

Free TON Decentralized Exchange Implementation Stage I

Contest submission By RadianceTeam

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Glossary

AMM — An automated market maker (AMM) is a type of decentralized exchange (DEX) protocol that relies on a mathematical formula to price assets. Instead of using an order book like a traditional exchange, assets are priced according to a ratio between assets in Liquidity Pools.

Liquidity Pools - liquidity pool is a trading venue for a pair of tokens.

Liquidity Provider – a user of the AMM DEX that add funds to pairs in return for a Liquidity Provider fees paid by traders for every trade.

Pair – a smart-contract system that manages DEX token reserves. A user can connect his client wallet to a pair to automatically deploy the respective TIP-3 wallets to perform token swap and provide liquidity.

TIP-3 token standard - Free TON standard interface for distributed tokens, provides basic functionality to mint and transfer tokens between token wallets.

Debot – special smart-contract, which intended to be run locally on client with full abilities to access blockchain. Primary goal is E2ED support.

Description

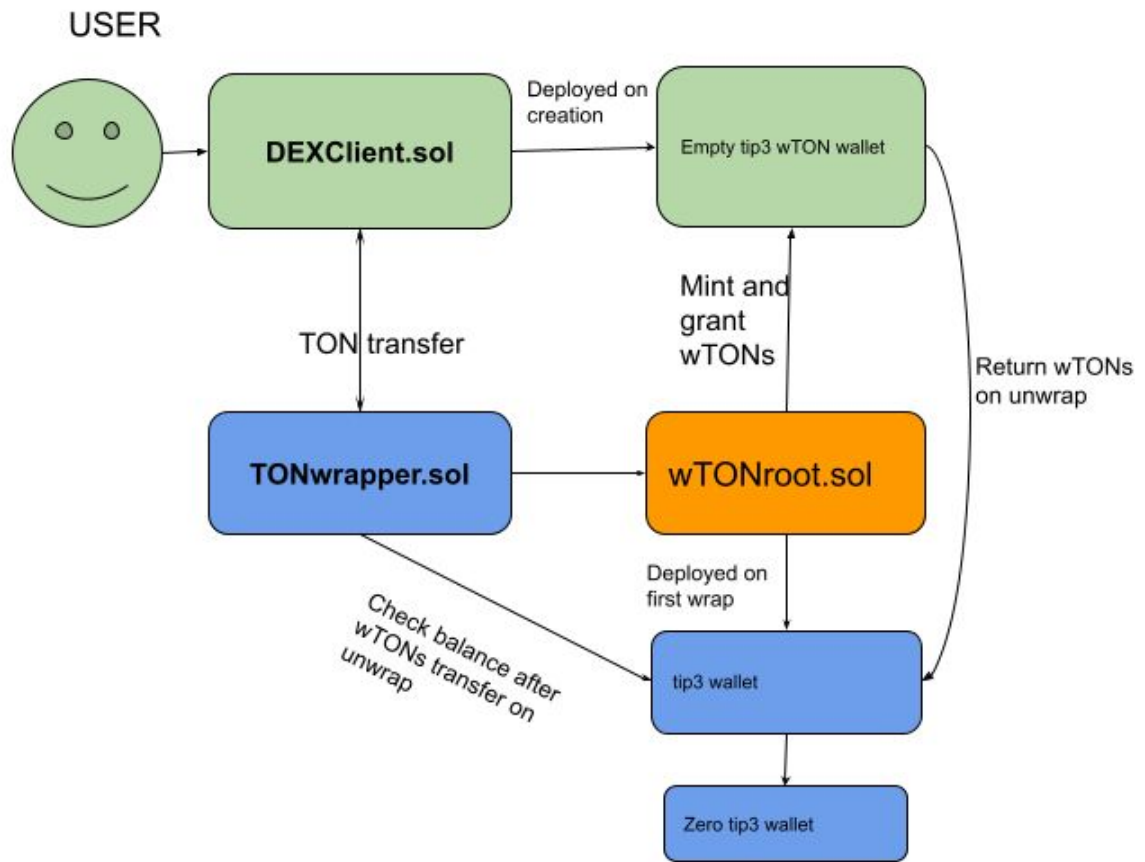
Implementation of this DEX is functionally based on Uniswap design approach and thus AMM-based with TIP-3 support for wrapping any coins and debot interface support.

What has been done:

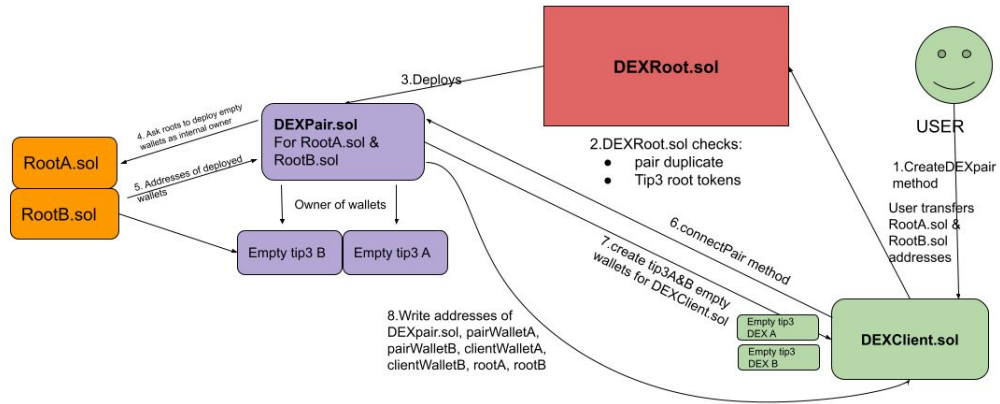
- set of smart-contracts:
 - DEX Client - a multi-token TIP-3 DEX wallet
 - DEX Pair - a smart contract that handles liquidity, exchange of assets, client wallet deployment
 - TONWrapper - handles “wrapping” of TONs and TIP-3 tokens into a standard necessary for DEX operation
- set of debots:
 - Wrapper
 - Liquidity provider
 - Swapper
- auto deployment of related smart-contracts;
- testing scenarios;
- preliminary gas measurements;
- performance/gas/optimisations for message routing (work in progress);
- preliminary integration of TIP-3 tokens into Extraton chrome extension wallet.

DEX Smart-Contract Architecture

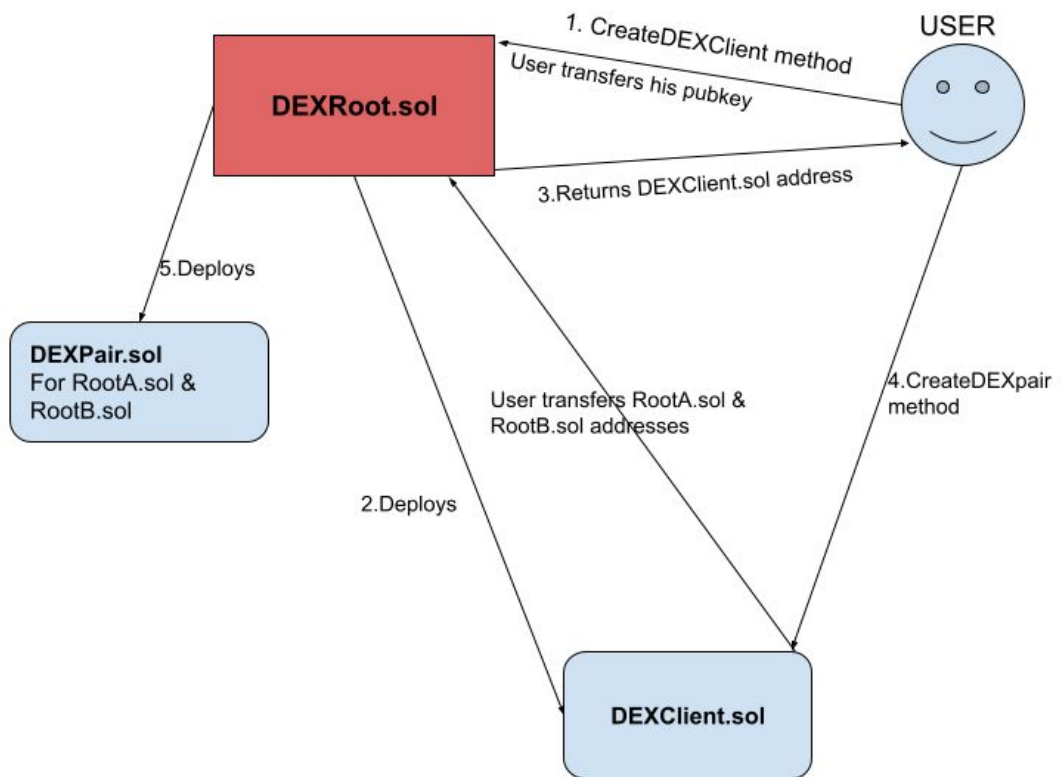
Minting (wrapper) diagram



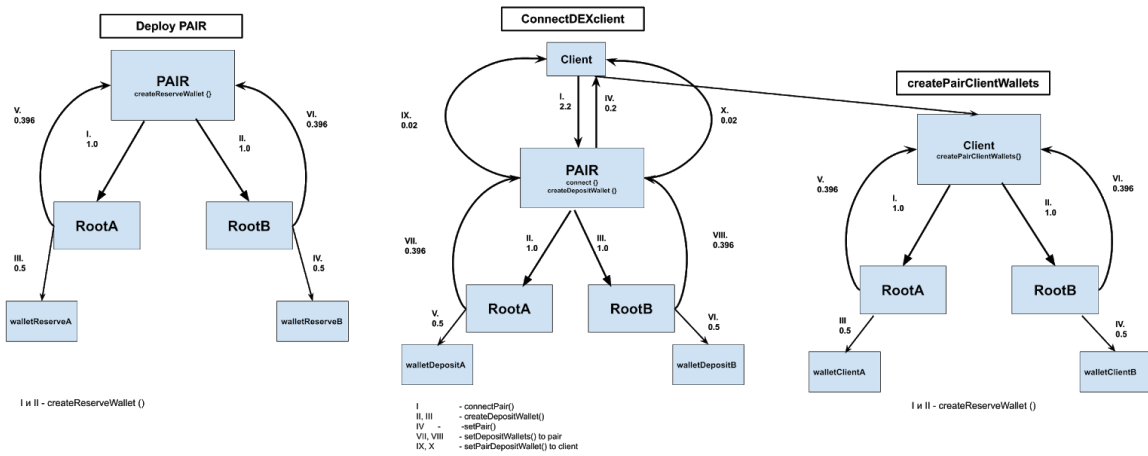
Pair create



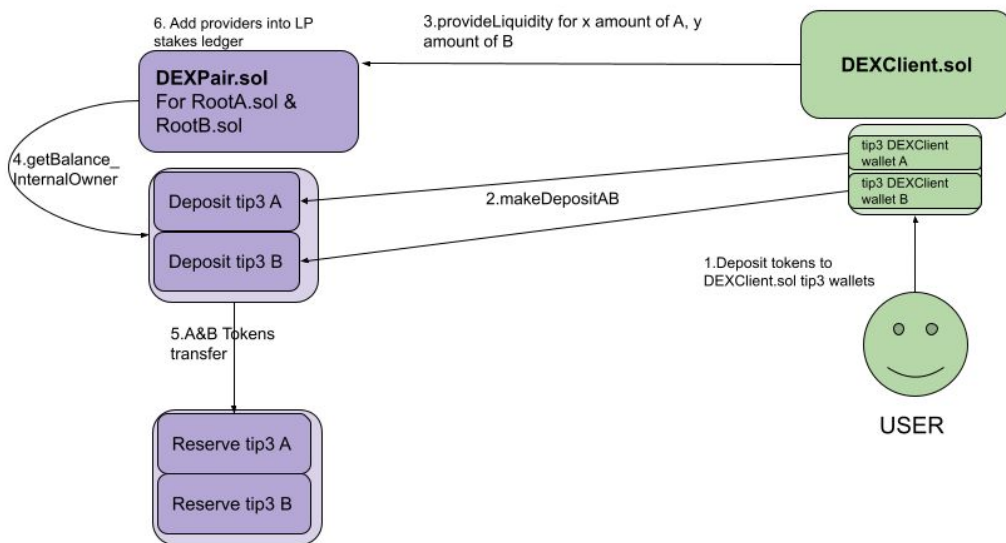
Client create



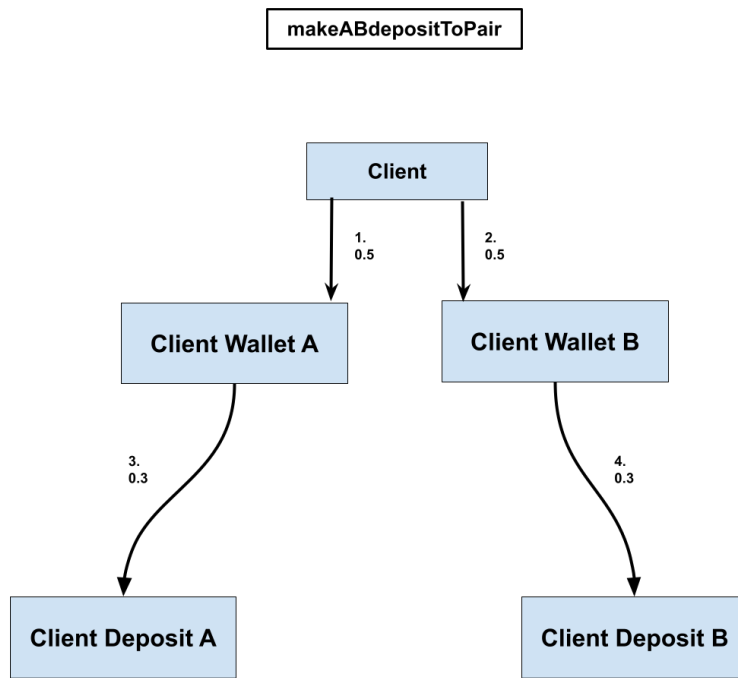
Client connection diagram



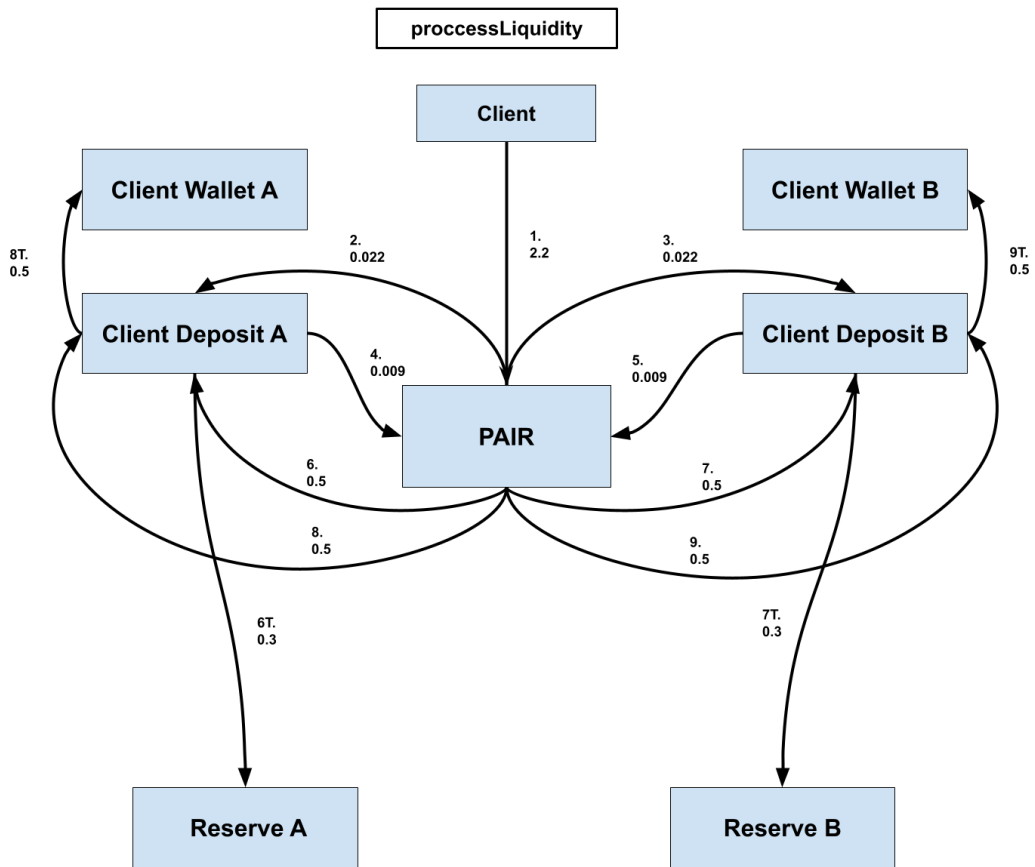
Provide liquidity



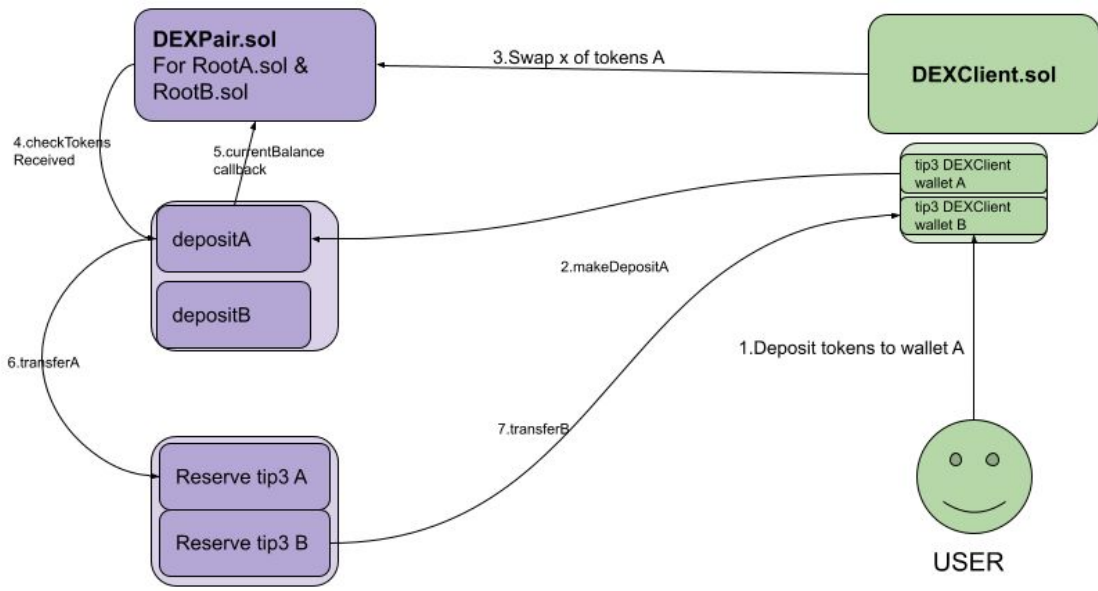
Liquidity processing diagram 1



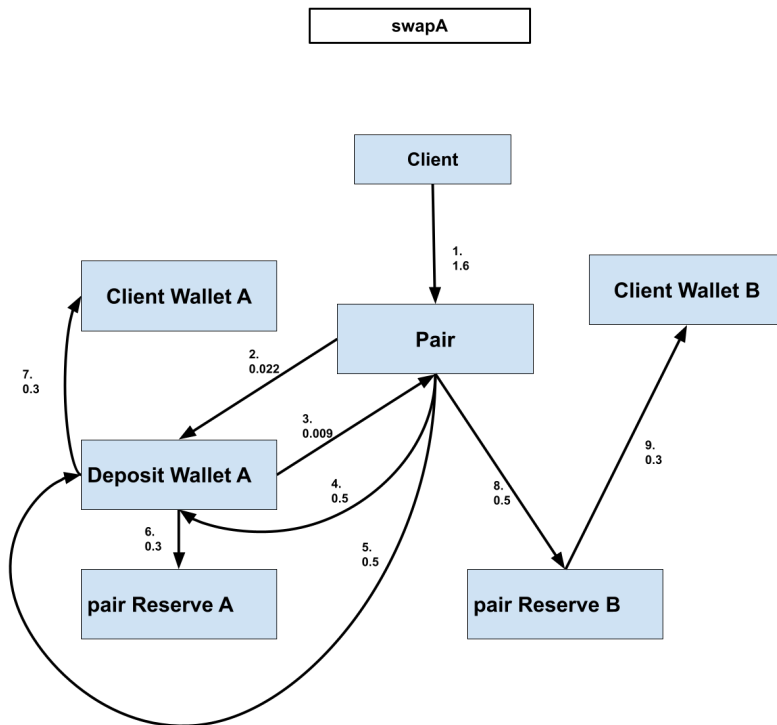
Liquidity processing diagram 2



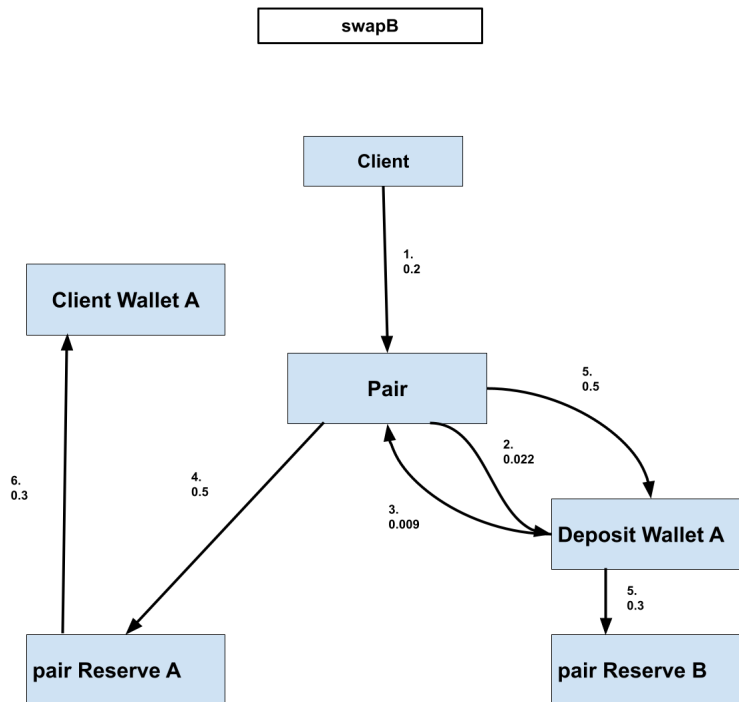
Swap



Swap diagram 1



Swap diagram 2



The current swap rate for 1 tokenA (to tokenB swap) is :

$$\text{Rate} = \text{balanceReserveB} / \text{balanceReserveA}$$

DEXpair swap fee default value is fix **0,3%** of quantity on income Token. Income token is the token which added to the DEX liquidity pool during swap operation (and not withdrawn).

Current stage implementation has a locked limit for maximum exchange rate change during one swap. DEXpair oracle limit for one swap is max **0,5%** change for *balanceReserveA* or *balanceReserveB*. On the next stage we will connect to existing oracle (if any) or provide another solution (based on decentralized bridge implementation).

Optimisations planned for later implementation stages:

- Getting rid of restriction on number of LPs in the system. This will be done by implementing TIP3-like decomposition to storing multiple contracts;
- Messages routing optimisations. This will heavily shorten the turnaround time of basic actions like performing a swap. Proposed changes will be made in deploying contracts into specific shard, so the TON message routing between blockchain shards will be minimized;

- Build for priority on client-side calculations in debot - this is an abstract principle, but all Free TON blockchain developers think about that priority.

Compatibility with TIP-3

As a mandatory requirement for contest submission we used TON LABS implementation of TIP-3 smart-contracts as a basis. During our work on this DEX we submitted a bugfix ([link to Github pull request](#)) to TIP-3 repository and discovered several additional options to discuss.

Because of that we have fulfilled the TIP-3 compatibility requirement.

Any other variations of TIP-3 token smart-contracts are necessary to be wrapped by DEX TIP-3 to be fully prepared to work with DEX smart-contracts. The wrapper realization is also provided (see).

Debot interfaces for DEX

A set of debot interfaces was developed for easy and smooth interaction with the decentralized exchange. Each of these debots have basic functionality for TONs and TIP-3 token balance display, connection to TIP-3 token pairs as well as specialized features:

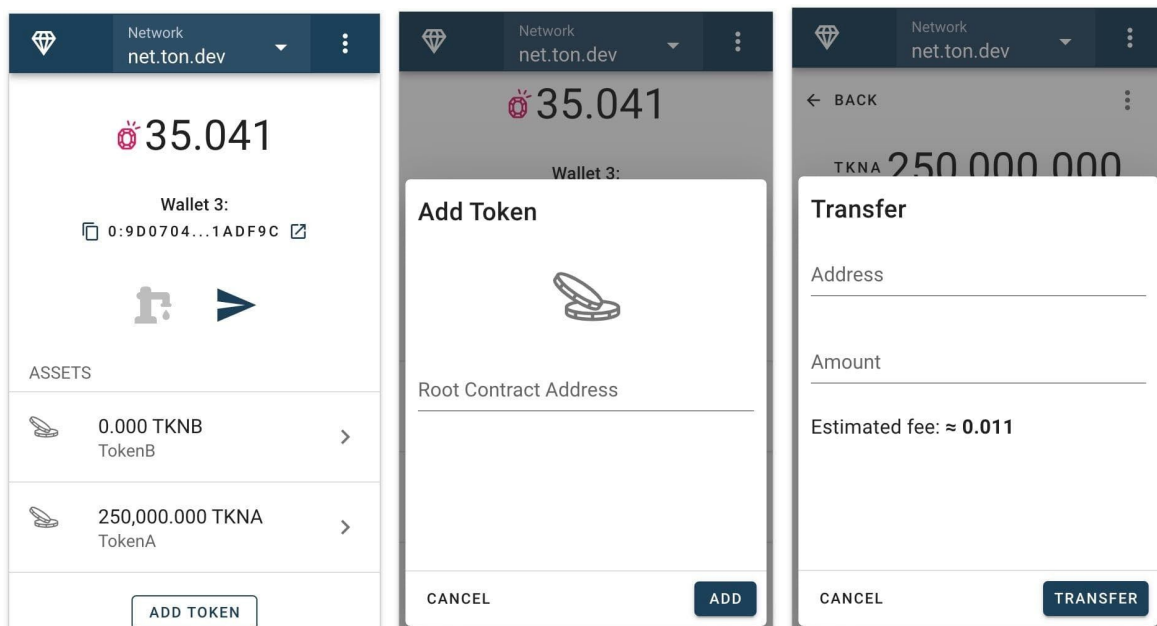
- Wrapper debot - a service debot that allows a user to convert their TONs into TIP-3 tokens for later use with token pairs that include wTON;
- Swapper debot - a debot that allows a user to swap tokens using liquidity in token pairs;
- Liquidity Provider debot - a debot that allows a user to provide liquidity into token pairs as well as withdraw it.

To view instructions on Debots and testing scenarios please open DEX-Debot readme here: <https://github.com/radianceteam/dex/tree/main/DEX-debots>

Secondary interfaces for DEX

Browser extension for Chrome

In cooperation with ExtraTON team the extension for Chrome browser called ExtraTON Wallet got the alpha version support for TIP-3 DEX compatible wallets. This feature is optionally available in the upcoming ExtraTON Wallet extension by ExtraTON.



Telegram bot

In order to bring the DEX functionality a step closer to real user we started working on a Telegram Bot which is intended for testing exchange functionality.

It will be available as @TONDEX_bot in Telegram, currently WIP (work in progress).

Testing scenarios for DEX

To test the proposed DEX implementation you can either use a set of scripts for tonos-cli or debot interfaces.

For this testing scenario we have prepared 6 TIP-3 token contracts and created trading pairs with liquidity to swap and provide liquidity to.

However, to use the proposed DEX implementation a user needs to convert their TON crystals into TIP-3 token (wTONs). For this purpose we have developed a TIP-3 Wrapper which can be accessed through tonos-cli scripts or debot interface. It can also be used to un-wrap TIP-3 TON tokens (wTONs).

Preliminary conditions for testing

- Deployed smart-contracts for DEXcore (see detailed instructions here <https://github.com/radianceteam/dex/tree/main/DEXcore>)
- Deployed TIP-3 Root contracts
- Token liquidity added to pairs