take effect immediately.

A delegation or deactivation takes several [epochs](#) to complete, with a fraction of the delegation becoming active or inactive at each epoch boundary after the transaction containing the instructions has been submitted to the cluster.

There is also a limit on how much total stake can become delegated or deactivated in a single epoch, to prevent large sudden changes in stake across the network as a whole. Since warmup and cooldown are dependent on the behavior of other network participants, their exact duration is difficult to predict. Details on the warmup and cooldown timing can be found [here](#).

Lockups#

Stake accounts can have a lockup which prevents the tokens they hold from being withdrawn before a particular date or epoch has been reached. While locked up, the stake account can still be delegated, un-delegated, or split, and its stake authority can be changed as normal. Only withdrawal into another wallet or updating the withdraw authority is not allowed.

A lockup can only be added when a stake account is first created, but it can be modified later, by the lockup authority or custodian, the address of which is also set when the account is created.

Destroying a Stake Account#

Like other types of accounts on the Solana network, a stake account that has a balance of 0 SOL is no longer tracked. If a stake account is not delegated and all of the tokens it contains are withdrawn to a wallet address, the account at that address is effectively destroyed, and will need to be manually re-created for the address to be used again.

Viewing Stake Accounts#

Stake account details can be viewed on the [Solana Explorer](#) by copying and pasting an account address into the search bar.