

Installation

Step 1: Node Installation

Step 1.1: Node Configuration

This step provides procedures to install BandChain's executable and sync blocks with other peers.

Assuming to run on Ubuntu 22.04 LTS allowing connection on port 26656 for P2P connection.

Before beginning instructions, the following variables should be set to be used in further instructions. Please make sure that these variables are set every time when using the new shell session.

Chain ID of testnet

```
export
```

CHAIN_ID

```
"band-laozi-testnet6"
```

Wallet name to be used as validator's account, please change this into your name (no whitespace).

```
export
```

WALLET_NAME

```
< YOUR_WALLET_NAME
```

Name of your validator node, please change this into your name.

```
export
```

MONIKER

```
< YOUR_MONIKER
```

Seed and persistent peers for P2P communication

```
export
```

SEEDS

```
"da61931cbbbb2b62dbe7c470d049126cf365d257@35.213.165.61:26656,fffd730672f04d5dc065fa9afce2eb1d6bc4d150@35.212.60.28:26656"
```

URL of genesis file for Laozi testnet

```
export
```

GENESIS_FILE_URL

```
https://raw.githubusercontent.com/bandprotocol/launch/master/band-laozi-testnet6/genesis.json
```

Data sources/oracle scripts files

```
export
```

BIN_FILES_URL

```
https://raw.githubusercontent.com/bandprotocol/launch/master/band-laozi-testnet6/files.tar.gz
```

Faucet endpoint

export

FAUCET_URL

<https://laozi-testnet6.bandchain.org/faucet>

Step 1.2: Build BandChain Core

The following applications are required to build and run the BandChain node.

- make, gcc, g++ (can be obtained from the build-essential package on linux)
- wget, curl for downloading files

install required tools

sudo

apt-get update &&

\ sudo

apt-get upgrade -y &&

\ sudo

apt-get

install -y build-essential curl

wget jq * Install Go 1.19.1

Install Go 1.19.1

wget <https://go.dev/dl/go1.19.1.linux-amd64.tar.gz> tar xf go1.19.1.linux-amd64.tar.gz sudo

mv go /usr/local/go

Set Go path to PATH variable

echo

"export PATH= PATH :/usr/local/go/bin:~/go/bin"

HOME /.profile source ~/.profile Go binary should be at /usr/local/go/bin and any executable compiled by go install command should be at ~/go/bin

Step 1.3: Clone & Install BandChain Laozi

cd ~

Clone BandChain Laozi version v2.5.4

git clone <https://github.com/bandprotocol/chain> cd chain git fetch &&

git checkout v2.5.4

Install binaries to GOPATH/bin

make

install

Step 1.4: Initialize the BandChain and download the genesis file

cd

HOME

Initialize configuration and genesis state

```
bandd init --chain-id CHAIN_ID
```

```
" MONIKER "
```

Replace genesis file with our genesis file

```
wget
```

```
GENESIS_FILE_URL -O HOME /.band/config/genesis.json
```

Download data sources / oracle scripts files, and store in HOME/.band/files

```
wget -qO- BIN_FILES_URL
```

```
|
```

```
tar xvz -C HOME /.band/
```

Create new account

```
bandd keys add
```

```
WALLET_NAME
```

Step 1.5: Setup seeds and minimum gas price

Add seeds to config.toml

```
sed -E -i \ "s/seeds = \" .* \" /seeds = \" {SEEDS} \" /"
```

```
\ HOME /.band/config/config.toml
```

Add minimum gas price

```
sed -E -i \ "s/^minimum-gas-prices = ./minimum-gas-prices = \" 0.0025uband \" /"
```

```
\ HOME /.band/config/app.toml
```

Step 2: Setup Cosmovisor

Pre-Requisite Readings * [Cosmovisor](#) Cosmovisor is a small process manager for Cosmos SDK application binaries that monitors the governance module via stdout for incoming chain upgrade proposals

Step 2.1: Setup environment variables

Add required environment variables for Cosmovisor into your profile

```
cd ~ echo
```

```
"export DAEMON_NAME=bandd"
```

```
~/.profile echo
```

```
"export DAEMON_HOME= HOME /.band"
```

```
~/.profile source ~/.profile
```

Step 2.2: Install and provide binaries

Install Cosmovisor and provide bandd binary to Cosmovisor

Install Cosmovisor

```
go install github.com/cosmos/cosmos-sdk/cosmovisor/cmd/cosmovisor@v1.0.0
```

Setup folder and provide bandd binary for Cosmovisor Genesis

```
mkdir -p HOME /.band/cosmovisor/genesis/bin mkdir -p HOME /.band/cosmovisor/upgrades cp
```

HOME /go/bin/bandd HOME /.band/cosmovisor/genesis/bin

Setup folder and provide bandd binary for Cosmovisor Upgrades

```
mkdir -p HOME /.band/cosmovisor/upgrades/v2_5/bin cp
```

```
HOME /go/bin/bandd DAEMON_HOME /cosmovisor/upgrades/v2_5/bin
```

Step 3: Sync with the network

There are two main ways to sync a node on the BandChain; Blocksync and State Sync. However, we recommend using State Sync as it's faster.

- Block Sync
- State Sync

Block Sync

Blocksync is faster than traditional consensus and syncs the chain from genesis by downloading blocks and verifying against the Merkle tree of validators. For more information see [Tendermint's FastSync Docs](#)

When syncing via Blocksync, node operators will need to provide the binary of each upgrade version for Cosmovisor to switch when it reaches the upgrade heights.

You can see the detail of genesis and each upgrade in the table below.

Upgrade name	Upgrade Height	Upgrade detail	Go version	Bandd version	Binary path
genesis	0		1.16.7	v2.3.6	
~/.band/cosmovisor/genesis/bin	v2_4 427000	link	1.19.1	v2.4.1	~/.band/cosmovisor/upgrades/v2_4/bin
~/.band/cosmovisor/upgrades/v2_5/bin	v2_5 5557800	link	1.19.1	v2.5.4	

Before doing the next step, you have to build and provide each correct bandd binary version to Cosmovisor in the binary path so that Cosmovisor can automatically switch it correctly.

State Sync

State Sync is an efficient and fast way to bootstrap a new node, and it works by replaying larger chunks of application state directly rather than replaying individual blocks or consensus rounds. For more information, see [Tendermint's State Sync docs](#).

Setup variables

Get trust height and trust hash

LATEST_HEIGHT

```
( curl -s https://rpc.laozi-testnet6.bandchain.org/block | jq -r .result.block.header.height ) ; TRUST_HEIGHT = (( LATEST_HEIGHT - 45000 ))
TRUST_HASH = ( curl -s "https://rpc.laozi-testnet6.bandchain.org/block?height= TRUST_HEIGHT "
| jq -r .result.block_id.hash )
```

show trust height and trust hash

```
echo
"TRUST HEIGHT: TRUST_HEIGHT " echo
"TRUST HASH: TRUST_HASH "
```

Setup State Sync config

Enable State Sync

```
sed -i \ '[statesync]/,+34 s/enable = false/enable = true/'
\ HOME /.band/config/config.toml
```

Set RPC Endpoint for State Sync

```
sed -E -i \ '[statesync]/,+34 s/rpc_servers = \" .* \"/rpc_servers = \" https://rpc.laozi-testnet6.bandchain.org:443,https://rpc.laozi-
testnet6.bandchain.org:443 \" /'
\ HOME /.band/config/config.toml
```

Set Trust Height for State Sync

```
sed -i \ "/[statesync]/,+34 s/trust_height = .*/trust_height = {TRUST_HEIGHT} /"
```

```
\ HOME /.band/config/config.toml
```

Set Trust Hash for State Sync

```
sed -i \ "/[statesync]/,+34 s/trust_hash = \" . * \" /trust_hash = \" {TRUST_HASH} \" /"
```

```
\ HOME /.band/config/config.toml
```

Step 4: Setup daemon service

We do recommend running the Bandchain node as a daemon, which can be set up using `systemctl`.

Step 4.1: Create BandChain service

Run the following command to create a new daemon `forcosmovisor` that runs `bandd` (This script works on non-root user).

Write bandd service file to `/etc/systemd/system/bandd.service`

```
export
```

USERNAME

```
( whoami ) sudo -E bash -c 'cat << EOF > /etc/systemd/system/bandd.service [Unit] Description=BandChain Node Daemon After=network-online.target
```

```
[Service] Environment="DAEMON_NAME=bandd" Environment="DAEMON_HOME={HOME}/.band"
Environment="DAEMON_RESTART_AFTER_UPGRADE=true" Environment="DAEMON_ALLOW_DOWNLOAD_BINARIES=false"
Environment="UNSAFE_SKIP_BACKUP=true" User=USERNAME ExecStart={HOME}/go/bin/cosmovisor start Restart=always RestartSec=3
LimitNOFILE=4096
```

```
[Install] WantedBy=multi-user.target EOF'
```

Step 4.2: Register and start bandd service

In this step, we will register and start `bandd` service

Register bandd to systemctl

```
sudo systemctl enable bandd
```

Start bandd daemon

`sudo systemctl start bandd` Once `bandd` service has been started, logs can be queried by running `journalctl -u bandd.service -f` command. You will see your node beginning to sync.

Step 5: Setup Yoda

Pre-requisite Readings * [Yoda](#) Since a subset of validators who are selected for a data request must send the data they received as a transaction of [MsgReportData](#) to BandChain.

Yoda is a program used by BandChain's validator nodes to help automatically query data from data providers by executing data source script, then submitting the result to fulfill the request. [Read more on the Yoda section.](#)

Yoda requires `indexer` to run properly. Please make sure if your node has set `indexer` in `config.toml` file as "kv"

Step 5.1: Installation

Before setting up Yoda, the Lambda function executor needs to be set up to execute data sources. If this step has not been done yet, please follow the instructions on the following pages (select either one of these methods):

- [AWS Lambda Function](#)
- [Google Cloud Function](#)

To check Yoda version, use the following command.

```
yoda version
```

v2.5.4

Step 5.2: Set the Yoda configurations

Use the command below to config your Yoda, replacing VARIABLES with their actual values.

```
rm -rf ~/.yoda
```

clear old config if exist

yoda config chain-id CHAIN_ID yoda config node http://localhost:26657 yoda config broadcast-timeout "5m" yoda config rpc-poll-interval "1s" yoda config max-try 5 yoda config validator (bandd keys show WALLET_NAME -a --bech val) Then, add multiple reporter accounts to allow Yoda to submit transactions concurrently.

yoda keys add REPORTER_1 yoda keys add REPORTER_2 yoda keys add REPORTER_3 yoda keys add REPORTER_4 yoda keys add REPORTER_5 Lastly, configure the Lambda Executor endpoint to helps running data source scripts and return results to Yoda. More details about the executor can be found in this [section](#) .

```
export
```

EXECUTOR_URL

```
< YOUR_EXECUTOR_URL
```

```
yoda config executor "rest: {EXECUTOR_URL} ?timeout=10s"
```

Step 5.3: Start Yoda

To start Yoda, it's also recommended to use `systemctl` .

Write yoda service to /etc/systemd/system/yoda.service

```
export
```

USERNAME

```
( whoami ) sudo -E bash -c 'cat << EOF > /etc/systemd/system/yoda.service [Unit] Description=Yoda Daemon After=network-online.target
```

```
[Service] User=USERNAME ExecStart=/home/USERNAME/go/bin/yoda run Restart=always RestartSec=3 LimitNOFILE=4096
```

```
[Install] WantedBy=multi-user.target EOF' The first time running Yoda, you will need to register and start yoda services by running the following commands.
```

Register yoda to systemctl

```
sudo systemctl enable yoda
```

Start yoda daemon

`sudo systemctl start yoda` After yoda service has been started, logs can be queried by running `journalctl -u yoda.service -f` command. The log should be similar to the following log example below. Once verified, you can stop tailing the log by typing `Control-C` .

```
.. . systemd [ .. . ] : Started Yoda Daemon. .. . yoda [ .. . ] : I [ .. . ] * Creating HTTP client with node URI: tcp://localhost:26657 .. . yoda [ .. . ] : I
[ .. . ] Starting WebSocket subscriber .. . yoda [ .. . ] : I [ .. . ] Subscribing to events with query: tm.event
=
```

```
'Tx' .. .
```

Step 5.4: Wait for the latest blocks to be synced

It is imperative to exercise caution and allow adequate time for the newly started BandChain node to synchronize its blocks until it has reached the latest block. The latest block can be verified on [CosmoScan](#) . [Previous Getting Started Next Become a Validator](#)