Using Ledger Nano Hardware Wallets in the Solana CLI

This page describes how to use a Ledger Nano S, Nano S Plus, or Nano X to interact with Solana using the command line tools.

Before You Begin

- Set up a Nano with the Solana App
- Install the Solana command-line tools

Use Ledger Nano with Solana CLI

1. Ensure the Ledger Live application is closed
2. Plug your Nano into your computer's USB port
3. Enter your pin and start the Solana app on the Nano
4. Ensure the screen reads "Application is ready"

View your Wallet ID

On your computer, run:

solana-keygen pubkey usb://ledger This confirms your Ledger device is connected properly and in the correct state to interact with the Solana CLI. The command returns your Ledger's uniquewallet ID . When you have multiple Nano devices connected to the same computer, you can use your wallet ID to specify which Ledger hardware wallet you want to use. If you only plan to use a single Nano on your computer at a time, you don't need to include the wallet ID. For information on using the wallet ID to use a specific Ledger, seeManage Multiple Hardware Wallets .

View your Wallet Addresses

Your Nano supports an arbitrary number of valid wallet addresses and signers. To view any address, use thesolana-keygen pubkey command, as shown below, followed by a validkeypair URL .

Multiple wallet addresses can be useful if you want to transfer tokens between your own accounts for different purposes, or use different keypairs on the device as signing authorities for a stake account, for example.

All of the following commands will display different addresses, associated with the keypair path given. Try them out!

solana-keygen pubkey usb://ledger solana-keygen pubkey usb://ledger?key = 0 solana-keygen pubkey usb://ledger?key = 1 solana-keygen pubkey usb://ledger?key = 2 * NOTE: keypair url parameters are ignored inzsh * see troubleshooting for more info

You can use other values for the number afterkey= as well. Any of the addresses displayed by these commands are valid Solana wallet addresses. The private portion associated with each address is stored securely on the Nano, and is used to sign transactions from this address. Just make a note of which keypair URL you used to derive any address you will be using to receive tokens.

If you are only planning to use a single address/keypair on your device, a good easy-to-remember path might be to use the address atkey=0 . View this address with:

solana-keygen pubkey usb://ledger?key

0 Now you have a wallet address (or multiple addresses), you can share any of these addresses publicly to act as a receiving address, and you can use the associated keypair URL as the signer for transactions from that address.

View your Balance

To view the balance of any account, regardless of which wallet it uses, use thesolana balance command:

solana balance SOME_WALLET_ADDRESS For example, if your address is7cvkjYAkUYs4W8XcXsca7cBrEGFeSUjeZmKoNBvEwyri , then enter the following command to view the balance:

solana balance 7cvkjYAkUYs4W8XcXsca7cBrEGFeSUjeZmKoNBvEwyri You can also view the balance of any account address on the Accounts tab in theExplorer and paste the address in the box to view the balance in your web browser.

Note: Any address with a balance of 0 SOL, such as a newly created one on your Ledger, will show as "Not Found" in the explorer. Empty accounts and non-existent accounts are treated the same in Solana. This will change when your account

address has some SOL in it.

Send SOL from a Nano

To send some tokens from an address controlled by your Nano, you will need to use the device to sign a transaction, using the same keypair URL you used to derive the address. To do this, make sure your Nano is plugged in, unlocked with the PIN, Ledger Live is not running, and the Solana App is open on the device, showing "Application is Ready".

Thesolana transfer command is used to specify to which address to send tokens, how many tokens to send, and uses the--keypair argument to specify which keypair is sending the tokens, which will sign the transaction, and the balance from the associated address will decrease.

solana transfer RECIPIENT_ADDRESS AMOUNT --keypair KEYPAIR_URL_OF_SENDER Below is a full example. First, an address is viewed at a certain keypair URL. Second, the balance of that address is checked. Lastly, a transfer transaction is entered to send1 SOL to the recipient address7cvkjYAkUYs4W8XcXsca7cBrEGFeSUjeZmKoNBvEwyri . When you hit Enter for a transfer command, you will be prompted to approve the transaction details on your Ledger device. On the device, use the right and left buttons to review the transaction details. If they look correct, click both buttons on the "Approve" screen, otherwise push both buttons on the "Reject" screen.

~ solana-keygen pubkey usb://ledger?key

42 CjeqzArkZt6xwdnZ9NZSf8D1CNJN1rjeFiyd8q7iLWAV

~ solana balance CjeqzArkZt6xwdnZ9NZSf8D1CNJN1rjeFiyd8q7iLWAV 1.000005 SOL

~ solana transfer 7cvkjYAkUYs4W8XcXsca7cBrEGFeSUjeZmKoNBvEwyri 1 --keypair usb://ledger?key = 42 Waiting for your approval on Ledger hardware wallet usb://ledger/2JT2Xvy6T8hSmT8g6WdeDbHUgoeGdj6bE2VueCZUJmyN ✅ Approved

Signature: kemu9jDEuPirKNRKiHan7ycybYsZp7pFefAdvWZRq5VRHCLgXTXaFVw3pfh87MQcWX4kQY4TjSBmESrwMApom1V After approving the transaction on your device, the program will display the transaction signature, and wait for the maximum number of confirmations (32) before returning. This only takes a few seconds, and then the transaction is finalized on the Solana network. You can view details of this or any other transaction by going to the Transaction tab in theExplorer and paste in the transaction signature.

Advanced Operations

Manage Multiple Hardware Wallets

It is sometimes useful to sign a transaction with keys from multiple hardware wallets. Signing with multiple wallets requiresfully qualified keypair URLs . When the URL is not fully qualified, the Solana CLI will prompt you with the fully qualified URLs of all connected hardware wallets, and ask you to choose which wallet to use for each signature.

Instead of using the interactive prompts, you can generate fully qualified URLs using the Solana CLIresolve-signer command. For example, try connecting a Nano to USB, unlock it with your pin, and running the following command:

solana resolve-signer usb://ledger?key=0/0 You will see output similar to:

usb://ledger/BsNsvfXqQTtJnagwFWdBS7FBXgnsK8VZ5CmuznN85swK?key=0/0 but whereBsNsvfXqQTtJnagwFWdBS7FBXgnsK8VZ5CmuznN85swK is yourWALLET_ID .

With your fully qualified URL, you can connect multiple hardware wallets to the same computer and uniquely identify a keypair from any of them. Use the output from theresolve-signer command anywhere asolana command expects a entry to use that resolved path as the signer for that part of the given transaction.

Troubleshooting

Keypair URL parameters are ignored in zsh

The question mark character is a special character in zsh. If that's not a feature you use, add the following line to your~/.zshrc to treat it as a normal character:

unsetopt nomatch Then either restart your shell window or run~/.zshrc :

source ~/.zshrc If you would prefer not to disable zsh's special handling of the question mark character, you can disable it explicitly with a backslash in your keypair URLs. For example:

```
solana-keygen pubkey usb://ledger \ ?key = 0
```

Support

You can find additional support and get help on the [Solana StackExchange](#) .

Read more about [sending and receiving tokens](#) and [delegating stake](#) . You can use your Ledger keypair URL anywhere you see an option or argument that accepts a . [Previous Using Hardware Wallets in the Solana CLI](#)[Next Solana CLI: Connecting to a Cluster](#)