The TEA Project Token Economy Whitepaper v0.1.0

TEA token, Camellia token, and Seed

TEA network has two tokens.

TEA: shortened as $T, is a utility token. It is used for mining revenue and service fees (aka Gas in Ethereum). It is a stable token pegging to the measurable computing resources.

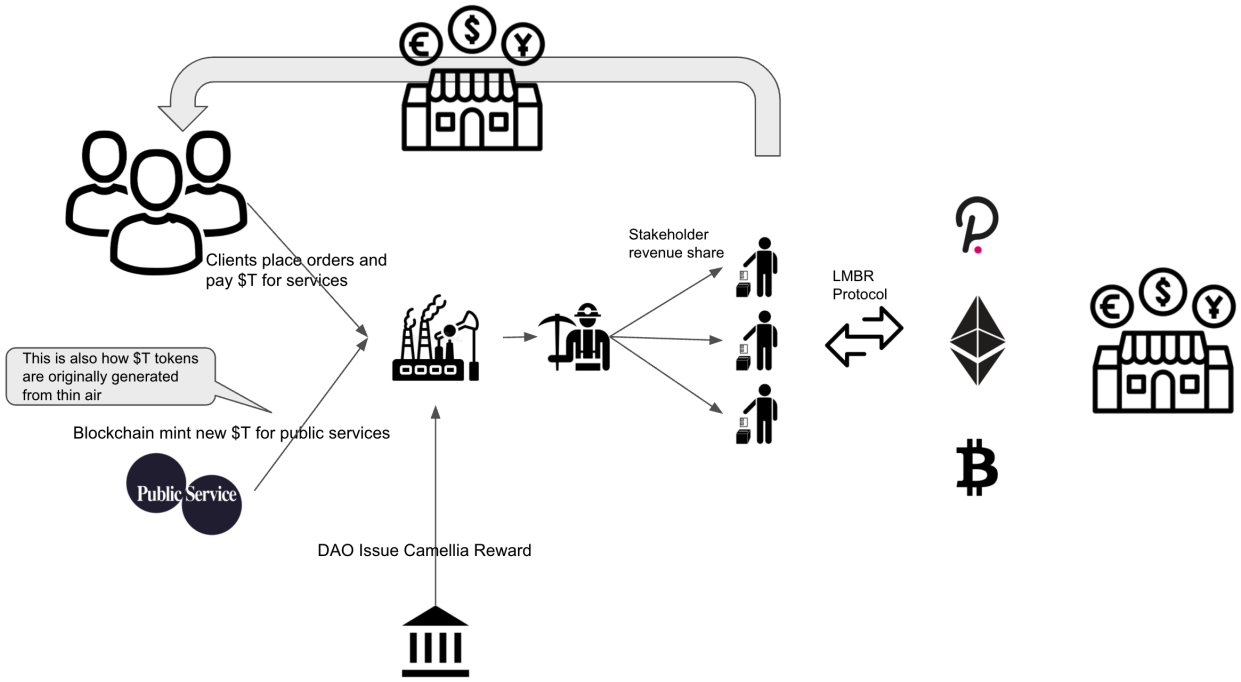
Camellia（CML）: also called "Tea Tree," is a governance token in TEA DAO. It represents the credit score and profitability of miners. CML has a limited supply.

Besides, there is another concept - Seed. The Seed is not a token but a qualification similar to headcount. Seed's primary purpose is to control how many new nodes are allowed to join the TEA network at any given time window. When more nodes want to join, they need to pay $T through bidding to obtain miner qualifications. The $T they spent in the bid is used to buy back CML from the market and burn them.

Miners earn service fees (gas fee) $T by executing customers' computing tasks assigned by the system. CML represents the credit score of a miner. The higher the CML, the higher probability that the miner will obtain high-value computing tasks, also the higher the community responsibility and voting power. Inside DAO, CML is also considered an equity token. The owner can stake his CML to a miner and share the miner's mining revenue. CML represents miners' profitability to be referenced as a credit score when applying for credit loans.

Principles and Goals of Economic System Design

- We create underlying support for under-collateral lending applications
- Through an unmodifiable constitution and modifiable community governance, the interests of both early and late participants are taken into account. Thus, the TEA network can benefit from early investors while always maintaining metabolism for long-term development
- Making TEA a legal utility token is to avoid governance risks
- Automatically adjust liquidity, allowing speculation and investment to be controlled, and profits coexist



TEA: T$ Utility Token

Generation and Distribution of TEA

TEA, shortened as T$, is a Utility Token. It is primarily used to pay for trusted computing services and internal public services in the TEA network. These costs include CPU usage, storage, and network traffic, similar to how cloud computing measures costs. The genesis block will not involve any $T assigned to the team or early investors. All $T needs to be obtained through mining.

How to Earn TEA

There are several ways to earn T$

- Miners provide trusted computing services to earn a gas fee and tips paid by clients
- Miners offer computing services for public services within the TEA network to obtain new-minted $T
- Anyone can purchase $T through token trading

- CML holder receives shared revenue through staking their CML on miners

TEA Token Issuance, Total Amount, and Price Anchoring

Unlike CML, T$ doesn't have a supply cap. Its inflation comes from the computational cost of public services. As long as there is computing resource consumption for public services in the TEA network, an equivalent amount of $T will be issued to public service mining participants. $T distribution is in proportion to the miners' workload. It's noted that $T paid by customers for trusted computing service is not part of $T mint.

Public services' resource consumption will increase or decrease along with the TEA network scaling up or down, which leads to the inflation rate of $T fluctuates. When the economy booms, more miners will join mining, the demands on public services increase, the inflation rate will increase. On the contrary, when the economy deteriorates, the inflation rate will decrease.

$T will continuously inflate as public services will always exist.

Since computing cost is objectively measured based on computational cost (such as CPU instructions, occupied time, network traffic or storage size and time, etc.), $T is a stable token pegging to computational costs.

TEA Price Fluctuation and Automatic Market Adjustment

Although $T is a stable token pegging to computational costs, its price could still fluctuate caused by the imbalance of supply and demand.

In the bootstrap stage after $T's launch, applications in the TEA network are underdeveloped. There are not many tasks needed to be executed. Therefore, there is little demand for $T. The selling order from miners who harvest $T from public service will result in a price drop. Once the price of $T drops, it becomes more cost-effective for traditional applications to migrate from centralized cloud computing to the TEA network. When they buy $T to pay for trusted computing services in the TEA network, the price will increase.

On the other hand, when the dApps in the TEA network are booming, many computing tasks appear to be queued for processing. Still, the number of miners increases slowly due to birth control (For reasons of birth control and Seeds bidding, please read The TEA Project Technical Whitepaper). Customers need to pay higher tips to get priority. New miners need to purchase $T to bid Seed or buy CML to join TEA. Both customers and new miners will pump up the price of $T. After more miners join the mining pool, the congestion is reduced. Thus the price of $T will

drop. The market mechanism automatically adjusts the supply and demand. The price of TEA will fluctuate around the cost of computing resources.

In addition to the adjustment of supply and demand by the market itself, various financial tools can help prices return to stability, such as collateral lending, credit lending, futures trading, etc.

Public Service Rewards and Distribution

Public service fees refer to the cost of conducting node security auditing, generating blocks, maintaining codes, and maintaining the system’s trustworthiness. These costs don’t have specific payers as public service beneficiaries are the entire community.

Public service cost is mainly the block validator rewards and the computational resources consumed for security remote attestation in the early stage. In the later stage, it will include various DAO internal administration costs. Earning $T by offering computing services is called mining.

Before $T can be purchased in the marketplace or provide computing services, mining is the only way to earn $T.

TEA Trading, and ERC20 Lock & Mint, Burn & Redeem Protocol

$T is a token based on Polkadot Substrate. It is not an ERC20 token issued on Ethereum. There is no way to trade $T directly on any ERC20 compatible token exchange. However, the Lock & Mint and Burn & Redeem (LMBR) Protocol allows owners to lock up their $T in TEA smart contract to receive the 1:1 equivalent of ERC20 Token t.eth. This token is a standard ERC20 token and can be used for various financial transactions on any Defi system that supports ERC20. At any time, owners can redeem their locked T$ by burning the equivalent t.eth. There is no financial loss except transaction fees. The same approach applies to CML and other blockchains that support smart contracts and multi-signatures, such as Polkadot's t.dot token.

Miner's Cost

The cost of miners includes

- purchase or rent mining machine
- electricity and network expenses
- pay for the security audit

Because the TEA network uses trusted computing technology, miners need to bring their own or rent mining machines. In the initial stage, only Amazon Nitro trusted virtual machines are approved as mining machines. In the future, we will develop various types of mining machines that meet risk diversification requirements. For details, please read The TEA Project Technical Whitepaper.

Unlike the POW consensus that consumes a tremendous amount of energy, the TEA network does not consume much power and doesn't require supercomputing power. It belongs to the green mining type. Therefore, this type of cost can be neglected.

The TEA network requires frequent, random, and unavoidable security audits to all nodes to make them eligible for running tasks and keep the system secure. Except for public services, if any node doesn't pay the audit fee or fails the audit, it will be considered an unsafe node and disqualified to participate in mining. If any Byzantine fault is confirmed by consensus, the bad actors' deposit and CML are confiscated, and they may even be removed entirely from the network.

In the pre-mining stage of network operation, the T$ issued with new blocks can cover these audit fees. Pre-miners do not need to pay an auditing fee. Once public mining starts, the miners need to pay for this cost.

Once a node passes initial remote attestation and starts mining, there is no way to pause, suspend, or hibernate. If a node is not reachable, it is considered a network fault and will pay for a minor penalty from its owner's account. The miners can stop mining by sending a resignation transaction. The node is removed from the TEA network after a clearance.

If the market deteriorates and the miner's revenue is not enough to cover its daily expenses, the miner can withdraw from the mining. In this way, the competition will decrease while individual miner income will increase. If the same miner decides to join mining again in the future, he has to go through the same process, such as bidding for Seed as other new miners need to do.

Camellia CML

CML is a governance token inside the TEA DAO. Its fundamental purposes are:

- As the basis for equity distribution, owners can earn passive income by staking.
- Participate in DAO governance as a voting weight

- As a reward for long-term honest computing services, it is also collateral of punishment for violations and cheating.
- As credit collateral for excess lending

Camellia is Not a Utility Token

CML has no absolute numerical meaning, which means a CML cannot peg to any entity value. CML is different from the T$, which pegs to computational costs. CML value only makes sense when it is compared to others. For example, the CML ratio on your account to the total CML. Or the ratio between your CML and your competitors'.

Camellia Cap and Reward Decays

The number of Camellia rewards in each block decreases according to the following calculation: Starting from the genesis block, each block rewards 8 CML. After every 1M block (about 72 days), this number reduces to 80% of the previous value. According to the 6 seconds block interval, there will be ten production cuts, and the reward amount is less than 1 within two years. So far, the total number of CML is 37439440.37. Although the additional issuance will continue, when the number is small enough (less than 10^-18)to be allocated to the miner's account, the reward stops.

Camellia's Lock-up and Staking

CML has two states, one is the free state, and the other is the lock-up state. When owners stake their CML on miners to share their TEA harvest, the CML is in a lock-up state, and the owners are called Landlords. Although the landlords still own those CML in the lock-up state, they cannot sell or use them as collateral. However, when the landlord votes in DAO, the locked-up CML is included in the voting weight.

In a free state, owners can sell or use their CML as collateral but cannot benefit from mining revenue sharing.

Earning Camellia via Mining

The principle of allocation of each block's CML is

The more work, the more rewards. It has a linear correlation with $T earned by miners.
The square root of Camellia's proportion becomes the weight, which is used to mitigate the Matthew Effect (Rich get richer)

The calculation method is the absolute value of each miner's weight.

```
weight_of_miner_i = tea_mined_by_miner_i_in_this_block * locked_camellia_of_miner_i.sqrt()
```

Miner's Camellia income

```
Camellia_income_for_miner_i = total_camellia_in_this_block * weigh_of_miner_i / total_weight_of_all_miners
```

Note:

1. The locked_CML_of_miner includes the miner's locked-up CML and the other CML owner stake to this miner. Only locked-up CML is counted.
2. Only miners get the CML reward, not the landlords. Landlords only earn the share of mining revenue in $T.

3. From this formula, you can see that only $T earned through mining is used to calculate weights, and those earned through transactions cannot be counted. This encourages miners to participate in the service actively, and the results are recognized by consensus.
4. CML locked up by miners is distributed based on the square root of proportion. Only the locked CML participates in the calculation. The goal is to encourage miners to lock up to drive CML prices up.
5. Taking the square root instead of direct proportional distribution reduces the gap between the rich and the poor.

In addition to earning CML through mining, all users can also obtain CML through trading.

As a reward for miners' honesty and trustworthiness, CML is also used to penalize dishonesty and trustworthiness. When a miner commits malicious acts or improper operations that create an unsafe computing environment found out by a security audit and agreed that this miner is no longer secure and trustworthy, the miner will be penalized and even kicked out from the TEA network. This part of the CML will be allocated to the whistleblower and the arbitration node participating in the judgment, and the remaining portion will be destroyed.

As CML has a supply cap, the issuance rate decays over time. The number of CML directly affects profitability. It is a scarce asset and has room for speculation.

Camellia is the Profitability and Voting Weight

An essential function of CML is voting power in DAO governance. Another function of CML is the weight that calculates the winning rate of task competition.

Only miners' locked-up CML is used to calculate the probability when layer 1 dispatch tasks to miners.

In the consensus algorithm, the probability of a computing node being assigned to a task is proportional to the miner's locked-up CML square root. Designed as a non-linear ratio makes up for the gap between rich and poor and class consolidation caused by the Matthew effect.

For tasks with mandatory requirements for CML values, it is necessary to use the same method for random allocation within the range that meets the requirements. If conditions are too strict and few eligible nodes, the tasks will cause security risks since attackers can quickly locate the winning miners. A disclaimer will explain that users should take their responsibilities and risks.

Camellia's Total Turnover Rate Limit

CML can be used for Sybil attack, that is, to acquire CML frantically in a short time to control the voting result and consensus mechanism. To prevent this attack, we have set a global CML transfer limit. If a total of the first 64 blocks in the entire network produce 1/128 of the total CML, this block cannot pack any transactions involving CML's transfer. These transactions will be postponed to the next block. If it is still exceeded, you still need to wait until the submission is no longer satisfied.

Use Camellia for Credit Lending

CML can be considered as a credit asset that represents the expectation of future income. Higher CML means higher mining income and higher repayment capability. Therefore, CML can be used as joint collateral in excess lending.

The Defi applications in the TEA network can use the borrower's CML value as a reference basis for issuing loans. According to the borrower's CML value, reasonable loan interest rates and different leverage ratios will be set. CML is used as a credit reference with other collaterals or used as collateral alone. When the borrower cannot repay the loan, his CML will be auctioned

as joint collateral to repay the loan. Once CML is used as collateral, the lender becomes its Lien holder even though the account still belongs to the original owner. It can continue to be used for various CML rights such as staking and voting. When a landlord stakes his CML to a miner for revenue sharing, the landlord still owns the CML, not the miner. The landlord can use its CML for credit lending, not the miner.

Camellia's Bankruptcy Auction Transaction

Credit can be used as collateral for loans. If the borrower defaults, the collateral must be sold through auction. CML transfers are also subject to the total amount of CML transfers on the entire TEA network. If a large number of unexpected transactions occur, they will automatically delay to avoid witch attacks and hijack voting and control the consensus mechanism.

Camellia's Value Increase Hypothesis

In the early stage, especially during the pre-mining period, mining rewards are high due to less competition. Early miners can accumulate CML and be more advantageous than the miners who join later. But as active miners increase and output decrease, the probability of task assignment and additional issuance weight is calculated using the square root method. Holding too much CML will not bring corresponding high returns. It could be a wise strategy to consider selling CML to new miners for better ROI. This method is conducive to balance both new and old miners' interests and promotes the TEA network's long-term development.

Seed and Birth Control

One of the attacks that can break the BFT consensus we used in TEA layer 1. Suppose hackers found a vulnerability on a TEA node. The hackers can generate a large number of new miners with this type of TEA node. As long as this type of faulty TEA node penetrates ⅔ of total TEA nodes, the hackers can use the vulnerability to control those nodes to attack the BFT consensus and eventually control the whole TEA network.

The best way to prevent this attack is to:

1. control the birth rate. Only a certain number of new nodes can join the TEA network in a certain period. This makes hackers need a very long time to reach the ⅔ threshold so that the good actors can gain some time to find out the bug and fix it.
2. Keep the diversity of the tech stack of the TEA nodes. If one type of TEA node reaches a threshold, then the seeds for this tech stack are limited to reduce the penetration rate.

Seeds Calculation

At any given moment, the number of new nodes allowed to join the TEA network is called Seed. The calculation method is shown below:

Seed = math::round::ceil(total_Seed * (1 + birth_rate))

There is an initial birth_rate in the founding block, which an algorithm can automatically adjust in the future, similar to the difficulty coefficient of BTC automatic adjustment. However, the TEA network's birth rate condition is changed according to the degree of task congestion. If there are few tasks, many nodes are in the idle state, meaning that the market is not prosperous, and the birth rate needs to be reduced to avoid vicious competition. On the other hand, if task congestion happens, it is necessary to increase the birth rate to recruit more nodes to release the computing pressure.

Seeds Window

Because the block interval is relatively short (it is now 6s), not every block has any Seed released. It is currently estimated that every 128 blocks (about 12 minutes), a new window opens to allow Seed to be released to new nodes.

Diversity Quota Control within Seed

To prevent Sybil attacks and over-concentrated software and hardware architectures, vulnerabilities that cannot be discovered in time spread to more than 2/3 of the fault tolerance limit. The following principles need to be additionally followed when allocating Seed.

Any kind of hardware and software structure of the mining machine will be subject to price control when the quantity exceeds 1/3. It is necessary to pay a higher Seed purchase fee to obtain the Seed.

Any kind of hardware and software structure of the mining machine will stop issuing new Seed when the quantity exceeds 1/2 and will not be able to recover until the ratio is lower than 1/2 This proportional control method contributes to the diversification of the entire network's software and hardware structure, avoiding vulnerability that can compromise more than 2/3 of the nodes.

Competition for Seed

When more nodes are waiting to join mining, they need to be eligible for bidding. The currency used for bidding is T$. Each time the bidding window appears, the miners with the highest bids get the opportunity to join the TEA network. Those who are left out have to wait for another bidding window to open.

The $T of bidding pay to the DAO. The DAO uses these $T to buy back CML and burn. This helps to push up the CML price by reducing supply.

If there are not enough competitors participating, the spare Seed will be invalidated and will not be postponed to the next window. In this case, new nodes are likely to join the TEA network without spending money.

The proceeds from the auction are used to pay for public service expenditures.

Transfer Seed

Miners can sell their active Seed to new miners who wish to join. Active Seed means the TEA node is actively running at the time of sale. If the miner quits mining before the time of purchase, the Seed is destroyed immediately. The market determines the price. If a miner has already voluntarily withdrawn or been expelled because of a failed safety audit, his Seed is destroyed too. There is no Seed in an inactive account. A seed is either active or destroyed.

Presale and Pre-mining

The financing method currently being considered is the pre-sale of Seed.

The users who purchase Seed during presale can start pre-mining when the TEA network main net is alive.

When the pre-mining stage is over, other miners will join the mining and compete with existing presale miners. However, those miners who participated in presales have advantages because they already accumulate CML and $T. In other cases, the miners who purchase presale Seed can also sell their Seed to new miners.

Usage of Presale Funds

During the presale of Seed, funds raised are mainly used for product development for the TEA network's main net launch. If there are any remaining funds, they will be transferred to DAO management to pay for future maintenance costs. DAO's voting mechanism manages it; these funds do not belong to any individual.

What do Presale Investors Get

Participants in the presale of Seed will create an account and receive a private key. This private key needs to be kept securely by the buyers. The public key is the miner's account. At the beginning of pre-mining, miners with these accounts can rent or build their mining machines. During this period, financial service applications such as exchanges have not been completed; they can only mine, not buy or sell. This period belongs to the accumulation of CML and $T. At this time, the mining has just started, the rewards rate has not been reduced, and there is no competition from public miners. The competition is small, profit is high, but the $T token cannot be traded yet, so there is no market price.

Possible Future Benefits of Presale Buyers

Presale buyers are the first to get CML and pre-mined T$. Starting from the main net launch, these miners have the right to sell their own T$ or CML and Seed. Of course, we encourage long-term holdings because, in the future, any assets can be sold when the market price is more satisfactory. After all, mining will become harder and less rewarding. The CML that was initially acquired will quickly be in an advantageous position in future competition.