

ContractLand

Powering The Decentralized Economy

Abstract. ContractLand is an asset tokenization, exchange, and management platform to enable businesses and end-users in the decentralized ecosystem of web 3.0. The platform is built on top of Terra-Chain; an Application Specific Blockchain (ASB) built for scalable and interoperable transactions, enabling the liquidity of tokenized assets across an internet of blockchain ecosystem.

Version 2.0.1

June 28th, 2018

Contents

Contents	1
Background	1
The ContractLand Platform	3
Built for the Internet of Blockchain	3
Platform Layers	4
Smart Contract Template Manager	5
Decentralized Exchange	6
Wallet	6
Terra-Chain	6
Blockchain Technology	7
Consensus	7
Aura - Authority Round	7
Benefits over PoW	8
Validators	8
Blockchain Economics	8
Permission	9
Interoperability	10
Terra Bridge	10
The ContractLand Token (CLC)	12
CLC will be deployed as an ERC20 token.	12
Token Utilities	12
Token Distribution & Fund Allocation	13

Background

Blockchain technology was revolutionary in enabling the creation of tokenized assets that are fungible, transferable, and verifiable. It allowed anyone to own and transfer assets across an open financial network without the need for a trusted third party. The inception of smart contracts extended these capabilities to a far greater degree - disrupting the fundamental form of human trust and interaction.

One of the most promising concepts spawned from smart contract adoption is **tokenization**. Differing from traditional cryptocurrency, a token allows for business logic and relationship models to be imbued in the token - providing unprecedented efficiency to **value transfer, contractual relationships, and capital management**. This not only has the potential for immense impact on modern digital constructs, but also brings several opportunities to revolutionize traditional business models. Since the inception of Ethereum, hundreds of new businesses have been conceived on this new decentralized medium, forming an entire new industry of blockchain-centric companies.

The adoption of the tokenization model has been substantial within the blockchain community, with innovation atop smart contracts bringing us closer to a more collaborative and fair economy. But to inspire wider utilization amongst traditional industries, we need to overcome obstacles imposed by barriers of entry, insufficient standards, and a lack of supporting infrastructure.

Technical Barriers

The process of development and execution of smart contracts is often complex, time-consuming, and error-prone. The demanding requirements of technical expertise and industry experience for blockchain-based development limits its benefits to a handful of groups. These groups, such as early adopters and established corporations financially capable to hire the necessary talent, cover a small spectrum of those willing to explore and incorporate the technology to business needs.

Lack of Standards

The rapid growth of the tokenization ideology spawned a variety of ways to perform token system design and distribution. The chaotic development of the [ICO](#) market in 2017 was a testimony to how the lack of standards can put both investors and businesses at risk. It is impractical to expect a non-blockchain-centric business to enter the space and navigate the technology without ending up on a similar path. A standardized process for designing business and value generation models based on crypto-token systems and distribution needs to be set in place.

Lack of Liquidity

Various public, consortium, and private blockchain systems are being developed and running as their own individual closed networks. Currently centralized exchanges and wallets plays the critical role in providing transfer of value and liquidity across different closed blockchain systems. However, the interests of cryptocurrency exchanges are not aligned with the interests of businesses. Enormous listing fees¹ and artificial volume inflation² are unsuitable for genuine businesses that need a stable, transparent and sustainable marketplace for their tokens. This will change as the need to transfer values across systems natively drives the advancement of technology on inter-blockchain communication.

ContractLand as an asset tokenization, exchange, and management platform will ground itself into the decentralized economic ecosystem, and provide liquidity to tokenized assets through:

- Simplifying and standardizing the utilization of smart contract and tokenized assets
- Build cross-chain exchange infrastructure to enable token liquidity of critical mass
- Improving end-user experience of blockchain and cryptocurrency

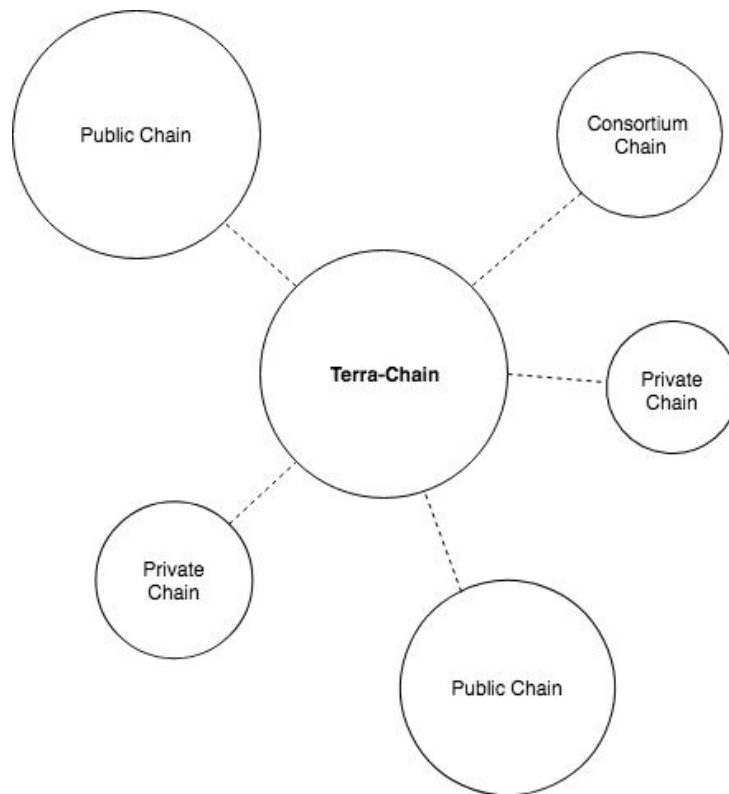
¹ "Cryptocurrency Exchanges Are Making Millions from Just Listing Coins." 12 Mar. 2018, <https://news.bitcoin.com/cryptocurrency-exchanges-are-making-millions-from-just-listing-coins/>. Accessed 21 Mar. 2018.

² "Chasing fake volume: a crypto-plague – Sylvain Ribes – Medium." 10 Mar. 2018, <https://medium.com/@sylvainartplayribes/chasing-fake-volume-a-crypto-plague-ea1a3c1e0b5e>. Accessed 21 Mar. 2018.

The ContractLand Platform

Built for the Internet of Blockchain

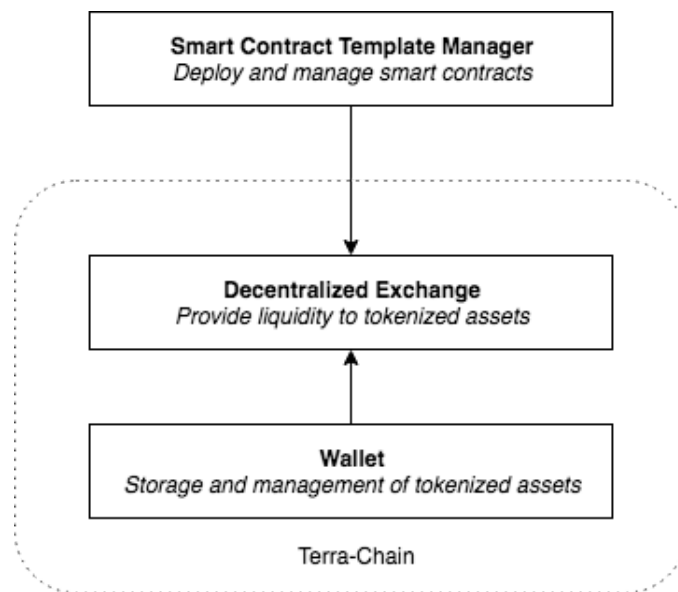
The future of web 3.0 lays in the ecosystem of an internet of blockchains, to enable businesses and end-users in this new paradigm, the ContractLand platform will initially pilot on the Ethereum blockchain, but ultimately run on-top of **Terra-Chain; an Application Specific Blockchain (ABC) built for the ContractLand platform to facilitate scalable, and transferrable transactions across an internet of blockchain ecosystem.** Terra-Chain will be first connected with Ethereum, and other popular blockchain systems to follow.



Terra-Chain connect to other blockchains via bridges

Platform Layers

The ContractLand platform is vertically integrated through the connection of the smart contract template manager, the exchange, and the wallet. The purpose of the integration is to facilitate organic and effective creation of tokenized assets while providing liquidity and management for those assets across various blockchain systems.



The three layers of the ContractLand platform

Smart Contract Template Manager

The platform contains a diverse set of standardized smart contract templates for the creation and management of tokenized assets, enterprise users can pick, deploy and manage their desired templates through the platform's user interface. The interface abstracts out the technical complexities of creating smart contracts, and provides plugins to make them easier to interact with for end users. Assets issued through the platform on the Terra-Chain can be freely transferred onto other connected blockchains and back.

Some example templates include:

- **Fungible Token**

Issuing a token can benefit businesses in a multitude of ways such as raising capital, payment processing, and community building. They achieve this by being more liquid, efficient, and transparent than their traditional counterparts. ContractLand's platform offers general implementations of these tokens that are customizable for specific business use cases on a per-deploy basis.

- **Crowdsale**

Crowdsale is the most prominent use case of smart contracts, and a powerful tool for businesses to raise capital. Combined with the property of fungible tokens, a crowdsale contract enables the trustless purchase of tokens for users. ContractLand standardizes the crowdsale process, creating a 'one-click' solution for businesses to run crowdsales.

Decentralized Exchange

ContractLand's decentralized exchange acts as the foundation layer for the platform, serve businesses and their end-users as a point of conversion and settlement for tokens. Tokens issued through the platform's template system are seamlessly integrated into the exchange for instantly tradability on the market. Dapps and wallet applications can also easily integrate with the exchange as the entirety of the logic of the exchange is written in smart contracts, allowing easy integrability to end-user applications.

The exchange can facilitate trading of assets from other blockchain systems such as existing tokens on the Ethereum blockchain. Users can simply transfer the tokens over from another chain to the Terra-Chain via the connection bridge, and start trading as if they were native assets. Assets can then be transferred back to their native chain afterwards as desired by the user.

Wallet

There are currently approximately a mere 30 million cryptocurrency users worldwide. As more businesses adopt blockchain technology, and end-user applications become more user friendly, more users will enter the space for non-trading or investment purposes. ContractLand's wallet, with direct integration into in the platform's exchange enables end-users with secured storage and utility of tokenized assets across various blockchain systems.

Terra-Chain

Terra-Chain is the first of its kind. It is an Application Specific Blockchain (ASB). ASBs are dedicated, permissioned, and high performing blockchain networks with pluggable PoA or PoS consensus. They can connect to public blockchains via an universal token bridge protocol, allowing value transfers and shared security. The ASB stack is highly modular with theoretically unlimited scalability. It's compatible with existing EVM ecosystem tools vastly simplifies the user and developer experience. To learn more about ASBs, you can review our upcoming technical paper on ASBs.

Terra-Chain runs on Proof-of-Authority³ as its consensus mechanism initially, and will upgrade to PoS. Unlike the Ethereum mainnet which allows anyone on the internet to deploy turing-complete smart contracts to the network, Terra-Chain will only run a set of smart contracts necessary to support the functionality of the ContractLand platform, and will be much lighter and performant as an ASB. The Terra Bridge is used to open up interoperability with other public blockchain networks and enable the transfer of value across different chains.

Terra-Chain mitigates blockchain scaling issues by allowing users to convert tokens from different public chains to tokens on Terra-Chain, and perform transfer and exchange operations with much lower transactions fees and faster block times. We believe Terra-Chain with its advantage on performance, cost, stability, and security over public blockchains will become a model for ASBs in the internet of blockchains ecosystem.

Blockchain Technology

The Terra-Chain network is fully compatible with the Ethereum protocol, and runs on the Parity client⁴. Parity is a modular, low-footprint, and high-performant Ethereum client with pluggable consensus and adjustable chain specifications.

³ "Proof-of-authority - Wikipedia." <https://en.wikipedia.org/wiki/Proof-of-authority>. Accessed 21 Mar. 2018.

⁴ "GitHub - paritytech/parity: Fast, light, robust Ethereum implementation.." <https://github.com/paritytech/parity>. Accessed 21 Mar. 2018.

Consensus

Aura - Authority Round

The Terra-Chain network runs on top of the Aura (Proof-of-Authority) consensus⁵ engine for its EVM blockchain in replacement of the original Ethash (Proof-of-Work) mechanism. The Aura consensus engine depends on a set of validator nodes (authorities) to be specified, who are responsible for creating new blocks and securing the blockchain in a round robin fashion. The consensus mechanism requires a majority (>50%) sign off by the validator set, after which finality is guaranteed. The Aura consensus mechanism is a popular choice for public chains and has been battle tested on networks such as the Ethereum Kovan testnet⁶.

Benefits over PoW

There are many advantages of Proof-of-Authority over Proof-of-work for application specific blockchain networks; It is **less energy consuming** since mining does not require solving arbitrarily difficult mathematical problems, more **performant** since a smaller set of mining nodes provides lower transactions acceptance latency, more **stable** since blocks are produced in short and constant intervals of time, and it is more **secure** as unwanted connection from attackers cannot overwhelm the network and potential revert global state.

Validators

Terra-Chain will be initialized with 10 validators. Prior to the launch of the Terra-Chain network, a validator generation event will be held to select the validators from a pool of reputable applicants. The validator set is maintained in a smart contract on Terra-Chain. Each validator holds a key that authenticates its identity. After the initialization of the network, validators can only be added or removed through a majority vote (>50%) from the existing validator set.

⁵ "Aura - Authority Round · Parity Ethereum Documentation." <https://wiki.parity.io/Aura>. Accessed 21 Mar. 2018.

⁶ "GitHub - kovan-testnet/proposal: Kovan PoA Testnet Proposal." <https://github.com/kovan-testnet/proposal>. Accessed 21 Mar. 2018.

Blockchain Economics

The token generation event for the Terra-Chain network will take place prior to the launch of the network, of which will be marked into the network's genesis block. Participant in the generation event will get their purchased tokens on the Terra-Chain network upon its launch.

Once the network is launch, the validators will start creating blocks, and receive transactions fees for providing security for the network.

The Terra-Chain network will initially be set to have a **4 seconds block time**. The total number of blocks created by validators per year will be:

$$\frac{30,758,400 \text{ seconds}}{4 \text{ seconds per block}} = 7,689,600 \text{ blocks}$$

Permission

Public blockchains optimizes for decentralization where all participants are able to perform all roles within the networks such as connect, mine, send transactions, and inspect blockchain state. The Terra-Chain network being an application specific chain for the ContractLand platform limits certain permissions of the network for enhanced security and performance.

Connect to Peers

Permissions on this layer determines which nodes can connect to the network and interact with other nodes. The Terra-Chain will not impose any limitations on this aspect as anyone should be able to connect to the network to use the ContractLand platform.

Mine

Terra-Chain's Proof-of-Authority consensus mechanism by default limits role of mining to the network's set of validator, enabling faster transaction confirmations, and more stable network states.

Send Transactions

There are three type of transactions on the EVM:

- Contract deployment
- Contract interaction
- Simple transfer

On the Terra-Chain network, contract interaction and simple transfers will be open to the public, while contract deployment will be only limited to network validators and existing contracts on the network. The only cases for contracts deployment on the Terra-Chain are for updates of the ContractLand platform, which will be done through the platform's validator node. And tokenized asset creation through templates, which will be done via factory contracts on the network.

Inspect Blockchain State

The inspection of blockchain state will also be available to the general public to ensure the verifiability of Terra-Chain's state integrity.

Interoperability

Interoperability is a key functionality of the Terra-Chain network. By connecting Terra-Chain to other major public blockchains, it opens up transferability and allows the ContractLand platform to become a liquidity center for tokenized assets across chains.

Terra Bridge

Terra Bridge is an open sourced solution for connecting blockchains and enable the transferring of tokens between them. The Terra Bridge is inspired by the Parity Bridge⁷, which allows the transfer of Ether between two EVM based chains, we have built on top of this original concept and have enabled the transfer of all tokens (including Ether, fungible and non-fungible tokens) between different blockchain systems beyond EVM chains. The bridge works through a *ForeignBridge* contract which takes token deposit from users on the *Foreign* chain, and the same amount of tokens will be accessible on the *HomeBridge* contract on the *Home* chain. The bridge works in conjunction with Proof-of-Authority consensus mechanism, as the relay of messages between chains happen in a byzantine

⁷ "GitHub - paritytech/parity-bridge: Bridge between any two ethereum"
<https://github.com/paritytech/parity-bridge>. Accessed 28 Jun. 2018.

fault tolerant way by the validators of the *Home* chain. In our case, Terra-Chain will be the *Home* chain and connected public chains will be *Foreign* chains.

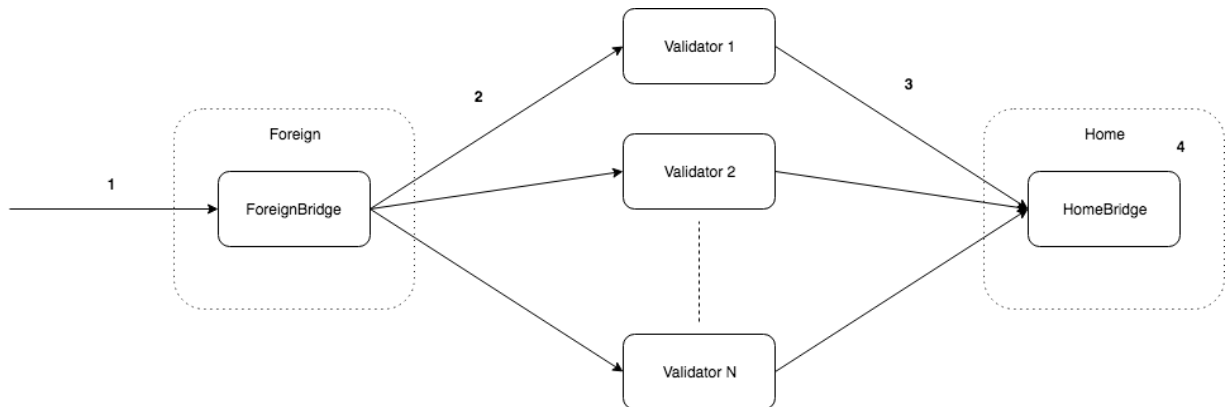


Illustration of token transfer from Foreign to Home

1. User deposit token into *ForeignBridge*
2. *ForeignBridge* emits *Deposit* event, and gets picked up by validators
3. For each *Deposit* event, validators execute *deposit* method on *HomeBridge*
4. Once a majority of the validators have confirmed the deposit, user balance will be increase on *HomeBridge*.

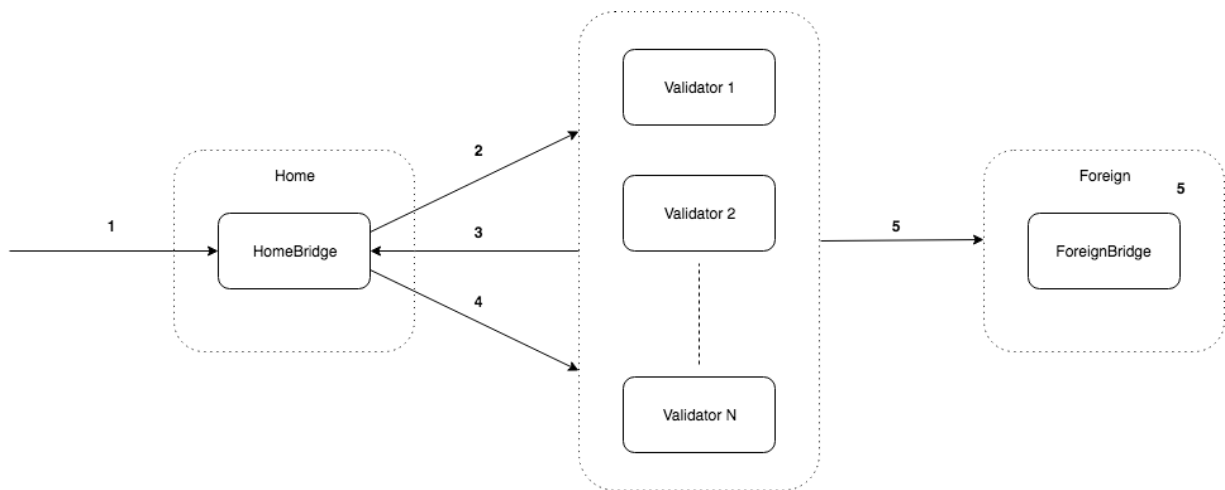


Illustration of token transfer from Home to Foreign

1. User withdraw token from *HomeBridge*
2. *HomeBridge* emits *Withdraw* event, and gets picked up by validators
3. For each *Withdraw* event, validators submits a confirmation message to the *HomeBridge* verifying the withdraw
4. Once a majority of the validators have confirmed the withdraw, the *HomeBridge* emits a *CollectedSignature* event

5. Any validator can then execute the *withdraw* method on the *ForeignBridge* with the collected signatures, and user tokens will be released from *ForeignBridge*

The ContractLand Token (CLC)

CLC will be deployed as an ERC20 token.

Token Utilities

- **Template Usage Cost**

CLC is used as the service token for the ContractLand's smart contract template service.

Costs for deployment and usage of templates will be charged through CLC.

- **Exchange Listing Fee**

Given the DEX is ran on an open network, it can be accessed and used by anyone. But only businesses approved by ContractLand will be visible and searchable on the official platform's user interface. This will be a standard and transparent fee structure applied to all businesses, and minimal compared to traditional crypto exchange listing fees.

- **Exchange Trading Discount**

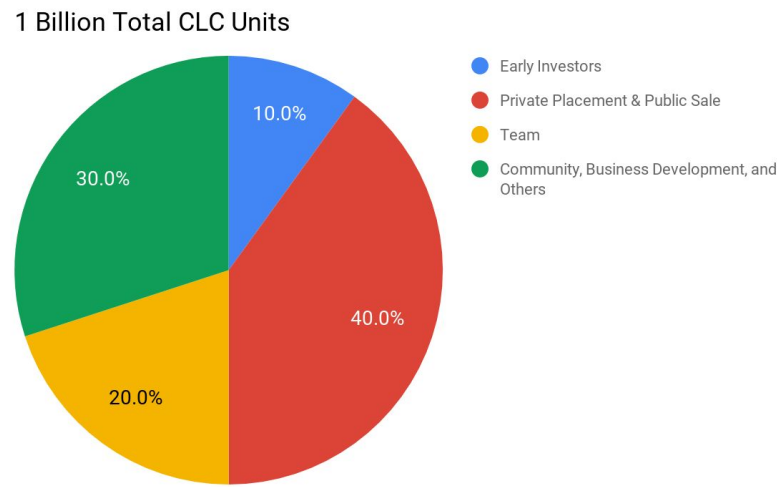
Holders of CLC will receive a discount on the trading fees of the DEX.

- **Terra-Chain Gas Fee**

CLC is used as the native token of the Terra-Chain network, and will be used for gas as Ether is on Ethereum.

Token Distribution & Fund Allocation

The total amount of CLC tokens will be 1 billion with the minimum unit of division being 18 digits after the decimal point.



Funds raised during the Contribution Period will be used solely for the purpose of development and operation of ContractLand.

