UltronGlow Whitepaper

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1 Introduction to UltronGlow

UltronGlow is a decentralized open-source parent blockchain platform. UTG is UltronGlow's native utility and governance token. The concept of UltronGlow was first proposed in 2019, inspired by Ethereum and Filecoin, as a *"blockchain platform for distributed edge computing and fragmentation storage applications."* The latest version of the "UltronGlow White Paper" in 2021, introduced the concept of building a distributed edge computing and fragmented storage network that can truly integrate the virtual world and real business, opening UltronGlow's development crowdfunding campaign. During the crowdfunding period, a series of followers and supporters were attracted to join in. UltronGlow's consensus mechanism is called GLOW. GLOW is a combination of four consensus mechanisms.

1. PoS (proof of stake)
2. PoSR (proof of storage resource)
3. PoTS (proof of traded storage)
4. PoSV (proof of space-time verification)

UltronGlow is different from other layer 1 blockchains. With over 2500 edge storage server node devices around the world, it supports the entire UltronGlow blockchain network through storage resources and edge computing capabilities. Through this infrastructure, anyone who wants to deploy apps, Dapps, games, and other programs can use UltronGlow's blockchain network and infrastructure.

2 The Vision of UltronGlow

UltronGlow’s vision is to achieve community autonomy, where all participants can freely enter and exit, pay and earn under the premise of following the project’s agreement.

With the growth of the network, UltronGlow will realize the integration of the real world and the virtual world, that is a strong contender to being a foundational layer that can support metaversal services and applications.

3 Economic Model

3.1 Types of Tokens

There are two types of tokens in the UltronGlow ecosystem

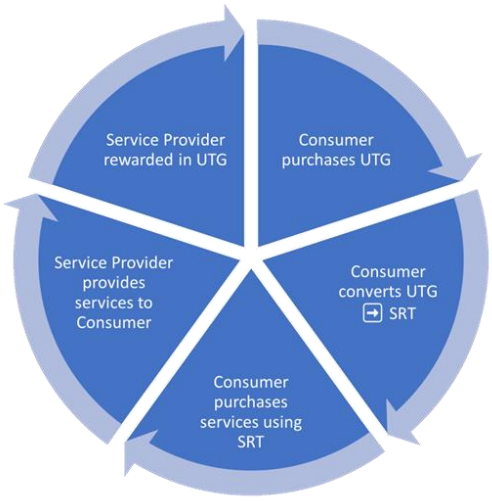
- **UTG (Utility Token)**

The utility token on the UltronGlow blockchain is called Ultron (UTG), which can be traded in many cryptocurrency exchanges. It is also the medium used on UltronGlow to pay transaction fees, distributed fragment storage, and edge computing services. The total circulation of UTG is 105 million. When a user consumes multiple services, UTG will be minted and burned, eventually decreasing the supply to 21 million. This ensures the total circulation of UTG will not depreciate due to inflation caused by the growth of time, but form a closed-loop by output, consumption and deflation.

- **SRT (PoTS Storage Settlement Token)**

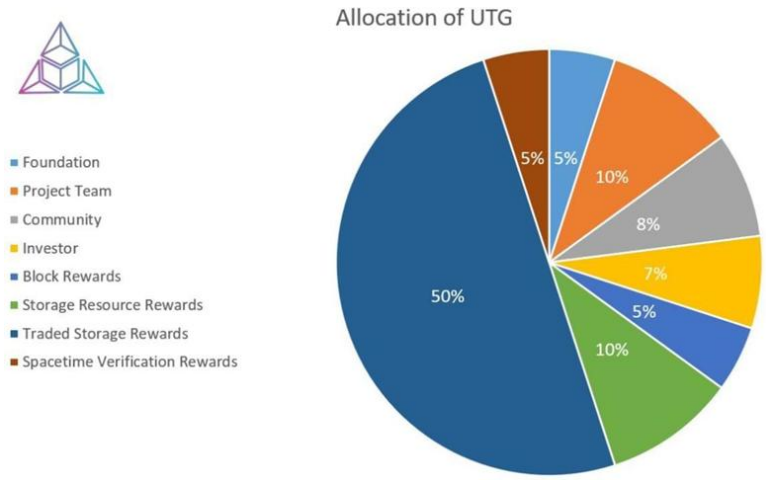
SRT is the settlement token for basic storage fees and value-added service fees of the PoTS distributed shard storage network of UltronGlow. The price is anchored to USDT/USDC, and the number is unlimited. SRT is a bridge between the real world and the virtual world. It reflects the effective storage amount and value generated by the application services on the UltronGlow network. The amount of SRT grows as the effective storage grows, and disappears with the disappearance of effective storage. In UltronGlow, SRT can only be minted through UTG conversion according to the market price. It is used for the consumption of effective storage of PoTS and cannot be traded.

The economic relationship between UTG and SRT in the UltronGlow network forms a closed-loop model, which is as follows:



3.2 Distribution of the UTG Token

The total amount of UTG to be minted is 105 million tokens. The allocation model of the UTG token is as follows:



- **5% (5.25 million):** foundation, used for long-term network governance, partner support, academic subsidies, public works, community construction, etc.
- **10% (10.50 million):** project team, used for research development, deployment and maintenance
- **7% (7.35 million):** investor, used for private placement, public placement, funding network development, business development, partnerships, etc.
- **8% (8.40 million):** community construction, used for community promotion, marketing, activities, partnerships, etc.
- **5% (5.25 million):** used for PoS block rewards
- **10% (10.50 million):** used for PoSR storage resource contribution rewards
- **5% (5.25 million):** used for PoSV spacetime verification rewards
- **50% (52.50 million):** used for PoTS effective storage resource services rewards

Note: The specific details of the PoSV spacetime verification consensus will be updated in subsequent versions of the white paper.

3.3 Minting of Tokens

The inflation issuance and minting method of UTG tokens are very different from the vast majority of existing blockchain projects. Traditional blockchain token minting is gradually reduced over time by way of bookkeeping rewards. In UltronGlow, our goal is to connect real-world services to the blockchain and to complete the value conversion. Therefore, the bookkeeping reward is only one of the methods to mint UTG, but another way of minting is to convert real services into digital assets on the chain in the form of storage resources and efficient storage based on PoSR and PoTS consensus: UTG. Therefore, different consensus mechanisms determines the corresponding minting methods and quantities:

	PoS	PoSR	PoTS	PoSV
Method	Reward Ultron nodes for block validation	Reward providers of storage space	Reward storage resource service providers	Reward spacetime verification of storage providers
Attenuation Model	Time-based decay model with 4% reduction in block height reward per 420,000 blocks	Time-based half-decay model with total issuance halved after 3 years	Half-decay model based on network-wide storage resources, with total issuance halved when network-wide computing power reaches 500 EB	

All UTG tokens minted by consensus will be subject to a 30 day lockout, and then released, avoiding damage to the UltronGlow network caused by early profiters leaving the market prematurely, protecting the interests of nodes that joined in later.

3.3.1 PoS Token Minting Attenuation Model

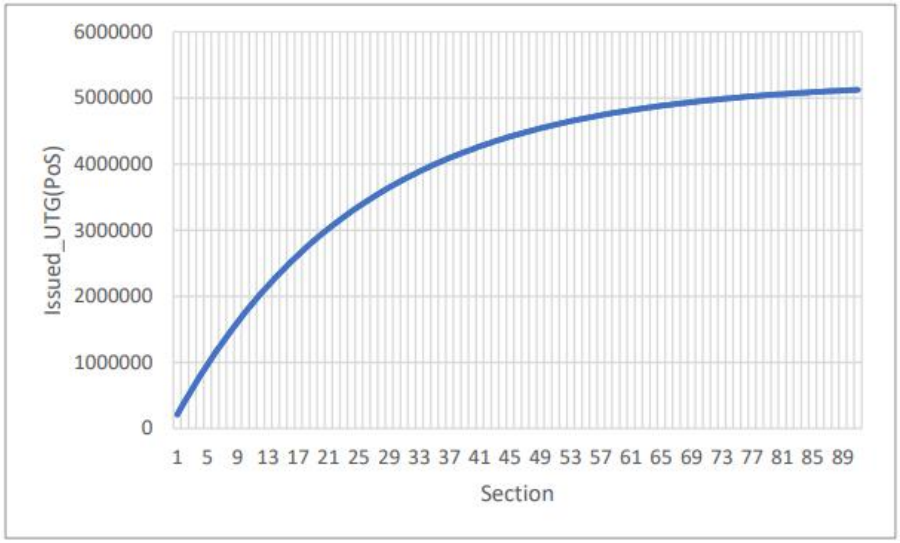
The right to generate a PoS block is controlled by the Ultron nodes, which are elected from candidate nodes through the PoS consensus in each round.

The issuance of block rewards adopts a time-based decay model, with a block generation period of 10 seconds, and a 4% decay every 420,000 blocks.

1. PoS Token Minting Attenuation

In the first attenuation period, each block will produce 0.5 tokens, attenuated by 4% every 420,000 blocks . Total_ ( ) is the total issuance in the nth attenuation period, n is the interval greater than or equal to 1. The cumulative issuance attenuation formula of a block token is as follows:

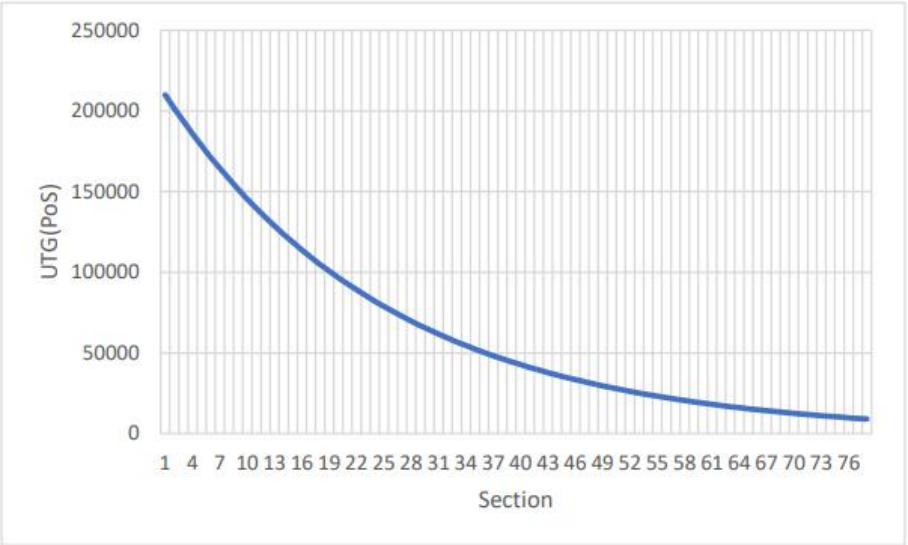
$$Issued\_UTG(PoS)_n = \frac{0.5 \times 420000 \times (1 - 0.96^n)}{1 - 0.96}$$



2. Calculation of the number of tokens issued for each attenuation interval of PoS

The formula for the number of issued tokens in the nth interval (per 420,000 blocks) is as follows:

$$UTG(PoS)_n = 0.5 \times 420000 \times (1 - 0.04)^{n-1}$$



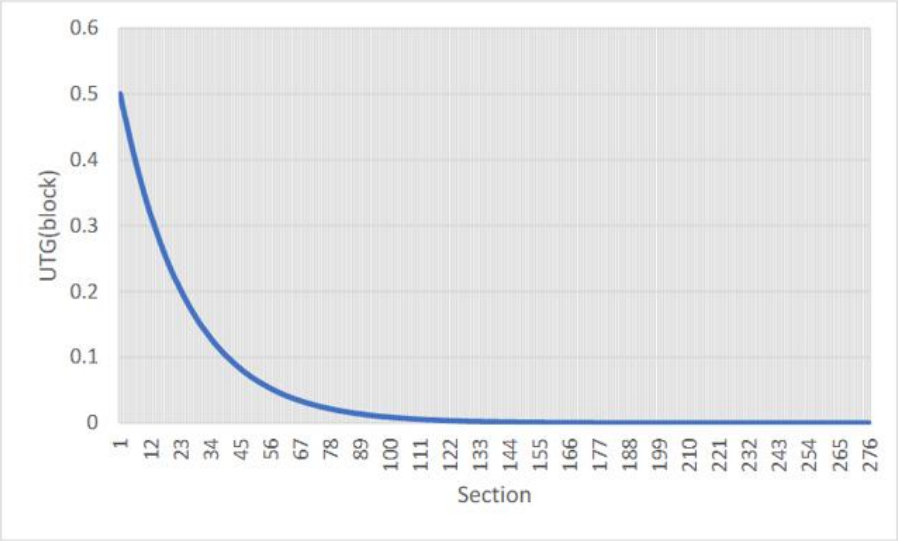
The trend of the two charts shows that the total number of UTG token issuance increases over time, but the number of issuance decreases gradually over each decay period.

3. Calculation of the number of rewards produced by each block of PoS

With the above formula, it is possible to derive the rewards that each block node can obtain when produced by the Ultron node. We set ( ) as the number of UTG rewards for the t-th block, then the reward formula for calculating the block is as follows:

$$UTG(block)_t = \frac{210000 \times (1-0.04)^{\lfloor \frac{t}{420000} \rfloor}}{420000}$$

The formula gives the following curve for the number of block rewards, which is fixed in each interval, but decreasing over time.



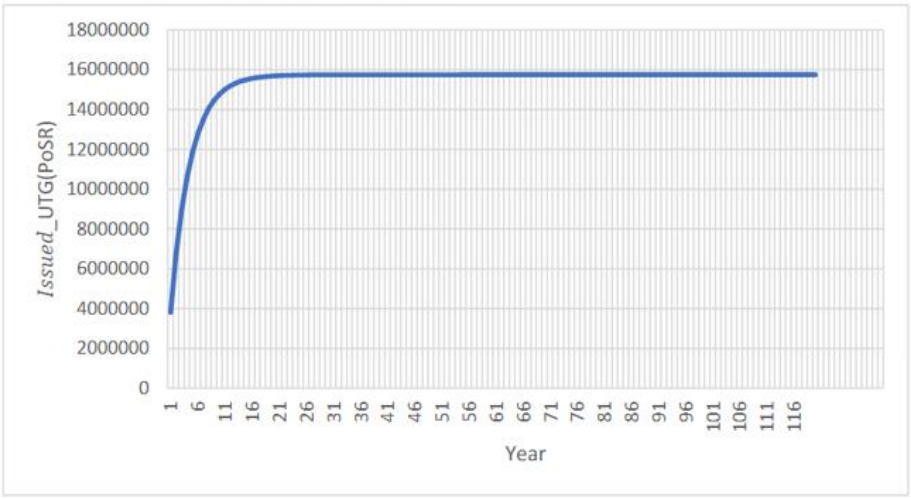
3.3.2 PoSR Token Minting Attenuation Model

Anyone who provides storage resources to support the layer 1 blockchain system, combined with VFS technology, will allocate PoSR rewards based on the storage resources of the entire network. PoSR's rewards are issued using a time-based decay model, with rewards being issued once a day with the completion of rewards being halved when reaching 3 years.

1. PoSR Token Minting Attenuation

We set _ ( ) is the total amount of rewards for PoSR, ( ) is the total number of tokens minted in the th year, the attenuation formula of PoSR is as follows:

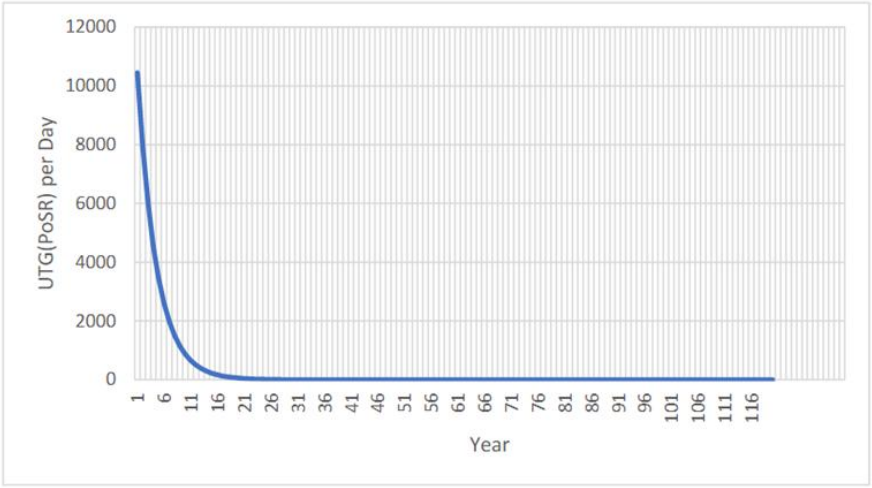
$$Issued\_UTG(PoSR)_n = Total\_UTG(PoSR) \times (1 - 0.5^{\frac{n}{3}})$$



2. PoSR Daily UTG Minting Quality Calculation

We can calculate that ((*y*) is the number of UTG tokens generated by PoSR per day in the th year in the following formula:

$$(UTG(PoSR)/day)_n = \frac{Issued\ UTG(PoSR)_n - Issued\ UTG(PoSR)_{n-1}}{365}$$



In PoSR, the daily rewards issued will be divided equally among all nodes across the network that have provided storage resources. The daily rewards are fixed for a natural year, but the rewards will decrease year by year.

3. Calculation of Daily PoS Rewards

Since the storage and bandwidth variables are introduced as parameters for the reward calculation, the reward per TB cannot simply be calculated as a percentage of the total TB in the network. In this model, we can only focus the calculation on the storage service provider dimension.

First, calculate the total number of PoSR rewards released for each day in year n, i.e. _ / :

$$Token\_PoSR/day^n = \frac{UTG(PoSR)_n - UTG(PoSR)_{n-1}}{365}$$

Next, the number of PoSR rewards available to a particular storage server is calculated. We set _ ( ) to be the PoSR rewards available on day of year , _ to be the bandwidth parameter variable, to be the calculated storage parameter variable, and ∑ _ to be the total storage capacity of the whole network after the calculation of the bandwidth variable*storage variable, resulting in the following formula:

$$Node\_rewards(PoSR)_t^n = Token\_PoSR/day^n \times \frac{Storage\_Node \times BD\_F \times SC\_F}{\sum Total\_cStorage_t}$$

	Free Resources	Served Resources
Caption	Storage resources that do not participate in PoTS	Storage resources that participate in PoTS
Debuff Rules	From the day of staking, the PoSR reward for nodes will be slowly reduced 1/30 daily, until the debuff ratio reaches 40%.	Storage resources that provided services will have full PoSR rewards (100%).
Disposal of debuff rewards	Debuff rewards will enter a black hole address for burning purposes during the reward release process.	

3.3.3 PoTS Token Minting Attenuation Model

The PoTS design matches the actual market and real services, i.e. valid storage resources or edge servers to measure the workload of services provided by the service provider. When the effective storage dynamic storage resource node is generated, the system will calculate rewards based on the effective resources being used and the SRT paid by the customer to incentivize the network nodes.

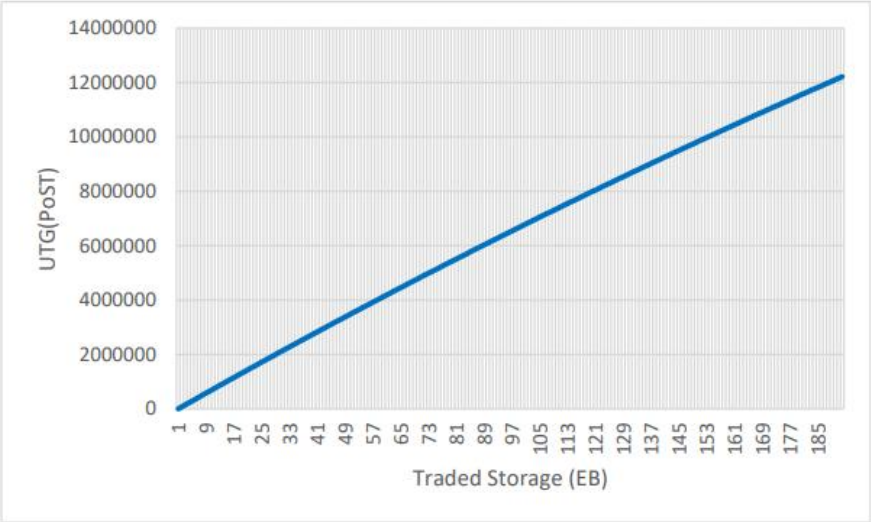
Since effective storage is a dynamic and unpredictable workload, in the issuance of valid storage-based tokens, UltronGlow's design is based on the cumulative total value of effective storage space as the basis for attenuation, rather than being based on time.

In UltronGlow, the output will be halved when the accumulated effective storage space of the whole network reaches 500 EB. When the accumulated effective storage space of the whole network increases by 1 EB, the output of UTG will decline resulting in the exchange ratio between the number of rental storage spaces and UTG being adjusted upwards.

1. PoTS Token Minting Attenuation

_ ( ) is set as the number of UTG tokens based on the cumulative output of PoTS in the th year, _ ( ) as the total amount of UTG that can be issued by the PoTS consensus, and is the number of EB. The cumulative issuance attenuation formula of PoTS is as follows:

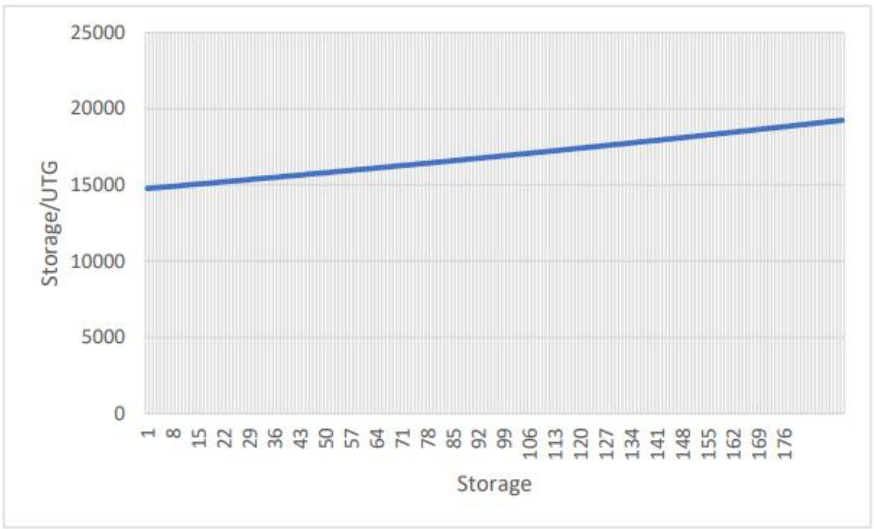
$$Issued\_UTG(PoST)_n = Total\_UTG(PoTS) \times \left(1 - 0.5^{\frac{n}{500}}\right)$$



2. Calculation of the Ratio of PoTS to UTG per TB

When calculating the th EB, the conversion ratio (/) between storage space and UTG is as follows:

$$(Storage/UTG)_n = \frac{1073741824(GB)}{Issued\_UTG(PoST)_n - Issued\_UTG(PoST)_{n-1}}$$



In the PoTS consensus, the most important thing is (/) , which determines how much UTG will be rewarded for each GB of storage space rented. (/) gradually increases as the accumulated storage space of the entire network increases. The amount of UTG that can be converted from 1 GB will gradually decrease at different EB stages.

3. PoTS Storage Resource Market Design

To use storage resources on the UltronGlow network, users pay the network a Storage Usage Fee set by the service provider, which is calculated in SRT. The Storage Usage Fee is made up of three factors:

1. The amount of storage space used
2. The number of days used
3. The contracted unit price

$$Storage\ Usage\ Fee(SRT) = Trade(GB) \times RentalDays \times ContractPrice(SRT/GB)$$

( )is the actual storage space used, is the storage space usage time limit and (/) is the unit price of the contract traded. The minimum days of storage use is 30 days. The minimum rented storage space is 1025 GB.

4. Commitment Staking of Storage Resource Consumption Contract

When entering a storage resource consumption contract, as the SRT paid by the consumer will be burned at one time, the service provider will need to pledge the UTG equivalent of the SRT being burned (based on the Time Weighted Average Price (TWAP)) at the time of the contract in order to protect the rights of the consumer.

Note: TWAP is calculated by weighting the historical UTG price within 7 days to avoid the impact of extreme market conditions on the SRT conversion ratio.

If the service provider has not made a pledge, the contract cannot be signed and the service provider must complete the pledge operation within the effective signing time in order to ensure the successful confirmation of the storage resource consumption service. At the expiration date of the contract, the pledge of commitment is subject to a 30-day lock-up and 180-day release rule.

5. Calculation and Distribution of PoTS Rewards

_ is set as the storage resource service reward available to the provider during the decay period, _ as the number of storage resources provided, (/) as the ratio of storage space to UTG in the th decay period, as

the PoTS storage resource rental benchmark fee, as the paid storage resource usage fee, as the storage resources usage time, _ as the bandwidth factor, _ as the storage capability factor, _ as the multiplier equity value, and _ as the adjustment factor. The PoTS reward algorithm is as follows:

$$UTG\_Reward_n^{node} = \frac{Trade\_SC}{(Storage/UTG)_n} \times \left(\frac{ContractPrice^{node}}{BasicPrice} \times E\_v\right) \times RentalDays \times (BD\_F + SC\_F) \times TS\_f$$

Covenant conditions:

- $0.1 \leq \frac{ContractPrice(SRT/GB)^{node}}{BasicPrice(SRT/GB)} \leq 10$
- $RentalDays \geq 30$
- Renting storage space $\geqslant$ 1025 GB
- E_v value:
  - When $ContractPrice^{node} < BasicPrice(SRT/GB)$, the value in the formula is $E\_v = \frac{1}{V\_Pots}$, V_Pots
  - When $ContractPrice^{node} > BasicPrice(SRT/GB)$, the value in the formula is $E\_v = V\_Pots$, V_Pots
  - When $ContractPrice^{node} = BasicPrice(SRT/GB)$, the value in the formula is $E\_v = 1$
- Storage Resource Rental ≥1025 GB

In order to ensure the interests of consumers and regulate the behavior of the provider, when the storage resource contract is determined, the UTG obtained by the provider will be issued according to the resource's (1/consumption duration) daily distribution, even though the SRT is burned at one time.

3.3.4 Factor Variables for Storage and Bandwidth

To improve the network's arithmetic and service capabilities, we have added the calculation variables of bandwidth factor and storage factor to the PoSR and PoTS reward calculations to encourage storage service providers to provide the network with more storage space and higher bandwidth resources.

1. Bandwidth Variable Factors

For different storage service provider bandwidth, factor variables will be involved in the calculation of PoSR and PoTS rewards. Set _ as the bandwidth factor when the bandwidth is Mbps, log5.5 as the bandwidth stake factor when the bandwidth is Mbps, ℎ _ as the weighting factor, and _ as the correction value. The calculation of the bandwidth factor is as follows:

$$BD\_F_n = \frac{\log_{5.5} n}{Weighting\_Factor_{bw}} - C\_V_{bw}$$

2. Storage Variable Factors

For sealed storage provided by different storage service providers, storage factor variables will be involved in the calculation of PoSR and PoTS rewards.

Set _ as the storage factor when the storage is TB, ℎ _ as the weighting factor, and _ as the correction value. The calculation of the storage factor is as follows:

$$SC\_F_n = \frac{\log_2 n}{Weighting\_Factor_{sc}} - C\_V_{sc}$$

3.4 Burning of Tokens

The minting of the token corresponds to an inflationary model of the economy. In a well-established economy, it is not enough to have inflation, which will lead to a rapid dilution of the value of tokens. UltronGlow is designed the following deflationary model to resist the problem of dilution of value due to inflation:

- **Output Deflation**
  The issuance of UTG follows a predetermined and controlled supply model. This model determines that the output of the token will gradually decrease over time.

- **UTG → SRT Conversion Deflation**
  The cyclical supply and demand model of UTG and SRT revolves around the service. The SRT paid by the service is burned while UTG is minted at the same time. If you continue to use the service, you need to destroy (burn) UTG to mint SRT. Such a cyclical model

predestines the demand for SRT to increase as the effective storage ecosystem grows (including applications, nodes, storage arithmetic, users, etc.), which results in an increase in the burning of UTG. The cyclical supply and demand for UTG and SRT represents an extreme deflation.

- **Slashing of Tokens**
  If the service quality of the node is unstable or malicious, a part of the pledged UTG token will be slashed (tokens burned).

3.5 Value Capture of Tokens

As an equivalent exchange for the value of storage resources, you need to pay SRT to get various services on the UltronGlow network. UTG is the embodiment of UltronGlow's equity and is the most important value underpinning the security of the entire network and its continued operation. UTG is required to be held or expended to participate in governance and to complete transactions, and is the only way to mint SRT, without which services on the UltronGlow network cannot be used.

Simply put, as the ecosystem grows and the number of service providers and service applications increases, the demand for SRT increases, as does the demand for and value of UTG.

3.6 Composition of Transaction Fees

In a blockchain network, transaction fees are used to incentivize witness nodes to help package transactions on the blockchain, while preventing malicious acts that endanger the security of the network. In the UltronGlow network, transaction fees are mainly composed of the following two parts:

- **Service Cost -** The minimum fee that needs to be paid for each transaction
- **Tips -** Fees determined by the consumer, used to increase the priority of the transaction

3.7 UltronGlow's Third-Party Token

In the blockchain, the issuance of tokens is an extremely effective incentive method for decentralized services. In the initial stage of the product, tokens can effectively promote user growth and increase core indicators such as user volume, activity, and retention.

Any organization or individual can issue fungible tokens or non-fungible tokens on UltronGlow, and the issuer of the token can determine the quantity, price, and distribution rules of the token.

4 Consensus

UltronGlow has brought together four consensus mechanisms that enable any participant of the network to earn rewards. The consensus mechanisms ensure that the network operates correctly and discourages 'bad-actors' from the network, creating a safe and secure environment.

These consensus mechanisms have been designed to bridge off-chain services with on-chain rewards, an area that many other blockchains have been unable to fulfill. Through this combination, users will have the ability to access and store data & information, while miners have the option of how much they want to contribute in return for how many rewards they want to earn.

4.1 Consensus Design

UltronGlow is unique in that there is not a single method of consensus in the network. Rather, it consists of the relatively standard Proof of Stake (PoS) for block generation, plus three additional consensus mechanisms which reward users of the network for provided resources.

This unique design is called the “GLOW” consensus of UltronGlow.

- **PoS (Proof of Stake)**
  PoS proves that by selecting Ultron nodes based on a specific algorithm among all candidate nodes to perform block generation of transactions is secure and fair, while earning PoS rewards.

- **PoSR (Proof of Storage Resources)**
  Members of the network who provide storage resources, combined with VFS technology, will be allocated PoSR rewards based on the network-wide storage resources.

- **PoTS (Proof of Traded Storage)**
  Combined with the support of storage resources and the proof of service work proof mechanism based on dynamic effective storage (application service), it completes the work proof of off-chain services and takes effective storage digitization as the value of on-chain and off-chain interoperability. If any storage resources are utilized or leased, service providers will be rewarded.

- **PoSV (Proof of Spacetime Verification)**
  Validators verify the authenticity of the space and bandwidth of all storage service providers in the network in order to eliminate false capacity and bandwidth claims, and to ensure the validity, continuity and reliability of the network's computing power. Validators will be rewarded for their efforts in the validation process.

4.2 PoS Consensus

UltronGlow's block generation is based on PoS consensus, but unlike other traditional blockchains with PoS consensus, UltronGlow PoS is done by Ultron nodes located at different levels to generate blocks. This improves the processing efficiency of the blockchain. Ideally, the confirmation time and the time to generate a new block are the same, which greatly improves the processing efficiency of the blockchain, while the hierarchical selection method provides a more fair chance for all candidate nodes to produce blocks.

4.2.1 Node Identity Design based on PoS Consensus

In the UltronGlow PoS consensus, the pledged nodes will have different identities according to the consensus stage:

- **Preparatory Node**
  All nodes that stake 20 UTG automatically become preparatory nodes. In each election, all preparatory nodes have the opportunity to enter the candidate node house, or eventually become Ultron nodes.

- **Candidate Node**
  All preparatory nodes with penalty scores less than 30 are eligible to enter the candidate node house, and the finalists become Ultron nodes in the next block generation cycle.

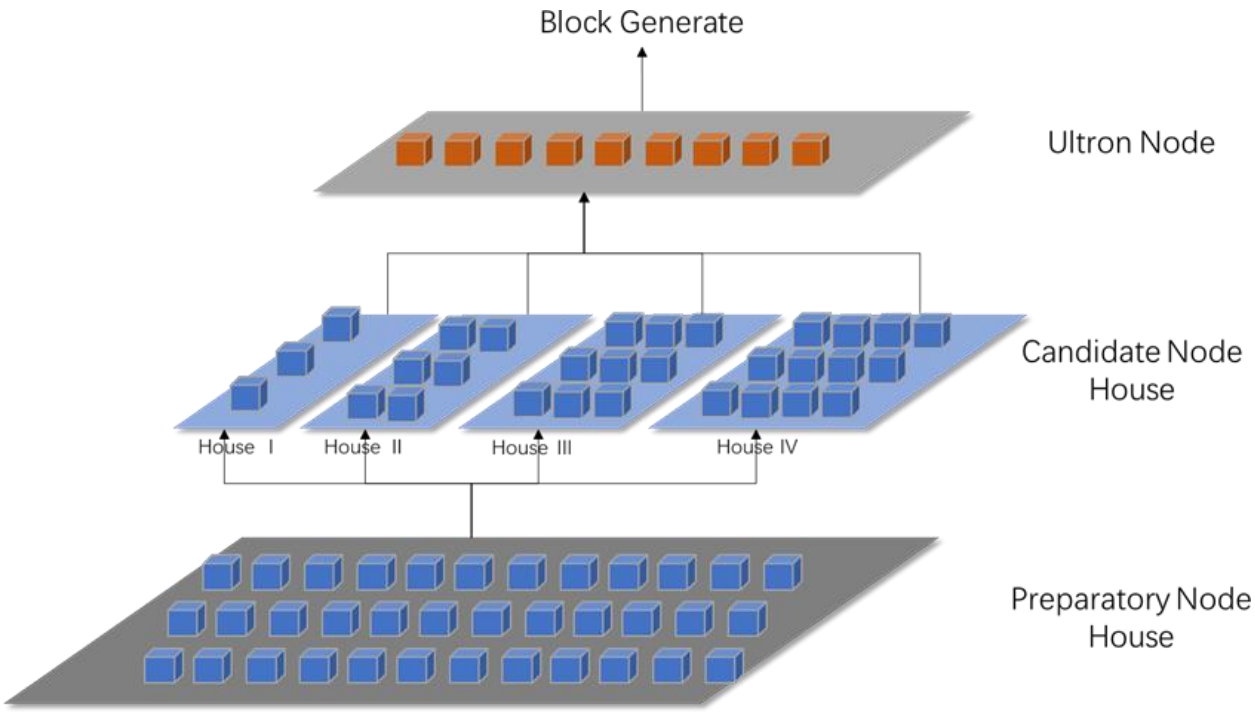
- **Ultron Node**
  Limited to 21 nodes chosen from the Candidate pool. Ultron nodes correspond to the package node of the blockchain. Only participants who are Ultron nodes have the right to generate blocks and obtain UTG block rewards during a block generation cycle.

4.2.2 PoS Consensus Cycle Design

UltronGlow's PoS consensus cycle is 2100 seconds, with a block generation interval of 10 seconds, and consists of 21 Ultron nodes. In each block generation cycle, 210 blocks will be generated. In the same block generation cycle, each block contains the same number of UTG rewards.

4.2.3 PoS Campaign Process

At the end of this block generation cycle, the blockchain will automatically start the next cycle of Ultron node elections. The elections are divided into three stages:



- **Stage 1:** After eliminating pre-candidate nodes with penalty scores greater than or equal to 30, the remaining pre-candidate nodes are populated into the candidate node house.

- **Stage 2:** Candidate node campaign ranking is based on the algorithm to derive the weighted ranking of the candidate nodes. According to the ranking, the top n names are selected as the Ultron nodes to enter the next round of the block generation cycle.

- **Stage 3:** The next round of block generation cycle consists of 21 Ultron nodes, which are randomly shuffled, and then broadcast to the entire network. After the next block generation cycle begins, the new Ultron node queue will start to generate blocks.

4.2.4 Block Production Rotation Design

By rotating nodes, the security and fair decentralization of block generation power can be guaranteed. A well-established consensus mechanism must ensure the decentralization of the blockchain network. Therefore, in the UltronGlow PoS consensus, a weighted and deduction algorithm will be introduced in each election window to ensure that the block

rights can be evenly dispersed. All post-selected nodes will not be controlled by some nodes with excessive equity for a long period of time.

4.2.5 Staking

As with other PoS blockchain networks, the UltronGlow PoS consensus is designed to maintain network security and ensure that participants will provide the relevant services in a manner that complies with the network code. Therefore, nodes must be stake to obtain the right to generate blocks. The minimum pledge amount to stake is 20 UTG. A node is allowed to cancel staking at any time and withdraw from the election and give up the right to generate blocks, however the stake amount will be released and locked for 180 days.

4.3 PoSR and PoTS Consensus

Both the PoSR and PoTS consensus are protocols designed to enable real-world business applications on the UltronGlow network. Their job is to complete the process of mapping real business assets (storage space) to numbers on the blockchain, and then converting the numbers into token assets on the blockchain through protocols.

4.3.1 Effective Storage Resource Stake

Nodes that want to participate in PoSR and PoTS consensus also need to stake, but they can participate in these two consensus mechanisms at the same time by staking. In order to maintain the security of the network and the stability of services, all storage providers need to promise to provide storage services for at least one year.

1. Design of Storage Resource Stake

The greater the bandwidth, the higher the efficiency of storage resource usage (reflected in the upload and download speed of data). By adding the bandwidth stake coefficient to the stake algorithm, we achieve the bandwidth-revenue-stake linkage adjustment mechanism to encourage more storage providers with high-quality bandwidth to join the network. This also regulates the behavior of participants who gain higher returns through staking. We set the amount of nTB UTG staking as ( ) / , the total UTG circulation of the whole network as _ ( ) , the total storage of the network as ∑ _ _ ( ) , and bandwidth stake factor as 5.5 ℏ ( ) with the adjustment factor as *S*. The calculation for staking is as follows:

$$Pledge(UTG)_t/nTB = Total\_Rewards(UTG)_t \times \frac{1}{\sum Total\_eff\_Storage(TB)_t} \times n(TB) \times \log_{5.5} Bandwidth(Mbps) \times S$$

Considering that in the initial stage of the project, the circulation of UTG and the total storage power of the entire network rises rapidly, causing the staking result calculated by this formula to be unpredictable. Therefore, we passed an agreement after advising with economic consultants, community and others, an initial staking amount was established as follows:

$$Total\_Rewards(UTG)_t \times \frac{1}{\sum Total\_eff\_Storage(TB)_t} = 1.25\ UTG/TB$$

Within one year after the project's mainnet is launched, the calculation of storage staking shall be based on this initial value. Starting from the second year, as the trend of UTG quantity and storage power stabilizes, the stake calculation will take effect.

If the following formula is true, then take the actual result as the staked amount of UTG/TB:

$$(Total_{Rewards(UTG)_t} \times \frac{1}{\sum Total_{eff_{Storage(TB)_t}}}) < 1.25UTG/TB$$

If this following formula is true, then take 1.25 UTG/TB as the staked amount:

$$(Total\_Rewards(UTG)_t \times \frac{1}{\sum Total\_eff\_Storage(TB)_t}) \geq 1.25$$

2. Release of Staked UTG

All storage service providers are required to commit to a stable service for at least one year, then nodes are allowed to discharge and the staked UTG will be released. When the storage service provider chooses to release the stake, it loses the right to participate in the PoSR and PoTS consensus.

The stake will be released according to the rules of the network, which is a 30 day lock, and then released linearly 180 days later.

4.3.2 PoSR Consensus

The original intention of the PoSR consensus reward was to incentivize all participants and expand the entire storage network.

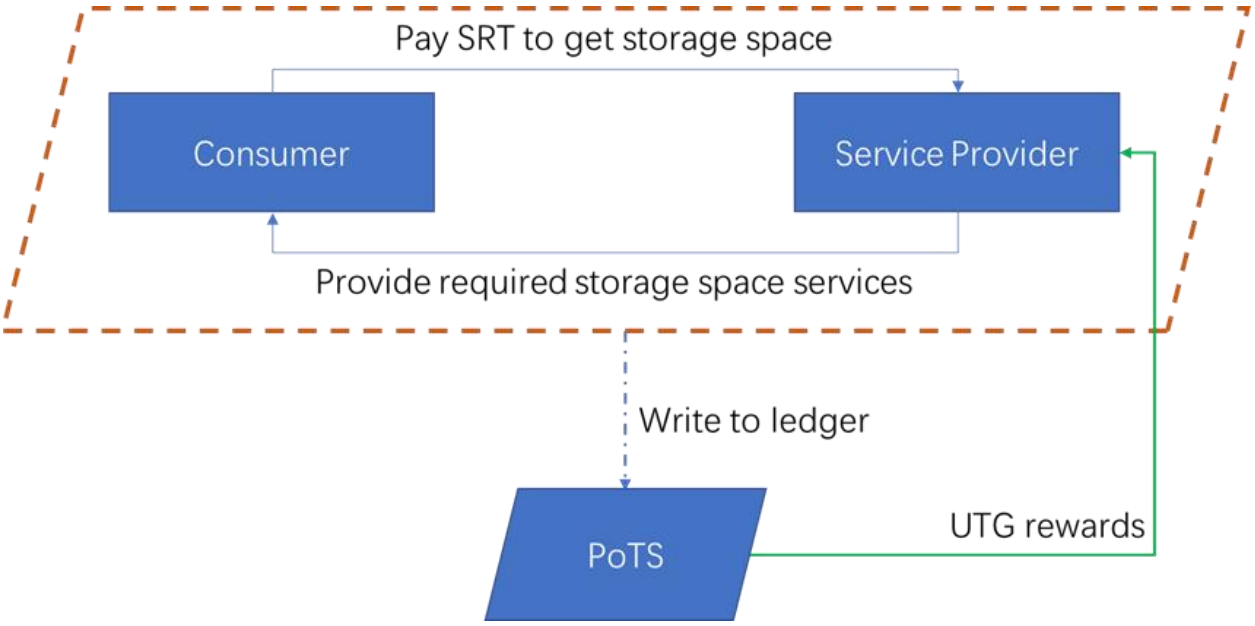
In UltronGlow, the PoTS consensus, which is the most important aspect of token minting, UTG can be minted only when there is actual operation between supply and demand because it maps to real-world business. However, in a normal business practice of supply and demand of storage space, since the behavior of storage consumers such as when or how much they consume is unpredictable, the storage space service provided by each node is difficult to ensure full load operation for 365 days. However, a healthy network requires a large amount of storage space to support the reliability and sustainability of its services.

Therefore, based on the above considerations, we have added an incentive consensus for the storage and computing power nodes of the entire network to the GLOW consensus, that is, the PoSR consensus. At the same time, in order to avoid storage providers only participating in PoSR consensus and obtaining rewards without providing real and effective services, the PoSR reward deduction rules are set for different status of storage resources. For more detail, please refer to the PoSR token minting chapter.

1. PoTS Consensus Working Model

Consumers of storage space choose different storage services according to their needs and pay the appropriate percentage of SRT after determining the required business model, storage volume, time and other commodity attributes. The storage service charge is defined by the provider, which can neither be lower or exceeding 10x of the network benchmark.

Once the SRT spent by the consumer is burned, the storage service is provided to the consumer for use in accordance with the contract requirements. When the entire commercial activity is started, the "consumer-server" consumption transaction will be recorded, and the PoTS consensus will issue UTG rewards to the provider daily according to the commercial contract based on the effective storage resources actually provided.



2. PoTS Commitment Staking

After the consumer and the server enter into a storage resource service contract, the server needs to pay the corresponding committed staked UTG to ensure that the consumer can use the data anytime and anywhere during the contract execution period. For specific rules, please refer to commitment staking.

3. Renewal

If the user is satisfied with the service of the current storage service provider, the user is allowed to initiate a renewal application to the storage server when the remaining time of the contract is less than or equal to 5%.

For the renewal application, the user also needs to pay an equivalent SRT fee for the new contract, and the service provider also needs to stake the equivalent value of UTG for the new contract as a service commitment fee. The renewal duration is a multiple of the current contract.

When the contract ends, the storage service provider will receive the full amount staked for the current contract and the previous renewal. In the event a storage service provider fails to complete the service within the time limit, the user can receive the corresponding SRT compensation.

4.4 Penalty

4.4.1 PoS Penalty

PoS maintains the stability of the entire network, so Ultron nodes will be slashed due to double-signatures, failures, etc. An initial PoS equity score for each node is set once it is eligible for block generation. This score is used to measure the normative behavior of the node. If the Ultron node has improper behavior such as missing blocks, its equity score will be deducted. When a node's penalty score is above 30, it will be prohibited from participating in elections and generating blocks.

If a node expects to remain in the running, it must restore its right to run for the Ultron node by resetting its equity score after paying the appropriate penalty amount.

4.4.2 Storage Resource Timespace Verification Penalty

The behavior of all service providers who provide valid storage resources is critical to the entire ecosystem. Service providers involved in malicious behavior will have their stake slashed as appropriate. PoSV's validators will be responsible for storage and bandwidth validation of PoSR.
Storage resources timespace verification penalty includes two levels of checks:

- **Storage Penalty**
  Storage resource providers are required to be able to remain online daily and submit proof of storage space during the challenge period. If the storage verification detected on that day is less than 80% of the pledged storage, it cannot participate in the PoSR rewards calculation on that day.

  If the storage service provider fails to pass the storage verification for 30 consecutive days, it's staked UTG and locked PoSR or PoTS rewards will be slashed. If the storage service provider wishes to participate again, a new stake will be required.

  If there is a PoTS contract on the node when the server is being penalized, compensation will be made according to the contract termination rules for users, and the contract will be terminated.

- **Bandwidth Penalty**
  The bandwidth of the storage resource provider is verified daily and if the bandwidth verified on that day is less than 80% of the claimed bandwidth of the pledge, the storage service provider will not participate in the calculation of the PoSR rewards on that day.

  If the storage service provider fails to pass the bandwidth verification for 30 consecutive days, it's staked UTG and locked PoSR or PoTS rewards will be slashed. If the storage service provider wishes to participate again, a new pledge will be required.

  If there is a PoTS contract on the node when the server is being penalized, compensation will be made according to the contract termination rules for users, and the contract will be terminated.

  (Failure of either bandwidth validation or storage validation will result in a penalty).

4.4.3 PoTS Storage Service Penalty

After the storage resource usage contract is signed, the provider is required to guarantee uninterrupted, 24x7 availability to avoid the scenario where a consumer's data is not available. To regulate the provider's behavior, we set the following penalty mechanism:

- **Contractual Non-Performance Penalty**
  If the storage service contract signed by the storage service provider is validated, and the validation fails, the consensus protocol will determine that the service is of poor quality and the service provider's PoTS reward for that contract will not be granted.

- **Compensation for Breach of Contract**
  Compensation for breach of contract refers to a penalty mechanism that allows users to terminate the storage resource contract by themselves when the service provider is judged to be unable to provide services, and requires the service provider to pay compensation.

  Storage service contracts do not allow cancellation by default unless a default penalty mechanism is triggered.

During the execution of each signed storage resource usage contract, if the verification of the service resource fails for ≥ 10% of the contract usage time limit, the PoTS consensus will determine that the user does not have the service capability and trigger the mechanism for the user to terminate the contract.

When the user decides to terminate the contract, the pledged UTG promised by the server to fulfill the contract will be destroyed and converted into SRT compensation to the user in proportion. The specific rules are as follows:

> Set n as the normal execution time of the contract, and T as the storage resource usage time signed by the contract.
> The amount of UTG compensated for the user = pledged UTG*(1-(n/T)), and the calculated UTG is converted to SRT compensation to the user at the time weighted average price (TWAP)
> The amount of UTG to be punished and destroyed = UTG pledged *(n/T), which represents the amount of UTG corresponding to the time the user actually uses

4.5 Consensus Evolution

A decentralized consensus mechanism needs to be able to cope with various potential risks . In UltronGlow, all nodes can initiate optimization proposals for the consensus mechanism. The proposal will be publicly voted on. When the number of passes reaches 2/3, the proposal will take effect and the proposal will be automatically implemented through an autonomous mechanism.

5 Application Economy of the UltronGlow Network Market

5.1 Economic Rules

The UltronGlow network is an open economy marketplace where every participant can find their role and participate in the network economy on demand. Depending on the scope of participation, the UltronGlow network includes the following participant roles:

	Free Resources
Investor	Including investors and currency holders. Investors provide funds, personnel, technology and market support for the economy, while currency holders provide a boost to the rise of UTG
Developer	Provide rich and diverse applications for the UltronGlow network, giving the network more application cases.
Customer	The customer of various services in the UltronGlow network.
Provider (Miner)	Nodes that provide storage resources and various services for the UltronGlow network. T They maintain the security of the entire blockchain and strengthen the service availability and diversity of the network. Customers and providers together form the supply and demand ends of the economy.
Validator	Provide spacetime verification capability for the UltronGlow network, ensuring the authenticity, validity, and reliability of the network's computing power.

Each participant can play multiple roles. For example, investors can provide financial support and also act as users of the efficient storage resources provided by a service provider. A healthy economy requires a variety of complex and well-connected relationships.

5.2 UltronGlow's Market Plans

Building a healthy, robust economy for the UltronGlow network will not happen overnight. We will first devote ourselves to the construction of an effective storage resource service market. On the premise of solving the problem of data ownership in Web3.0, we will

gradually develop various business models according to the scale of the network and market demand.

1. Basic Market: Effective Storage Resource Service Market

In UltronGlow's effective storage resource service market, service providers provide storage resources and consumers use them on demand, forming an effective data-based sharing business model. The effective storage resource service market will prepare the on-chain and off-chain business for migration and growth.

2. Advanced Market: Edge Computing Market

The hardware capabilities within the server that carries the computing power of storage resources will be fully utilized and integrated to form a global computing market. This includes compute, storage, and networking to achieve a complete set of the edge computing market, so that the service node CPU, memory, GPU, network, storage can be used for real business.

When customers deploy a project in UltronGlow, they need to calculate computing and storage space to store data, all of which are recorded on the UltronGlow blockchain, to implement a true decentralized network.

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