Validator Guide: Staking

By default your validator will have no stake. This means it will be ineligible to become leader, and unable to land votes.

Monitoring Catch Up

To delegate stake, first make sure your validator is running and has caught up to the cluster. It may take some time to catch up after your validator boots. Use thecatchup command to monitor your validator through this process:

solana catchup ~/validator-keypair.json Until your validator has caught up, it will not be able to vote successfully and stake cannot be delegated to it.

Also if you find the cluster's slot advancing faster than yours, you will likely never catch up. This typically implies some kind of networking issue between your validator and the rest of the cluster.

Create Stake Keypair

If you haven't already done so, create a staking keypair. If you have completed this step, you should see the "validator-stake-keypair.json" in your Solana runtime directory.

solana-keygen new -o ~/validator-stake-keypair.json

Delegate Stake

Now delegate 1 SOL to your validator by first creating your stake account:

solana create-stake-account ~/validator-stake-keypair.json 1 and then delegating that stake to your validator:

solana delegate-stake ~/validator-stake-keypair.json ~/vote-account-keypair.json Don't delegate your remaining SOL, as your validator will use those tokens to vote. Stakes can be re-delegated to another node at any time with the same command, but only one re-delegation is permitted per epoch:

solana delegate-stake ~/validator-stake-keypair.json ~/some-other-vote-account-keypair.json

Validator Stake Warm-up

To combat various attacks on consensus, new stake delegations are subject to awarm-up period.

Monitor a validator's stake during warmup by:

- View your vote account:solana vote-account ~/vote-account-keypair.json
- This
- displays the current state of all the votes the validator has submitted to the
- network.
- View your stake account, the delegation preference and details of your
- stake:solana stake-account ~/validator-stake-keypair.json
- solana validators
- displays the current active stake of all validators,
- including yours
- solana stake-history
- shows the history of stake warming up and cooling down
- over recent epochs
- Look for log messages on your validator indicating your next leader slot:[2019-09-27T20:16:00.319721164Z INFO solana_core::replay_stage] voted and reset PoH at tick height ####. My next leader slot is ####
- Once your stake is warmed up, you will see a stake balance listed for your
- validator by runningsolana validators

Validator Rewards

Once your stake is warmed up, and assuming the node is voting, you will now be generating validator rewards. Rewards are paid automatically on epoch boundaries.

The rewards lamports earned are split between your stake account and the vote account according to the commission rate set in the vote account. Rewards can only be earned while the validator is up and running. Further, once staked, the validator becomes an important part of the network. In order to safely remove a validator from the network, first deactivate its stake.

At the end of each slot, a validator is expected to send a vote transaction. These vote transactions are paid for by lamports from a validator's identity account.

This is a normal transaction so the standard transaction fee will apply. The transaction fee range is defined by the genesis block. The actual fee will fluctuate based on transaction load. You can determine the current fee via theRPC API "getRecentBlockhash" before submitting a transaction.

Learn more abouttransaction fees here .

Monitor Your Staked Validator

Confirm your validator becomes aleader

- After your validator is caught up, use thesolana balance
- command to monitor
- the earnings as your validator is selected as leader and collects transaction
- fees
- Solana nodes offer a number of useful JSON-RPC methods to return information
- about the network and your validator's participation. Make a request by using
- curl(or another http client of your choosing), specifying the desired
- method in JSON-RPC-formatted data. For example:

// Request curl -X POST -H "Content-Type: application/json" -d '{"jsonrpc":"2.0","id":1, "method":"getEpochInfo"}' http://localhost:8899

// Result { "jsonrpc" : "2.0" , "result" : { "epoch" :3, "slotIndex" :126, "slotsInEpoch" :256 } , "id" :1 } Helpful JSON-RPC methods:

- getEpochInfo
- An epoch
- is the
- time, i.e. number ofslots
- , for
- which aleader schedule
- is valid. This will tell you what the current epoch is and how far into it the
- cluster is.
- getVoteAccounts
- This will tell you how much active stake your validator
- currently has. A % of the validator's stake is activated on an epoch boundary.
- You can learn more about staking on Solanahere
- .
- getLeaderSchedule
- At any given moment, the network expects only one
- validator to produce ledger entries. Thevalidator currently selected to produce ledger entries
- is called the "leader". This will return the complete leader schedule(on a
- slot-by-slot basis)for currently activated stake, the identity pubkey will
- show up 1 or more times here.

Deactivating Stake

Before detaching your validator from the cluster, you should deactivate the stake that was previously delegated by running:

solana deactivate-stake ~/validator-stake-keypair.json Stake is not deactivated immediately and instead cools down in a similar fashion as stake warm up. Your validator should remain attached to the cluster while the stake is cooling down. While cooling down, your stake will continue to earn rewards. Only after stake cooldown is it safe to turn off your validator or withdraw it from the network. Cooldown may take several epochs to complete, depending on active stake and the size of your stake.

Note that a stake account may only be used once, so after deactivation, use the cli'swithdraw-stake command to recover the previously staked lamports. Previous Validator Guides: Monitoring a Validator Next Validator Guides: Troubleshooting