DC Economic White Paper

1. Overview

DC, as a decentralized cloud service platform, is a distributed network that everyone can participate in and use. After a period of growth, the DC network will ultimately be governed by the community. In this network, whether cloud service space providers, demanders, or various stakeholders maintaining the system can freely enter and exit under the premise of complying with the system protocol. The economic model of DC maintains the interests of all participants and ensures the development of the entire DC system.

2. Economic Design Objectives

The economic design goal of DC is to align the interests of all participants with the value growth of the DC system, on one hand, to protect the interests of the participants, and on the other hand, to maintain the stability of the DC system. That is, all participants contribute to the DC system while pursuing their own interests.
To achieve our economic design goals, we mainly consider the following aspects:

- How to ensure the security of the DC protocol
- How to maintain the sustainable development of the DC network
- How to protect the interests of the participants
- How to keep the interests of the participants aligned with the value of the DC system

Before designing the DC economic model, let's first analyze the models of existing distributed systems:

- Bitcoin, as the earliest blockchain protocol, uses native tokens to incentivize nodes to verify transactions and uses PoW consensus to coordinate competition among nodes. In Bitcoin's economic model, early block rewards are the main way to maintain node interests, and after block rewards decrease, transaction fee income becomes the main way to maintain node interests. Bitcoin is widely recognized for two functions: value storage and circulation payment. Value storage users expect to hold tokens to preserve or increase in value, focusing on the security of the Bitcoin network protocol and deflationary monetary policy; circulation payment users use the peer-to-peer value transfer function of the Bitcoin network, similar to fiat currency payment functions, focusing on Bitcoin's transaction costs and value volatility. Without changing the existing Bitcoin economic model, the interests of value storage users are protected, and in a network dominated by such users, many transactions will not occur, making it difficult to maintain nodes and ensure network security in the long term. This will affect the sustainable development of the entire system.
- Ethereum is the largest smart contract platform, where the native token is used to pay for computing services. Similar to Bitcoin, after block rewards decrease, service fees may become the main way to maintain node interests. However, unlike Bitcoin, Ethereum has more transaction-based circulation payment users, and its monetary policy is not fixed, currently being inflationary. The planned ETH2.0 system will change Ethereum's consensus to PoS, designed to protect node interests through perpetual inflation, which will devalue the token. Its economic model will balance this relationship as much as possible.
- Filecoin, built on top of IPFS with an added incentive layer, provides decentralized storage. By using a unique storage verification method to ensure the validity of data storage and relying on the

applicability of storage, Filecoin can be said to be the first blockchain project attempting to match real-world applications. Filecoin introduces the concept of "useful consensus" and designs two types of pledges: storage pledge and commitment pledge. Storage pledge is used in the storage market, and commitment pledge is used for chain maintenance. For Filecoin to develop sustainably, it needs to incentivize the storage market and avoid miners only obtaining block rewards, while the activity of the storage market needs real applications to bring in a large number of users. However, Filecoin itself has issues with storage efficiency and retrieval efficiency, unable to meet the daily file access needs of ordinary users, which will inevitably lead to a shrinking storage market. The final result might be that Filecoin only innovated the blockchain's pledge model with the introduction of "useful consensus" but still could not make applications land in the real world.
- Crust is a decentralized cloud system based on the Polkadot ecosystem, featuring storage. Unlike other blockchain systems, it introduces the concept of merchants and combines merchants with validators, candidates, and guarantors in the Polkadot ecosystem, forming its unique economic model. In Crust's traditional blockchain system, a new revenue model is built where merchants generate continuous revenue by providing storage and retrieval services to users, a real-world economic model that Crust applies to the blockchain world. Additionally, to ensure network security, Crust also cleverly combines storage and staking, ensuring a healthy development of the chain. However, limited by the single storage mode, its adaptability to application scenarios is not strong, which will lead to many difficulties in the development process.

After learning from other distributed project models, DC proposes the DC economic model and asset system based on its own project characteristics.

3. DC Participants

There are multiple participants in the entire DC system, each with different needs. According to the way each role participates, we divide them into: cloud service space providers, validators, candidates, nominators, DAPP developers, and users. In this document, the mentioned users mainly refer to users of DAPPs based on DC, who are also holders of DCT tokens on the DC chain.

3.1 Cloud Service Space Providers

Cloud service space providers are nodes in the network that provide storage resources and computing services. These providers can earn revenue by offering storage, computing, and bandwidth cloud services to the DC system. Additionally, cloud service space providers can also earn a portion of the revenue from tokens spent by users during the application usage process.

3.2 Validators

Validators are blockchain validation nodes in the DC network responsible for verifying transactions and blocks, thereby maintaining the overall network's security. Only those who receive sufficient staking support can become validators. Participating validator nodes can earn transaction fee income and a share of the blockchain rewards for each period, and they must also bear the risk of asset forfeiture. Validators can also earn revenue in their capacity as cloud service space providers.

3.3 Candidates

Candidates in the DC network are nodes that compete to become validators but have not yet qualified. The status of candidates and validators is not fixed; their identities may change each period, primarily based on the number of staking tokens they receive at the end of each period.

3.4 Nominators

All holders of DCT tokens can become nominators, who elect validators on the DC chain by staking DCT. Once elected as effective validators, they can work for the network and receive rewards. Nominators also earn income from this process. The income is derived from the total rewards received by the validators, from which the validators' compensation is deducted, and the remainder is distributed to nominators based on the proportion of DCT staked by them. Once nominators stake their tokens, they do not need to take any further action.

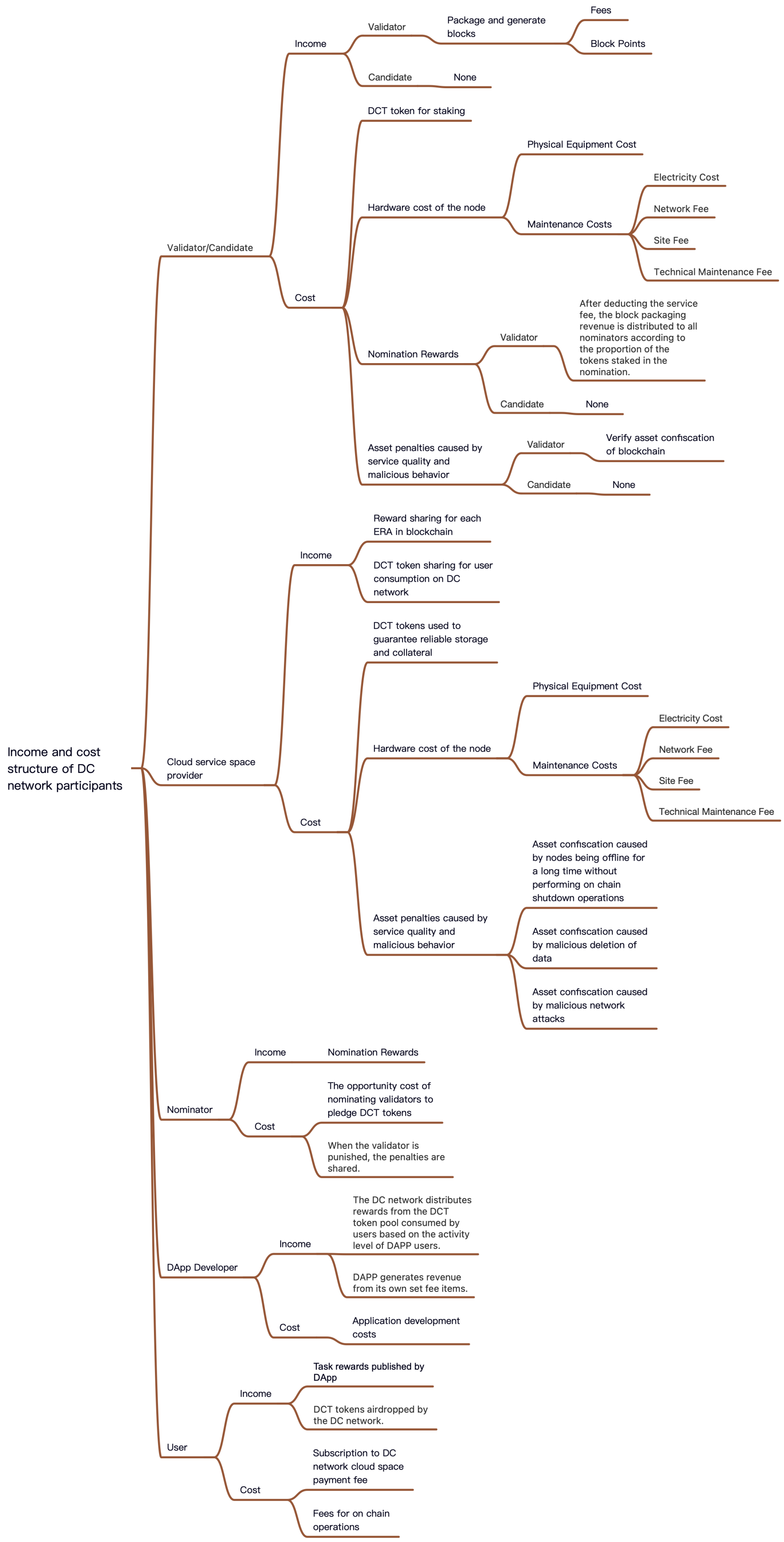
3.5 Application Developers

All application developers who develop and publish applications based on the DC network. From development to the release of applications, these developers do not need to hold any DCT tokens, yet they are vital participants in the entire DC network. They are the engineers who build the bridge between users and the DC network and are the driving force behind the ecological development of the DC network. As long as applications have active users, they can continuously earn revenue from the DC network, and all applications developed on the DC network inherently possess decentralized capabilities.

3.6 Users

Users refer to those who utilize the resources of the DC network, primarily those who use DCT tokens to subscribe to cloud service space on the DC network and use various applications based on the subscribed cloud space.

The income and cost structure of each participant is shown in the following diagram:



4. Tokens

The native token in the DC network, DCT, functions similarly to ETH in the Ethereum network or DOT in the Polkadot network.

4.1 Functions of the Token

In the DC network, DCT tokens primarily serve the following functions:

1. Used for staking to maintain the DC network's NPOS consensus.
2. Used as a pledge for cloud service nodes to provide cloud service capabilities.
3. Act as a security deposit and commission for providing resource services.
4. Can be used to purchase various resources and services.
5. Used to reward application developers and cloud service space providers.
6. Serve as transaction fees for using the network.
7. Used in on-chain governance mechanisms for election and voting, and for voting on proposals.

The DC network's blockchain consensus inherits the Nominated Proof of Stake (NPoS) consensus from the Polkadot network. It is also a proof of stake system, mainly involving two roles: nominators and validators. In the DC ecosystem, nominators are indirect participants who contribute to the network's stability and security through their staking actions. Specifically, nominators need to complete two core tasks: firstly, to screen and select a reliable validator, and secondly, to put their own tokens into the voting pool. Through this staking method, they not only participate in electing validators but also share in the rewards from the network. Validators are the providers of validation nodes and are active members of the network.

By adopting the NPoS mechanism, in addition to enhancing security, it also encourages broader community participation, thereby increasing the network's resilience. Token holders from diverse backgrounds can actively participate in enhancing the network's economic security with almost no restrictions, and earn rewards through participation in governance and verification (staking). Nominators can choose or nominate up to 16 validators. As long as at least one of the nominated validators is selected, the election mechanism ensures that all the stakes contributed by the nominators are utilized. This unique feature significantly enhances the decentralization and economic security within the NPoS, setting it apart from other PoS systems. In the NPoS system, the participation of nominators not only increases the staking amount of validators, thereby enhancing the entire network's economic security, but also lowers the difficulty for small DCT token holders to participate in staking. These factors collectively enhance the network's health and inclusivity.

In NPoS, those validators who are just starting or are in the growth phase can receive financial support from nominators, which is risk-free. This is because even if only one of several validators chosen by a nominator is selected, their entire stake (or the tokens invested) still contributes to enhancing the network's security. Nominators can also more freely support those emerging validators they believe are promising and performing well, thus having the opportunity for more targeted risk assessment. Additionally, this mechanism aligns with the economic incentives of nominators and validators; even if only one validator is selected, both nominators and validators still benefit, promoting network decentralization without compromising its economic security. In contrast, in traditional PoS systems, if your stake is not selected as a validator, then that part of the stake remains inactive, leading to inefficient capital utilization.

As a fundamental infrastructure network protocol, DC provides the functionality of a cloud service space market, where DCT tokens serve as a security deposit to maintain order in the cloud service space market. To maximize the efficiency of capital utilization, all DCT tokens used for cloud service capability staking can also be used by users for nominator staking or validator staking.

In the DC network, users need to consume DCT tokens when using applications. The vast majority of DCT tokens used to purchase cloud service space are acquired by application developers and cloud service space providers.

Application developers in the DC network are responsible for developing and releasing applications on the DC network, guiding users into the DC network, and earning revenue from the tokens consumed by users within the network.

Similar to other blockchain projects, DCT tokens are also used as transaction fees for using the network, akin to Gas in Ethereum. They can also be directly used to purchase resources and services within the network. The governance mechanism of the DC system uses DCT tokens for on-chain council elections and voting, and for voting on proposals.

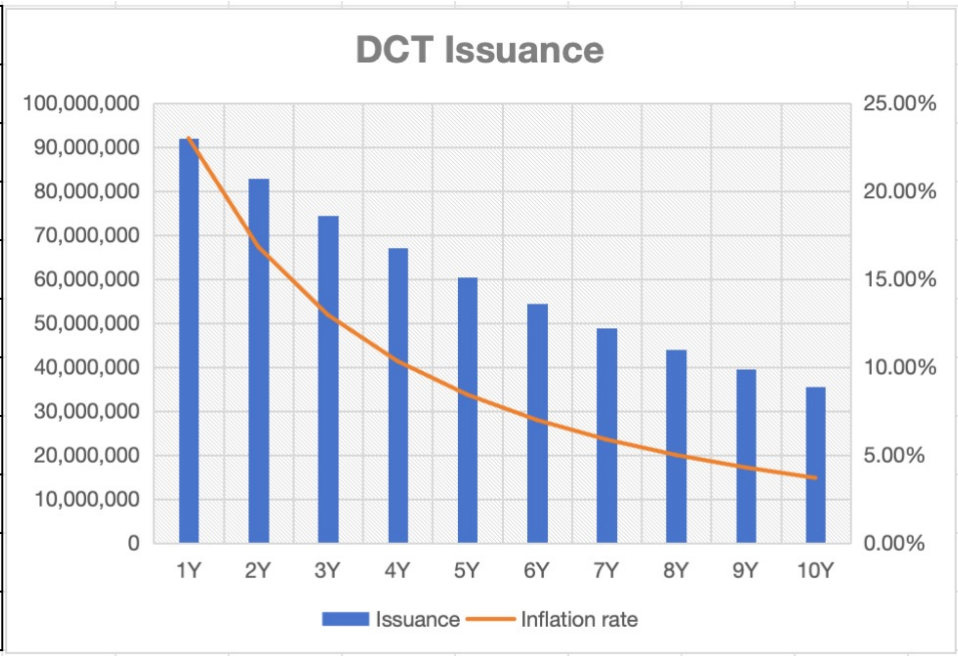
4.2 Token Generation and Destruction

There are two ways DCT tokens are generated: one is a one-time generation at the launch of the mainnet; the other is generated with the creation of blocks. The number of tokens generated at the launch of the DC mainnet is 400,000,000 DCT, primarily used for the following purposes:

- 100,000,000 DCT allocated for community development (25%)
- 40,000,000 DCT used for business and market promotion (10%)
- 100,000,000 DCT transferred to investment institutions (25%)
- 80,000,000 DCT awarded to the technical team (20%)
- 80,000,000 DCT reserved by the foundation (20%)

Tokens generated with block creation are divided into rewards for each period and rewards for point exchange, mainly awarded to nodes participating in the network to maintain the security of the network protocol and to incentivize various participants to engage in the network early on. The total annual issuance decreases by 10% each year until the total inflation rate of the network reaches 3.3%, after which it will no longer decrease. The specific data for the next 10 years is as follows:

Year	Issuance	Inflation rate
1Y	92,000,000	23.00%
2Y	82,800,000	16.83%
3Y	74,520,000	12.96%
4Y	67,068,000	10.33%
5Y	60,361,200	8.43%
6Y	54,325,080	6.99%
7Y	48,892,572	5.88%
8Y	44,003,315	5.00%
9Y	39,602,983	4.29%
10Y	35,642,685	3.70%



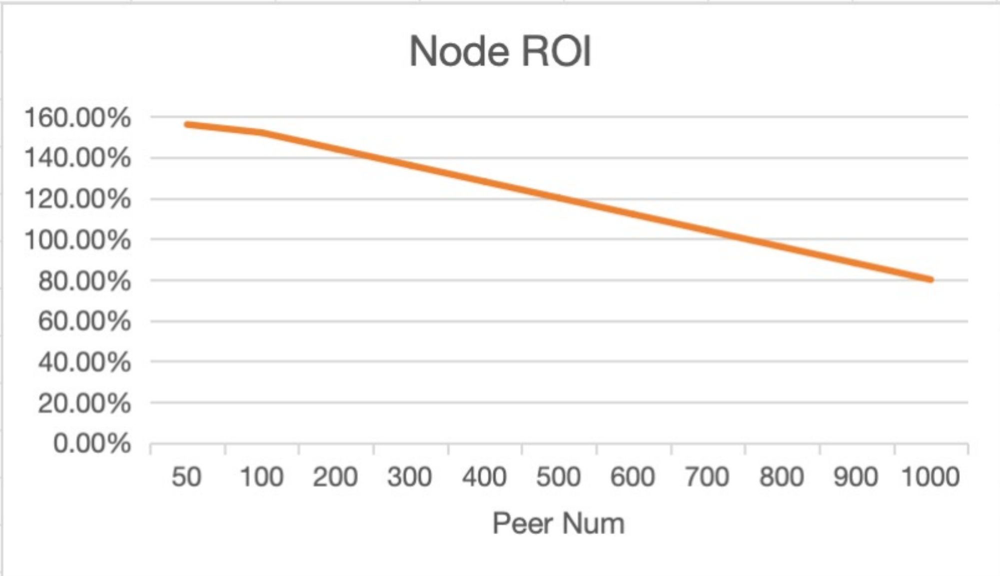
To ensure the long-term stable development of the DC network, the issuance of tokens is divided into two phases based on the number of cloud service nodes n in the network:

- Phase One: Project launch phase, n < 1000 (and n has never exceeded 1000). Since the DC network's public beta phase already stored actual user data, the data and incentives generated during the public beta will be inherited by the official network. During the early public beta phase, the number of participating validator nodes and cloud service nodes is relatively small, necessitating a special incentive strategy for these early participants to ensure they receive maximum investment returns without causing excessive issuance of DCT tokens, which could undermine their market value. In this phase, the cloud space market is not yet mature, so node earnings primarily come from on-chain periodic rewards of the DC network. Additionally, during this phase, DCT tokens are mainly concentrated in the hands of network stakeholders, effectively ensuring the security of the DC network. Thus, to ensure cloud service nodes have more earnings, the distribution ratio of tokens issued by the DC network between validator nodes and cloud service nodes in this phase is 1:9. To ensure stable development of the DC network while securing sufficient earnings for early participants, we tie the annual issuance volume and yield of DCT to the input costs and designed yield rates, determining the issuance volume of DCT for the first phase using the following formula: First phase designed average yield rate for cloud service nodes:

$$S\_p1 = (200 - \frac{n}{10}) \div 100$$

Average yield rate curve as shown below:

Peer Num	Node ROI
50	156.00%
100	152.00%
200	144.00%
300	136.00%
400	128.00%
500	120.00%
600	112.00%
700	104.00%
800	96.00%
900	88.00%
1000	80.00%



Individual cloud service node investment cost:

$$C\_peer = G\_peer + C\_node$$

Where:

$$C\_node = (200 \times 1024 \times P\_g\_y) \times 8$$

Total estimated cost for the entire network in the first phase:

$$C\_total = n \times C\_peer$$

Based on the designed yield rate and the total estimated cost of the network, the total number of DCT issued in the first phase can be calculated as:

$$I\_p1 = \frac{C\_total \times S\_p1}{0.9}$$

Note: Since C_total is a dynamic value, the DCT issued in each reward period is also dynamic.

Where:

- S_p1: The designed average yield rate for cloud service nodes in the first phase, where n is the current number of cloud service nodes. As the number of cloud service nodes is dynamic, S_p1 also changes dynamically. As the number of cloud service nodes increases, the yield rate gradually decreases, which helps prevent excessive issuance of DCT tokens that could undermine their market value.
- G_peer: The maximum DCT quantity that a single cloud service node can stake for maximum computational earnings, a dynamic value that changes as the number of cloud service nodes increases. For more details, refer to the Cloud Service Node Staking Model section.
- C_peer: The investment cost for a single cloud service node.
- C_node: The hardware and network maintenance costs for a single cloud service node. Since the value of DCT is not constant, directly converting hardware and maintenance costs to DCT is challenging. However, we can assess the costs of node hardware investment and ongoing maintenance using the value of the node's storage space in DCT (for more details, see: Design of the

Cloud Service Market). Therefore, we can evaluate the investment and maintenance costs of the node using the formula C_node = (200 x 1024 x P_g_y) x 8, where P_g_y represents the value per G per year of cloud service storage space, 200 x 1024 represents the maximum reward storage space size of 200T for a single cloud service node, and 8 represents the hardware, network, and maintenance costs converted to eight times the value stored in the node.

- C_total: The total estimated investment for the entire network.
- I_p1: The total number of DCT that will be issued by the DC network in the first phase.

In this phase, if the number of DCT issued according to the inflation formula exceeds the total amount of DCT used for rewards, the excess will enter the treasury. Through democratic governance, this excess can be awarded to various participants or periodically destroyed every 24 days at a rate of 1% of the total treasury amount.

Phase Two: Official operation phase, n >= 1000 or n has exceeded 1000 but has fallen back below 1000. In this phase, the cloud service space market is mature, and the earnings of cloud service nodes primarily come from commission income from the cloud service space market. In this phase, the yield rate for cloud service nodes gradually decreases as the number of cloud service nodes increases. In this phase, the distribution ratio of tokens issued by the DC network between validator nodes and cloud service nodes gradually rises to 1:1.

There are two main factors affecting the total circulation of DCT tokens within the network:

Tokens locked or occupied within the network, leading to a reduction in the total circulation. This includes scenarios such as the cloud service capability pledge provided for cloud service nodes to join the network, payments for purchasing cloud service space, voting in on-chain governance, and staking in the consensus mechanism.

Tokens are destroyed when used, thereby reducing the total amount of tokens. Currently, in the DC network, the destruction of tokens is led by the Treasury. 80% of transaction fees from on-chain operations and 10% of the fees paid by users for subscribing to cloud service spaces are transferred to the Treasury. Additionally, 1% of the total amount of tokens in the Treasury is destroyed every 24 days.

4.3 Token Value

DCT is a functional token of the DC network, and its value is dependent on the DC network. The value of DCT is positively correlated with the scale of the DC network; when the DC network is used by a large number of users, the demand for DCT will rise accordingly, which in turn drives up the value of DCT. There are three main ways that DCT tokens capture network value:

- The first is the actual economic activity generated when users pay with DCT for services provided by various applications based on the DC network, such as subscribing to cloud services, activating paid features in applications, and purchasing NFT assets within the network.
- The second is when tokens are locked or occupied within the network upon use, leading to a reduction in the total circulation, such as the cloud service capability pledge provided for cloud service nodes to join the network, voting in on-chain governance, and staking in the consensus mechanism.
- The third is when tokens are destroyed upon use, thereby reducing the total amount of tokens, such as a portion of transaction fees.

5. Economic Model

The DC economic model mainly addresses the issue of fairly distributing benefits among all participants while ensuring the security of the network protocol. The economic model incentivizes participants to join the network, making the system stronger, more secure, more valuable, and uses DCT tokens as a means of carrying and transferring value to sustain the system's development.

5.1 Design of NPoS Consensus

The blockchain consensus in the DC network uses NPoS (Nominated Proof of Stake), a variant of PoS. Its main purpose is to elect validators participating in the consensus protocol and encourage them to act honestly. This includes three aspects:

- For validators: Becoming a validator requires staking a sufficient amount of DCT as a guarantee of good behavior. However, validators' rewards are not derived from the amount of DCT staked but from their performance. If their actions deviate from the protocol, their stake is reduced; conversely, good performance is rewarded. This mechanism effectively incentivizes validators to act honestly, thus maintaining the overall security of the system.
- For nominators: This scheme allows any DCT holder to support one or more validators by staking a certain amount of DCT. Nominators' rewards and penalties are synchronized with those of the validators they support, and the amounts are proportional to their stakes. Additionally, based on the "fair representation" principle discussed later, nominators can achieve a higher rate of return by staking their stakes on validators with smaller staked interests.
- Security through economic game theory: By linking validators' behavior with staked interests and introducing economic game theory, validators intending to act maliciously must weigh the pros and cons to avoid losses. This nominator-validator arrangement provides strong security guarantees for the system.

Additionally, the election process in NPoS is both fair and secure:

- Fair representation: This principle ensures that all elected validators have equal voting rights regardless of the amount of stake. This strategy, while respecting the nominators' freedom to nominate, ensures that any holder of at least one DCT has at least one elected validator and guides nominators to distribute their stakes evenly among different validators, thus avoiding overrepresentation or underrepresentation.
- Security level: DC defines security levels based on the amount of stake received by validators, and the "fair representation" principle ensures that stakes are evenly distributed among validators, significantly increasing the difficulty for attackers to become validators and launch attacks, thus providing security guarantees for the system.

5.2 Revenue Model Design

To ensure the stability, security, and sustainable development of the DC network, DC has designed revenue models for validator nodes, cloud service nodes, and DApp developers. Below, we will analyze the return on investment for each contributor participating in the network, and we will once again present the income and cost structure in the DC network:

- C_hardware: Hardware costs incurred by nodes participating in the network
- C_m: Maintenance costs for node hardware

- C_app: Costs for application developers to develop applications
- C_app_m: Costs for application developers to operate and maintain applications
- C_val_dct: Value of DCT staked by validator nodes
- C_cloud_dct: Value of DCT staked by cloud service nodes
- R_fee: Transaction fees for block creation
- R_cycle_v: Share of block creation rewards in the blockchain cycle rewards
- R_cycle_c: Share of cloud service rewards in the blockchain cycle rewards
- R_cycle: Blockchain cycle rewards, R_cycle = R_cycle_v + R_cycle_c
- R_sub_c: Share of cloud service rewards in the subscription cycle rewards for cloud service spaces
- R_sub_app: Share of app rewards in the subscription cycle rewards for cloud service spaces
- R_sub: Subscription rewards for cloud service spaces, R_sub = R_sub_c + R_sub_app
- R_app_f: Revenue related to paid features and services designed by application developers
- F_c: Fees paid by users to purchase cloud service spaces; 90% of this fee is used as subscription rewards for cloud service spaces, i.e., R_c = F_c * 0.9, with the remaining 10% going to the Treasury
- F_p: Rewards paid by validator nodes to nominators
- F_s: Fees forfeited by nodes
- I_y: Number of DCT tokens issued in the current year

The rewards for the blockchain cycle in the DC network come from the number of DCT tokens newly issued each year, which on an annual basis is:

$$R\_v = I\_y$$

The ratio of block creation rewards to cloud service rewards within the blockchain cycle is:
Phase One:

$$R\_v\_p : R\_v\_s = 1 : 9$$

Phase Two:

$$R\_v\_p : R\_v\_s = 1 : 1$$

The ratio of cloud service rewards to app rewards within the cloud service space subscription rewards is:

$$R\_c\_s : R\_c\_a = 2 : 3$$

The ROI (Return On Investment) for validator nodes is:

$$ROI = \frac{R\_cycle\_v + R\_fee - F\_p - F\_s}{C\_hardware + C\_m + C\_val\_dct}$$

The ROI for cloud service nodes is:

$$ROI = \frac{R\_cycle\_c + R\_sub\_c - F\_s}{C\_node + C\_m + C\_c\_dct}$$

The ROI for app developers is:

$$ROI = \frac{R\_sub\_app + R\_app\_f}{C\_app + C\_app\_m}$$

In the DC network, both validator nodes and cloud service nodes need to stake DCT tokens, whereas app developers do not need to stake DCT tokens.

Phase One is the initial stage of the project where DCT is mainly concentrated in the hands of the project team and early investors. Therefore, the goal of this phase is to attract more nodes to join the network. The DCT staked by cloud service nodes as a guarantee can be used again for staking in validator nodes or nominating other validators. In this case, the average ROI calculated for cloud service nodes actually includes the earnings when the node acts as a validator. For this reason, we have set up a separate blockchain cycle reward model to ensure a very high ROI for cloud service nodes during this phase, with the expectation of attracting more cloud space service providers early on. The reward formula for each cycle in the DC network is: :

$$R\_v = \frac{(\frac{n \times C\_peer \times S\_p1}{0.9})}{N\_c}$$

Where:

- R_v: Number of DCT tokens issued each reward cycle in the DC network
- N_c: Total number of blockchain reward cycles in the DC network per year, approximately 365, implying a cycle reward occurs daily
- C_peer: Estimated average input cost for a single cloud service node, including hardware investment cost, subsequent maintenance cost, and cloud service capability staking cost, calculation methods can refer to the Token Generation and Destruction section's initial stage total estimated cost content
- S_p1: Yield rate designed for Phase One, which is a dynamic value, refer to the Token Generation and Destruction section's Phase One yield design content
- n: Total number of effective nodes in the network

In Phase Two, as the DC network begins to stabilize and the value of DCT tokens is generally recognized and has brought about a certain price increase, the balance of staking and rewards is left to the market to decide. That is, as the volume of user cloud service subscriptions increases, the corresponding node earnings will increase, thereby attracting more cloud service providers to participate and provide services. The DC network needs a certain redundancy of cloud service space to ensure the overall network security, so when the ratio of used space to total space exceeds 50%, we have specially designed a compensation mechanism for cloud service nodes. The compensation ratio is as follows:

$$(\frac{Sr}{0.5})^2$$

The DC network is a foundational network that provides cloud services for applications. During the service process, cloud service nodes will encapsulate and store data using Tee. If they go offline, the data stored on the nodes will enter a backup transfer process, increasing network load. To smooth the network operations, the DC network's rewards for cloud service nodes tend to favor nodes that have stored more data. Therefore, we have designed a reward distribution that combines the stored space revenue distribution with the total node storage capacity distribution to ensure that nodes with more stored data receive more rewards. The proportion of these two modes in the cloud service node rewards is as follows:

$$R\_stored : R\_space = 1 : 4$$

- R_stored: The proportion of rewards for nodes with stored data
- R_space: The proportion of rewards for the total storage capacity of nodes

Additionally, bandwidth is a guarantee of cloud service quality, so we also consider the bandwidth of cloud service nodes as one of the factors in their rewards. Nodes that reach the set bandwidth speed will receive full rewards, while those that do not meet the standard will have their rewards reduced. The DC network has set a bandwidth compensation discount rate r_bandwidth, with the current chain configuration for bandwidth as follows:

- bandwidth >= 100M, r_bandwidth = 1
- 50M <= bandwidth < 100M, r_bandwidth = 0.8
- 20M <= bandwidth < 50M, r_bandwidth = 0.6
- 10M <= bandwidth < 20M, r_bandwidth = 0.5
- bandwidth < 10M, r_bandwidth = 0.2

r_bandwidth can be adjusted later based on network conditions through on-chain governance.

The final cycle reward calculation for cloud service nodes is:

- When the used cloud service storage space is less than or equal to 50%, i.e., Sr <= 0.5:

$$\mathrm{R\_per\_cycle} = (\mathrm{R\_cycle\_c} + \mathrm{R\_sub\_c}) \times \frac{(\mathrm{r\_stored} + 4 \times \mathrm{r\_space})}{5} \times \mathrm{r\_bandwidth}$$

- When the used cloud service storage space is more than 50%, i.e., Sr > 0.5:

$$\mathrm{R\_per\_cycle} = (\mathrm{R\_cycle\_c} + \mathrm{R\_sub\_c}) \times \frac{(\mathrm{r\_stored} + 4 \times \mathrm{r\_space})}{5} \times \mathrm{r\_bandwidth} \times (\frac{\mathrm{Sr}}{0.5})^2$$

Among them:

- R_per_cycle: The actual reward obtained by the cloud service node in a single reward cycle.
- r_stored: The proportion of data stored by the cloud service node in the total network data storage.
- r_space: The proportion of cloud service space provided by the cloud service node in the total network cloud service space.
- Sr: The ratio of used space to total space, with a value range in the formula from 0.5 to 1. When the ratio of used space to total space is less than 50%, the compensation ratio is 1, meaning no compensation is provided. When the ratio of used space to total space is more than 50%, the compensation ratio is greater than 1, meaning compensation is provided.
- R_cycle_c: The cloud service reward portion of the blockchain cycle reward.
- R_sub_c: The cloud service reward portion of the cloud service space subscription cycle reward.

Cloud service nodes primarily derive their income from two sources: the DCT issued through the DC network's inflation formula and the DCT paid by users for subscribing to cloud service spaces. Initially, the DCT issued by the DC network's inflation serves as the main source of income for cloud service nodes. In the long term, the DCT paid by users for subscribing to cloud service spaces will become the main source of income for cloud service nodes. When income sources are stable, the income of cloud service nodes is determined by the proportion of cloud storage space provided by the individual node in the entire network's cloud service storage space. As more cloud service nodes join the DC network, the income of each node will decrease, so the income of cloud service nodes is inversely proportional to the number of cloud service nodes in the network. When the number of cloud service nodes in the DC network reaches a certain level and the income can no longer meet the expectations of cloud service space providers, it will prevent new cloud service nodes from joining, avoiding resource waste.

Combining the previously designed revenue distribution model for stored space, the income of cloud service nodes that have joined and stored data will always be higher than that of new nodes. Therefore, at the time point when the income is about to fail to meet the expectations for new nodes to join, the income of already joined nodes will still be slightly higher than the expected income, rarely leading to nodes leaving the network, thus ensuring network stability. Next, if applications attract more users to the DC network or users pay more DCT to subscribe to more cloud service spaces, the income of cloud service nodes will rise, attracting more cloud service nodes to join until the income can no longer meet the expectations for new nodes to join. This design allows resource supply to change according to market demand.

Additionally, DC hopes that a significant portion of all DCT supply is staked in NPoS, as a higher staking rate helps achieve higher economic security, but a balance between liquidity and staking rate must be maintained. The biggest difference between the DC network and other blockchain projects is that the DC network itself is a utility blockchain ecosystem backed by cloud service space. The main economic activity designed is for users to pay DCT to purchase services or assets. Therefore, we have set the ideal DCT staking rate range in the DC network to be between 25% and 50%. If the staking rate in the network is too low, the security of the entire ecosystem network might be compromised, so the DC network will provide more incentives to DCT holders to increase staking. If the staking rate is too high, it will lose liquidity, and the DC network will significantly reduce the incentives.

According to the design, after the block reward period, the token inflation rate in the DC network will be maintained at a stable perpetual inflation rate of 3.3%. At this inflation rate, DC expects that when the staking rate is 25%, the average yield will be around 10%, attracting more DCT to participate in staking. If it is below this value, the average yield will further rapidly increase; conversely, if the staking rate exceeds 50%, the average yield of staking will sharply decrease.

The compensation inflation rate is as follows:

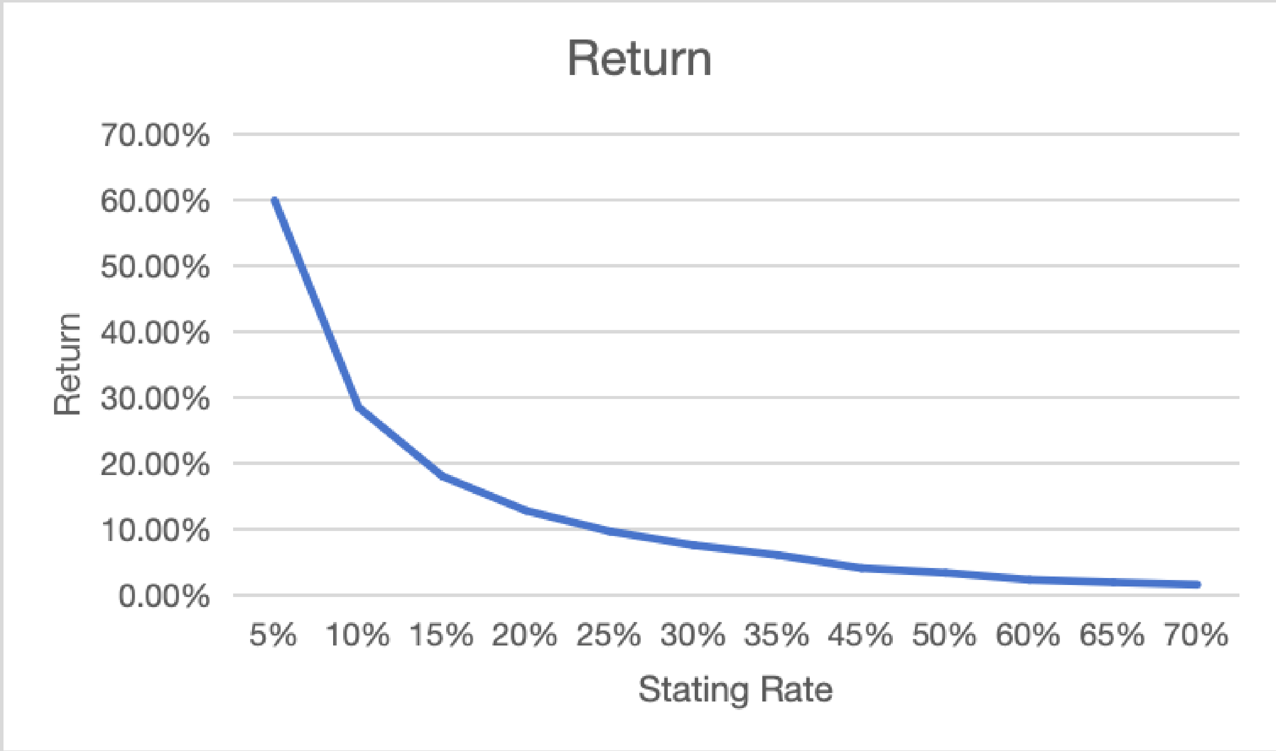
$$(1 - \frac{\mathrm{Sr}}{0.5}) \times 1.5$$

Ignoring hardware costs, the average yield rate r for effective staking across the network is:

$$\mathrm{r} = \frac{\frac{\mathrm{In}}{2} + (1 - \frac{\mathrm{Sr}}{0.5}) \times 1.5}{\mathrm{Sr}}$$

Where:

- Sr: The effective staking rate across the network
- In: The set network-wide inflation rate
- r: Staking average yield rate
  The long-term average yield rate curve for staking is shown in the following graph:



In the DC network, applications are an essential component of the ecosystem. DC is akin to the foundation of a decentralized network, and applications are the high-rise buildings constructed on this foundation for users to occupy. For the DC network to thrive, it must attract more application developers. Technically, DC provides comprehensive support including development SDKs, debugging environments, and development manuals. Economically, DC offers various income models for application developers, including cloud service space subscription revenue sharing, application sponsorship rewards, and a developer funding program. Since the latter falls within the scope of on-chain governance, it will not be discussed here. Below, we detail the first two revenue models provided by DC for application developers.

1. Cloud Service Space Subscription Revenue Sharing:
   After users subscribe to cloud service spaces in the DC network, the DCT paid by the users for these subscriptions is distributed between cloud service nodes and application developers in certain proportions: 40% enters the cloud service node reward pool, and 60% goes into the application developer reward pool. The DCT in the application developer reward pool is distributed to developers based on the daily active user ratio of their applications during each reward cycle of the DC network. This distribution aims to encourage more application developers to join the DC network and provides them a passive income source. Furthermore, the DCT paid by users for cloud service subscriptions circulates between cloud service nodes and application developers, thereby increasing the circulation and liquidity of DCT and enhancing its value. The revenue calculation formula for each application per reward cycle is as follows:

$$R\_app = \frac{R\_pool}{N\_c} \times r\_a$$

Where:

- R_app: Revenue generated for developers by the application
- R_pool: Total amount in the application developer reward pool network-wide
- N_c: Number of reward cycles in a year in the DC network blockchain, approximately 365, meaning roughly one cycle per day

- r_a: Daily active user ratio of the application

1. Application Sponsorship Rewards:
   This is an additional reward mode provided by the DC network for application developers. In the DC network, the treasury or any other user can transfer a certain amount of DCT into the application sponsorship reward pool. Combined with two pre-set on-chain reward rules—the daily reward limit and the reward amount per daily active user—additional rewards can be distributed to applications in the DC network. As long as an application has active users on a given day, it can receive corresponding rewards. In the early stages of the DC network, to encourage more application developers to join, DC will inject 10 million DCT into this reward pool to motivate developers. The formula for calculating the amount of additional rewards distributed during a reward cycle is as follows:

$$\text{R\_app\_ex} = \text{Min}\{\text{N\_a\_total} \times \text{R\_single} , \text{Ex\_d\_l} , \text{Ex\_r}\} \times \text{r\_a}$$

   Where:

- R_app_ex: Additional revenue generated for developers by the application
- N_a_total: Total number of active users across all applications network-wide
- R_single: Reward amount per daily active user in DCT
- Ex_d_l: Daily limit on the DCT amount for sponsorship rewards
- Ex_r: Amount of DCT in the sponsorship reward pool
- r_a: Daily active user ratio of the application

5.3 Design of the Cloud Service Market

DC differs from other blockchain projects that primarily use on-chain operations for ecosystem transactions. DC transforms operations that users would typically perform through on-chain transactions into subscriptions for cloud storage spaces on-chain, which then allow users to perform various activities and data storage and access off-chain. This shift moves daily transactions from on-chain to off-chain, significantly reducing transaction costs for users and reducing the load on on-chain transactions, thereby increasing the throughput of the chain. Moreover, utilizing off-chain TEE-based local security consensus enhances the performance of decentralized applications and addresses the storage bottleneck of blockchains, providing users of decentralized applications with a Web 2.0 experience.

DC network has specifically designed a decentralized cloud service market for this purpose. It is an open market where anyone can offer or subscribe to cloud storage spaces.

The cloud storage spaces subscribed by users are shared among various applications and can be used across applications. DC network will configure cloud storage space packages at the chain's launch to facilitate user subscriptions. Each package's information mainly includes the size of the cloud storage space and the validity period of the package. The price of the package is automatically calculated based on the issuance of DCT and the effective storage relationship in the DC network. The formula for calculating the price of cloud service space per G per year is as follows:

$$\text{P\_g\_y} = \frac{\text{I\_a}}{\text{S\_a}} \times \text{P\_f}$$

Where:

- P_g_y: Price per G per year of cloud service space
- I_a: Total issued DCT across the network
- S_a: Total effective cloud storage across the network, in G
- P_f: Price factor, currently set at 0.001, which can be set through on-chain governance to ensure price stability

Assuming that the DC network officially launches the blockchain cycle rewards with 50 nodes, then I_a is approximately 400,000,000 DCT, and S_a is approximately 10,000,000G, then P_g_y equals 0.04 DCT, meaning that 200G of cloud service space is roughly equivalent to 8 DCT. If we consider this price in a real-world context, it indicates that the cloud service space is almost free. This is because, at the project's inception, the number of users is very limited, and the cloud service storage space is almost entirely unused, with supply far exceeding demand. This is also very beneficial for attracting Web 2.0 users to migrate into the DC decentralized network.

Let's further assume that by the end of the first year, the number of cloud service nodes has just exceeded 1,000. Based on the inflation rate, we can calculate that I_a is approximately 492,000,000 DCT, and S_a is approximately 200,000,000G, then P_g_y equals 0.00246 DCT, meaning that 200G of cloud service space is about 0.5 DCT. This price seems even cheaper compared to the project's launch. However, the actual situation is not as it seems because, by this time, the DC network has begun to stabilize, the value of DCT tokens has been recognized, and there has been a certain price increase. The cloud service storage space provided by the DC network not only offers various storage functions for cloud drives and albums under the Web 2.0 model but also provides cloud service capabilities for peer-to-peer communication, message caching, and social routing for various applications under the Web 3.0 model, achieving a one-time subscription shared by various applications. Therefore, according to the market's supply and demand, this price of 0.5 DCT should be close to the real-world price of various cloud drives for 200G per year. From this, we can further deduce the real-world value of the DCT tokens.

From the analysis of the two node scenarios selected above, we can see that as more cloud service nodes join the DC network, the value of P_g_y decreases, meaning the amount of DCT users need to pay per G per year for storage decreases, while the real-world price per G of storage remains relatively stable. Thus, the increase in the value of DCT is inevitable. This means that as the DC network continues to develop, the value of DCT tokens will also increase, which is an important economic model design of the DC network.

The cloud service spaces subscribed by users have a limited period. After the effective period expires, the DC network provides users with a three-month grace period. During this period, the DC network will not delete any user data, but users cannot use the cloud service space. If users renew their subscription during the grace period, they can continue to use the service normally; if users do not renew during the grace period, then the DC network will delete the user's data. This policy is designed to encourage users to renew their subscriptions on time and to remove inactive users and their data, freeing up resources for users who genuinely need them.

5.4 Staking Model for Cloud Service Nodes

In addition to validator nodes that require staking, cloud space service providers operating cloud service nodes need to stake a certain amount of DCT to guarantee the cloud space services provided, ensuring the normal operation of cloud service nodes while also generating certain profits. As the DC network develops, the real-world value of DCT is expected to rise. If the staked DCT amount for each cloud service node remains unchanged, the cost of each cloud service node will become increasingly high, while the hardware

value of the cloud service space needing the guarantee does not improve. This leads to an economic over-guarantee situation and may also hinder new cloud service nodes from joining, ultimately affecting the healthy development of the DC network. Therefore, the DC network makes the staked DCT amount per node a variable that changes with the value of DCT. Additionally, we have limited the storage capacity of individual cloud service nodes to a maximum of 200T. Considering a security strategy that requires at least five valid data backups across the network, we set the number of staked coins per G (denoted as G_g) at 15 times the annual value of cloud service storage space per G.
The calculation formula is as follows:

$$G\_g = P\_g\_y \times 15$$

Furthermore, when the number of cloud service nodes n does not exceed 1000, i.e., during the first phase of the DC network, to encourage more cloud space service providers to join, the DC network introduces a certain discount on the number of DCT staked.
The calculation formula is:

$$G\_g = P\_g\_y \times \frac{1000 + n}{2000} \times 15$$

where: n <= 1000

The maximum space capacity of each cloud service node is 200T, hence the maximum staked DCT amount needed for calculating profits for a single cloud service node (denoted as G_p) is:

$$G\_p = 200 \times 1024 \times G\_g$$

Since the staking amount is dynamic, to prevent cloud service nodes from accidentally disconnecting due to insufficient staked DCT amounts for cloud service space caused by price factors, and thus being unable to provide cloud service space, the DC network allows cloud service nodes to join and provide services if the staked DCT for guaranteeing cloud service space exceeds 30% of the maximum staked DCT amount for a single cloud service node. However, the actual profit obtained by the corresponding cloud service node can only be the proportion of the staked DCT. That is:

$$R\_c\_r = \frac{Min[G\_r, G\_p]}{G\_p} \times R\_c$$

Where:

- R_c_r: The actual profit obtained by a single cloud service node
- G_r: The actual staked DCT amount of a single cloud service node
- G_p: The maximum staked DCT amount needed by a single cloud service node
- R_c: The profit a single cloud service node should receive when fully staked

If the cloud service provider timely supplements the DCT amount to reach G_p, then in the next reward cycle, the node will receive the full profit.

5.5 Composition of Transaction Fees

In blockchain networks, the typical resources and corresponding fee structures are as follows:

- Limited block size, where transaction fees are charged based on the number of bytes each transaction occupies;
- Limited block generation time, determined through calculations or performance testing to assess the time consumed by different transactions;
- On-chain state storage resources, which typically involve either a one-time payment or a leasing model. One-time payments occur during the transaction processing and are assessed during development. The leasing model also considers the duration for which a transaction occupies the on-chain state, with overdue states being cleared after a certain period.

In the DC system design, transaction fees consist of the following components:
Total Fee = Base Fee + (Byte Fee + Weight Fee) × (1 + Dynamic Adjustment Rate) + Tip

The base fee is a fixed charge applicable to every transaction, where the byte fee = cost per byte × number of bytes. The system provides an initial fee configuration, which can be updated with upgrades. The dynamic adjustment rate varies according to the block resource utilization ratio, increasing transaction fees when network resource usage is high and decreasing them when usage is low. Tips are determined by the transaction sender to prioritize their transaction for faster processing, especially during network congestion. Tips go directly to the block-producing nodes, while the remaining transaction fees are distributed with 80% going to the treasury and 20% to the block-producing nodes.

5.6 Penalty Mechanism

The DC Staking module includes a penalty mechanism for validators. At the end of each cycle, the network checks the validators, and penalties are triggered if a validator is found to be offline or attacking the network maliciously. The penalty involves a proportionate deduction of the staked DCT tokens and removal of the validator's status. The amount of assets forfeited due to being offline is calculated as the maximum penalty ratio that occurred in a cycle multiplied by the number of tokens staked by the validator. The forfeiture ratio calculation x is:

$$\mathrm{x} = \mathrm{Min}\{\frac{3 \times \mathrm{Max}[\mathrm{k} - (\frac{\mathrm{n}}{10} + 1)\ ,\ 0]}{\mathrm{n}}\} \times 0.07$$

Where:

- k: Number of validators that were offline
- n: Total number of validators

Assets forfeited are transferred to the treasury, and if not reclaimed by the validator through an appeal within a certain period, the system defaults to destroying these assets. Nominators, whose nominated validators are penalized, will also see their nomination stakes forfeited. Additionally, DC has designed corresponding penalty measures for cloud service nodes:

1. If a cloud service node goes offline due to a fault or other reasons, the DC network provides a 7-day response time during which the node provider can repair the node or perform on-chain operations to voluntarily exit the DC network without any penalties; if the response time exceeds 7 days, the node will be removed from the network, and all staked DCT tokens will be forfeited.
2. DC cloud service nodes operate in a TEE environment. To ensure network security, the DC network continuously monitors the code version running on cloud service nodes. If a node is found to be

forging its operating environment or attacking the network maliciously, it will be removed from the network, and all staked DCT tokens will be forfeited.
3. If a cloud service node restarts, it must wait approximately three hours before it can receive the cycle reward again. This measure is to prevent frequent restarts that could destabilize the network.

5.7 Token Trading Market

The DC network does not provide its own token trading market but will connect to various token trading markets within the Polkadot ecosystem. Users can transfer DCT tokens to other blockchain networks with established trading markets via cross-chain messages.

5.7 On-Chain Governance

DC uses Substrate technology to build an on-chain governance mechanism, mainly focusing on managing treasury funds and potential proposals for system improvements. The treasury account receives a portion of the transaction fees and a part of the revenue from user subscription service payments. These accumulated funds may be used in the future to participate in auctions for parachain slots in Polkadot and to fund developers within the ecosystem. During network operation, assets might be wrongly forfeited due to imperfections in the network; we aim to correct such errors through a specific channel. The voting feature of on-chain governance allows DCT token holders to participate in the network's development. The on-chain governance mechanism is still under development.