DARWINIA

GENEPAPER

Preview Version 0.7

Abstract

Blockchain is being layered and specialized, the underlying public chain network is responsible for consensus security and cross-chaining, and the second layer network and sidechain are moving towards specific application areas.

New technologies like Polkadot and Substrate are in line with this trend. Darwinia Network (Darwinia), a cross-chain and application chain network focused on games and applications, opt-in this ecological and technological trend. Darwinia Network uses layered networking, cross-chain interaction, application-oriented design, and user experience as key design features and principles.

Darwinia Network is committed to being the blockchain infrastructure and network of the future gaming world.

Background

The world is being blockchainized. In addition to the financial industry, the game industry is the most likely to bring change. Blockchain will greatly enhance the openness and collaboration of the game world.

In the process of using blockchain technology to create new open game, we found that there are several problems in the combination of game and blockchain:

1. The current blockchain infrastructure is not yet able to meet the requirements of the game player, especially user experience.

At present, the user experience problem of blockchain games is mainly reflected in two aspects. First, the use of digital wallets is difficult. User need to backup private key, the inability to retrieve assets if password forgot. These defects are still big cognitive thresholds for users. Second, the low-TPS of the public chain, and the paid mode are also a big obstacle for Internet free users.

2.Traditional game vendors lack blockchain experience

The development of blockchain game requires a certain blockchain technology accumulation, and the traditional game building a complete blockchain game development platform is costly.

3.Blockchain game between different public chains are split

Due to the heterogeneity of the public chain, blockchain game developers need to develop the same game for each public chain in order to reach multiple public chain community, and the cost is relatively high.

We hope to use the most advanced blockchain technology and framework to construct an open network and application suite to solve these problems. This network and application suite combines blockchain trusted technology with a Web3 infrastructure with the following features: layered network design, cross-chain interaction, developer-friendly, best user experience, and high concurrency and customized.

This network is the Darwinia Network, this application suite is the Darwinia AppChain.

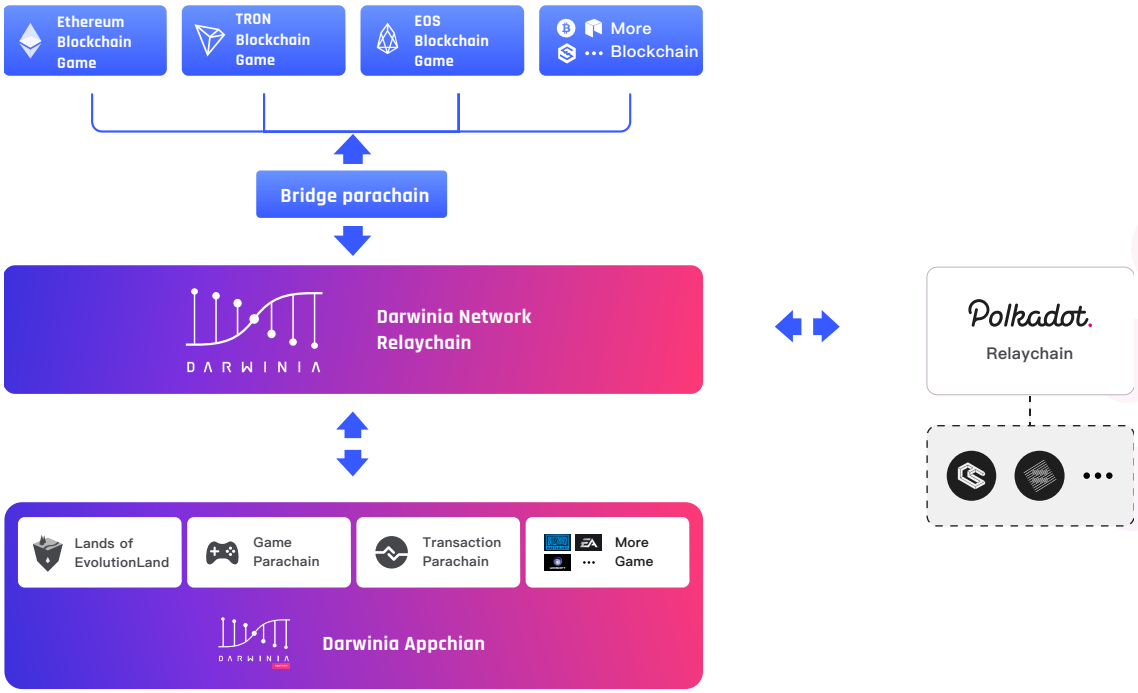
Darwinia Network

Darwinia network is a blockchain network based on Substrate[1] technology. The architecture design refers to the cross-chain network framework of Polkadot [2], including Relay chain, Parachain, bridge and other designs. Darwinia network is part of the Polkadot ecosystem, and at the same time differentiated from Polkadot, Darwinia network focuses on cross-chain and application chain operations in the game and application direction.

Blockchain games or Dapps can easily do cross-chain interoperations for game assets and game operations through the Darwinia network. For example, Cryptokitties can transform its NFT (Kitties) on the Ethereum into NFT on EOS through the Darwinia chain; players on the Ethereum and players on the EOS can play Evolution Land game simultaneously through the Darwinia network. At the same time, thanks to the Polkadot ecosystem, Darwinia Network can link to a wider range of games and players.

Architecture design

The architecture relationship of Darwinia Relay Chain, Darwinia AppChain, Polkadot Relay Chain, etc. is shown as below



Darwinia Relay Chain

Darwinia Relay Chain is the most important role in the Darwinia Network, it is also the hub of the Parachain.

Darwinia Network itself can operate as a stand-alone cross-chain network, and Darwinia relay chain will be responsible for consensus security and cross-chain interoperability. At the same time, thanks to Polkadot providing an open heterogeneous network access method, Darwinia Relay Chain can also choose to access Polkadot as a Parachain of Polkadot, then Polkadot will take over and be responsible for the security of the Darwinia relay chain. All of the Parachain in Darwinia Network will be able to connect to a wider external blockchain network via Polkadot.

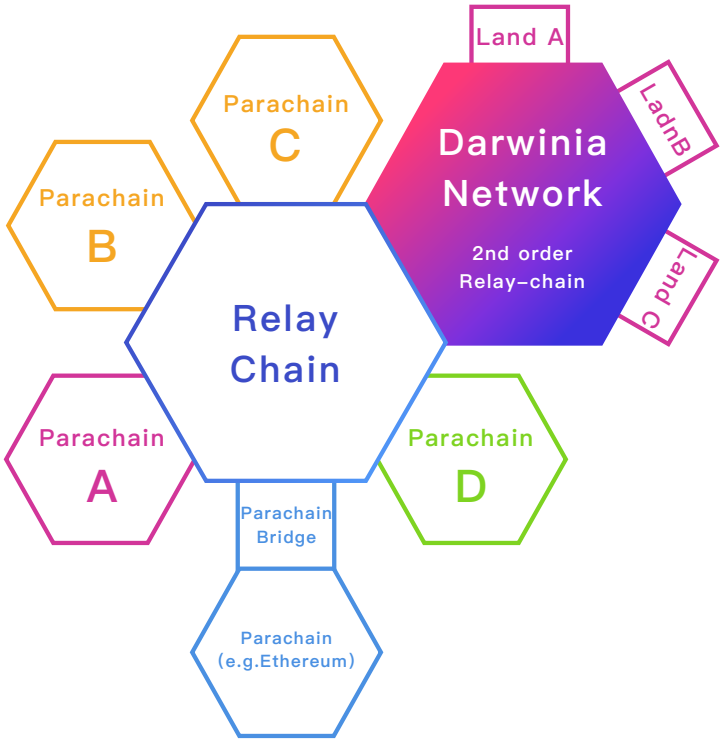
To this end, we divided the operating mode of Darwinia relay chain into Solo mode and Polkadot connection mode

Solo mode

Darwinia network can choose to operate as an independent public-chain network and is responsible for its own consensus security, with its core business and application services, including the cross-chain functionality of each application chain, controlled by Darwinia Network itself.

Polkadot connection mode

In Polkadot connection mode, the Darwinia Relay Chain, in addition to being able to operate as a relay chain for Darwinia Network, will also serve as a Parachain for Polkadot.



Token

The system token for Darwinia Network is RING, RING is also used as gas for transactions. Gas include transaction fees, contract execution fees, network bandwidth charges, storage fees, and more.

KTON, obtained by locking RING, is the Staking and Governance Credential of Darwinia networks. The KTON Holder and KTON Staking Locker will receive Darwinia network revenue and Staking revenue. KTON can only be obtained by locking the RING. The earliest design to obtain the KTON by locking the RING appears in the Gringotts of Evolution Land. The related introduction can refer to the Gringotts KTON model [5].

RING's initial supply (INITIAL_SUPPLY) before Darwinia network mainnet release is 2 billion, after which the newly issued RING will be distributed to the validators and nominators (Staking participants).

After the Darwinia network mainnet release, the total cap of the block reward (MAX_BLOCK_REWARD_YEAR) is adjusted once a year. The maximum limit of the annual block reward is 20% of the remaining issueable supply. The actual inflation rate will be affected by the locking rate of RING and KTON, which will be much less than 20% and is expected to be 4%-10%.

Total remaining issueable RING = HARD_CAP - CURRENT_SUPPLY

Total cap reward for current year = Total remaining issueable × 1/5

Supply in the next year = supply in the previous year + total actual reward in the year

The total number of HRAD_CAP for RING is 10 billion.

According to the annual block reward limit and the block interval (in seconds), you can calculate the block reward toplimit (MAX_BLOCK_REWARD) for each block of the year.

Block Reward Limit for Each Block = Total Reward Limit for the Year × Block Interval Time /Total Number of Seconds per Year (365 * 24 * 3600)

Finally, the actual amount of the block reward for each block is linearly proportional to the RING locking rate and the KTON locking rate:

RING locking rate = currently unexpired and locked RING / currently total RING

KTON Locking Rate = currently locked KTON / currently total KTON

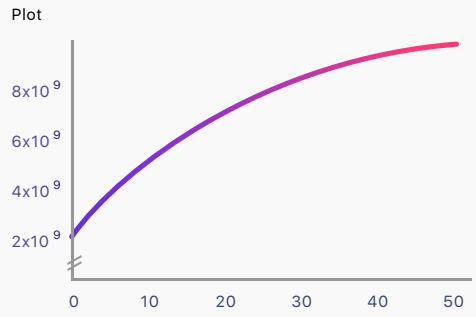
In Solo mode (different from the Polkadot connection mode, see the Staking chapter), the actual block reward for each block is:

Actual block reward per block = block reward limit × (X% × F (KTON Locking Rate) + Y% × F (RING locking rate) + (100-X-Y)%)

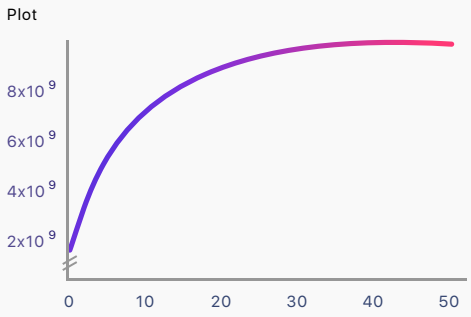
Remarks: X, Y are system parameters, satisfying X+Y <= 100. The meanings of X%, Y%, and (100-X-Y)% indicate the percentage of rewards assigned to the validator, the KTON holder, and Treasury,

respectively, where the validator part already contains Nominator and Collator. F (locking rate) represents a function related to the linearity of the locking rate, which is still under study. In the simplified case, it can be understood as "F (locking rate) = locking rate".

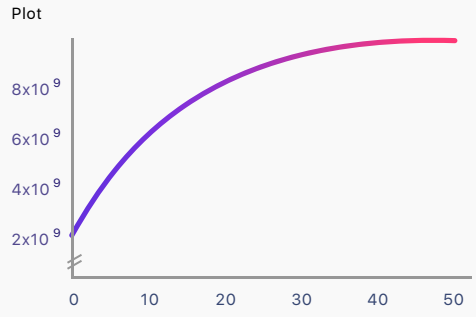
In the actual network operation process, the locking rate is constantly changing. Here are some examples of simplified and idealized situations. For example, when the locking rate is 20%, 35, 50%, and 65%, the corresponding supply growth curve:



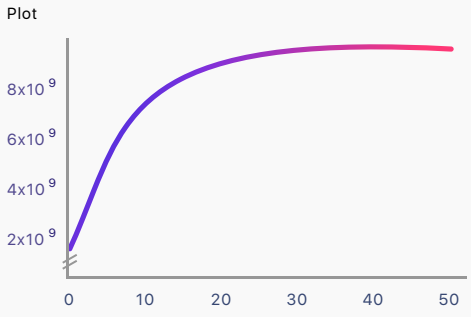
Supply curve when the expected lock rate is 20%



Supply curve when the expected lock rate is 50%



Supply curve when the expected lock rate is 35%



Supply curve when the expected lock rate is 65%

Staking

Darwinia Network will distribute all of its income as an incentive to Staking participants.

Darwinia network's revenue sources fall into two broad categories:

1. BLOCK_REWARD, the annual block reward limit will decrease over time, and the inflation rate will shrink and decrease rapidly over time.

2. Darwinia network transaction fees (NETWORK_FEE) include developer access to Darwinia network of cross-chain services, Darwinia network parachain access fees, and related applications such as Evolution Land's choice of revenue allocated to Darwinia Network.

Because the Polkadot network uses a shared pool security model, the security of the Parachain is guaranteed by the Relaychain, so when in the Polkadot Connection Mode, Darwinia network does not need its own validator, only the Collator is responsible. .

Therefore, the security incentives of the Darwinia network's Staking in these two modes will be very different, as follows.

Solo mode income distribution

The validator and KTON holders will share the Darwinia network's revenue in a ratio that allows KTON holders to vote for their own KTON to the validator and obtain the Staking incentive for the validator. In addition, with reference to Polkadot's distribution design, we introduce Treasury, which is mainly used to pay for developers to provide software update, parameter adjustment and other services according to the results of network governance voting to ensure the system continues to operate stably.

The specific allocation method is as follows (X, Y is the system parameter, which will be set by the governance mechanism of KTON voting):

((locked KTON, all KTON, Treasury)=
[(block reward upper limit × KTON locking rate + NETWORK_FEE) × X% , (block reward limit × RING locking rate + NETWORK_FEE) × Y%), (block reward limit + NETWORK_FEE) × (100-X-Y)%]

Polkadot connection mode income distribution

When Darwinia Network intends to connect to the Polkadot network, according to the model of Polkadot Parachain Auction[4], Darwinia relay chain will need to lock enough DOTs to participate in the Parachain Slots bidding. Whether it wins is only related to the number of locked DOTs. In order to be competitive enough, Darwinia Network will design a

crowdfunding lock-up mechanism to motivate Darwinia community participants to help bidding.

Crowdfunding locks auction

Polkadot's Parachain Slot auction allows any type of abstract account to participate in the auction, including general address accounts, smart contract accounts, and parachain accounts. This extensive abstract account support provides flexibility for participating bidders to design a variety of decentralized bidding models. Darwinia Network will design a way for the Polkadot connection model to participate in the Parachain Slots auction through crowdfunding DOT. The crowdfunder does not need to transfer the DOT ownership, only need to lock the DOT and provide the locking credentials, and open a certain vote or bidding permissions are available for the Darwinia Relay Chain. DOTs participating in bidding locks are secure because the entire process is done through smart contracts (or relay chains) and no one can control this partially locked asset.

When Darwin switched to the Polkadot connection mode, the Darwin network no longer needed its own validator, and the part that was used to motivate the KTON locker Staking would be used to reward those who helped Darwin's DOT lock-up bidding, which means that DOT holders of the Darwinia community will be able to earn RING by providing DOT bidding lockout vouchers.

(Darwin bidding locked DOT, all KTON, Treasury)=
[(block reward limit + NETWORK_FEE) × X% , (block reward limit × RING locking rate + NETWORK_FEE) × Y%, (block reward limit + NETWORK_FEE) × (100-X-Y)%)]

Darwinia AppChain

In order to facilitate game developers and other application developers to build blockchain networks that meet application-level requirements without having to know too much blockchain knowledge, Darwinia Network design and develop a set of application blockchain frameworks called the Darwinia AppChain based on Substrate and Darwinia's blockchain kernel (Darwinia Kernel).

Darwinia AppChain is a set of blockchain development kits that can meet the needs of application developers for different blockchain customizations, you can even create a public chain by one-click.

Darwinia AppChain is designed to meet the needs of the application level, even the business level, rather than the platform requirements of the public chain. Therefore, Darwinia AppChain will focus on the flexibility of the framework, and the diversity of components. The consensus algorithm, speed and governance mode with be significant different between Darwinia AppChain and normal public chain.

Darwinia AppChain is also based on the Substrate framework, using the same kernel as the Darwinia network, so the Darwinia AppChain can be connected directly to the Darwinia Network as a Parachain.

Interstellar asset coding protocol

For different items, we will mark it with a unique identifier. In the virtual asset world, because there are different ledgers or blockchain networks (domains in short), different items can be distinguished in the same domain because they have different identifiers. But the observers in the domain cannot recognize the external ones.

At present, many of the existing ERC721 blockchain applications are designed to identify the assets within the domain, and do not take into account the reuse of assets in different domains. This leads to when it comes to the reuse of non-homogeneous assets, a single Token ID cannot identify a unique asset, and it needs to bring a lot of domain information, which is very complicated to implement.

In order to solve this problem, **we have designed an interstellar asset coding protocol so that different public chain and different game assets can be uniquely identified in the Darwinia network, making game assets to be cross-chained easily.**

Community Ecosystem

Protocol Researcher

The protocol and standard research's work is divided into two parts. The first part comes from the community. Darwinia Network accepts any RFC submission from the community, including new additions, improvements and modifications. These RFCs will be open to the community and fully discussion and research to reach a consensus. The second part is from the core research team, which is responsible for organizing RFCs, organizing RFC peer audits and security audits, using Darwinia Network governance models and tools for protocol governance and voting, and forming a final agreement design draft for delivery to the protocol development team.

The submission and management of RFC documents is currently carried out on Github [3] and can be accessed if you are interested.

Developer

Develop and improve Darwinia Network, Darwin AppChain and related services, and develop applications and services using the Darwinia Network and the Darwinia AppChain. Early community open source software development, especially important infrastructure software development (including network protocol design, protocol

implementation, node software, wallet, browser, etc.), will be sponsored and supported by the Darwinia Network Foundation, currently the mainly Darwinia Network open source software developer is **Itering Tech**。

In addition to software development for infrastructure, the developer community includes application developers, which can be divided into Dapp developers and Appchain developers, Evolution Land, and more.

Evolution Land

Evolution Land is a virtual management game base on blockchain and autonomy. Its first, second and third continents are based on Ethereum, Tron and EOS development. The way the Evolution Land connects to the Darwinia network is as follows:

1. The first, second, and third continents, as heterogeneous other public chains, will access the Darwinia network through bridge parachain.

2. Subsequent continents will be developed based on the Darwinia AppChain and can be directly connected to the Darwinia network relay chain.

Dapp Developer

Dapp developers include developers who develop applications based on the Darwin Web Smart Contracts module, as well as developers who develop Dapp on the public chain, such as blockchain games or Defi applications on platforms such as Ethereum, TRON or EOS. For the Dapp and game assets on the public chain, bridge parachain of Darwinia network can be connected to the Darwinia network for cross-chain transfer operations.

AppChain Developer

Application chain developers developing with the Darwinia Web Application Suite (Darwinia AppChain).

Darwinia Fund

A non-profit open source fund established by the community to support and promote the development, construction and promotion of the early Darwinia network.

Relay chain Validators

By locking KTON to participate in the election to become a validator, the validator responsible for the processing of the transaction ,sealing new blocks and the maintenance of the nodes, validator will receive a share of Darwinia Network revenue. Like Polkadot's participants, Darwinia Network has nominators, collaters, fishermen besides validator.

KTON Holder

KTON is a reward for long-term holders of RING. Holding KTON will earn a share of Darwinia network revenue. At the same time, KTON holders can lock KTON and vote for potential validators to help them run. If the election is successful, the locked KTON can share the dividend of the validator revenue.

CrowAuction DOT Holder

Refer to the crowdfunding lock auction section in the Polkadot connection mode.

DARWINIA

User

Users of Darwinia Networks and Darwinia AppChain related products and services.

Roadmap

2019 Q2

Darwinia Network
Solo Mode Testnet

2019 Q4

Darwinia Network
Mainnet

2020 Q1

Darwinia AppChain
Beta Version

2020 Q2

Darwinia AppChain
New Land For EvolutionLand

Reference

(1) https://github.com/paritytech/substrate
(2) https://polkadot.network/PolkaDotPaper.pdf
(3) https://github.com/darwinia-network/rfcs/tree/master/zh_CN
(4) https://wiki.polkadot.network/en/latest/polkadot/learn/auction/
(5) https://forum.evolution.land/topics/55
(6) https://research.web3.foundation/en/latest/polkadot/Token%20Economics/#treasury