



Nebulas NAX White Paper

Nebulas Foundation

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1 The Nebulas Vision

Blockchain technology itself is not a brand-new technological innovation but rather a combination of a several of technologies (including cryptography, distributed systems, game theory, etc...) resulting in a novel innovation. Bitcoin [1] created the perfect design for "a decentralized electronic cash system" opening the door to the blockchain world. Next, Ethereum further proposed a smart contract blockchain framework with Turing complete code thus creating the ERC20 token paradigm which made it easier to finance new ideas via blockchain.

Blockchain technology has thus achieved unprecedented prosperity and development. The Nebulas White Paper [2] also presented its own blockchain concept and is committed to the vision of "to allow everyone to benefit fairly from decentralized collaboration." It also presented novel technologies such as Nebulas Rank (NR), Developer Incentive Protocol (DIP), Nebulas Force (NF) and Nebulas' unique approach to on-chain consensus entitled Proof of Devotion (PoD).

Over the past two years, Nebulas have learned from their strengths within the blockchain world. We understand that there will be further exploration and experimentation within blockchain collaboration. With this in mind, our next attempt will be the NextDAO platform.

2 NextDAO

2.1 Blockchain Collaboration

With the emergence of the Ethereum ERC20 token a new financing method based on smart contracts via blockchain led to a very low asset issuance expense and with the support of various blockchain trading platforms, tokens were able to obtain liquidity. This new capability led to early investors being able to exit their investment at any time leading to a sinificantly reduced investment length. This new paradigm did not however solve post-financing issues for projects and as a result, this led to the creation of many deceitful projects.

Blockchain technology is essentially a decentralized, trustless, game-based au-

onomous system. Its real charm is its open collaboration model based on consensus mechanisms under the idea of decentralization. The most famous attempt at blockchain collaboration is the DAO (Decentralized Autonomous Organization) project on Ethereum. The DAO ideology is derived from equity financing technology on the Ethereum blockchain which creates a decentralized management structure by utilizing code for organizational rules and the decision-making process. This capability eliminates the need for written documentation and reduces the requirement for human intervention. In 2016, Ethereum's DAO project was hacked and tens of millions of dollars worth of ETHER was stolen which eventually led to a hard fork on the Ethereum blockchain. Although The DAO was ultimately not successful, it was a great attempt and a lot of lessons were learned which has assisted follow-up projects.

We believe that collaboration via blockchain still has the following issues:

- **Collaboration role diversification** In the early Bitcoin community, the community consisted of miners and coin holders. With the emergence of Ethereum, more and more people were exposed to the blockchain and created additional user groups such as developers and application users. Due to this, the distribution of rights and responsibilities of different user roles was challenged.
- **Single incentive mode** At present, most of the public chain consensus incentives are focused on mining incentives based on PoW or PoS. With more user roles within a blockchain ecosystem, a single incentive model cannot adequately give incentives to all participants.
- **Ecosystem models lack fairness** The current blockchain ecosystem model is not fair to most participants leading to some mainpulating the system for their personal benefit.

In order to solve the problems of blockchain collaboration listed above but not limited to, Nebulas proposes a financial blockchain collaboration framework entitled "NextDAO." This platform will include public chain collaboration, governance and decentralized finance (DeFi).

2.2 Public-Chain Token Economy

The Token Economy is embodied in an economic model that includes the generation, circulation, repurchase and incentives of issued tokens. In the conventional economy, the manifestation of the asset include: currency, notes, points, stocks, claims,

usage rights, ownership, and so on. The generation, circulation, repurchase and incentives of these rights are all guaranteed by centralized institutions. In the world of blockchain, a decentralized economic model has emerged. With this emergence, a typical use-case of a public chain token economy is the Ethereum ERC20 token. It greatly facilitated the speed of financing and distribution leading to a stimulated economic prosperity on Ethereum as well as driving the development of the entire blockchain industry.

Therefore, the value and innovation of the public chain is not only due to the innovation of this technology itself but also the model and commercial innovation brought by technology.

Building a Token Economy for a public chain is just as important as developing the underlining public chain technology. The biggest problem facing public chain incentive is human nature which eventually becomes a human-to-human game. As a result, the participants are aimed at obtaining their best interests rather than completing the best ecological construction.

Most public chain projects fail in comparison when trying to compare the power of the Ethereum community. With this in mind, it's critical to design a token economy that suits it's ecosystem. A designed token economy must align with the expansion of consensus, the development of the community and a model that presents a positive ecosystem to all which will bring long-term benefits to the system. The positive development of user incentive is needed in order to promote the development of blockchain technology and its commercial expansion.

The public chain can be thought of as a public resource platform where any user can utilize or trade on. Therefore, the public chain does not belong to any individual and is a public resource. In order to avoid the tragedy of the commons [3], an effective and high-liquidity economy is needed to form a long-term effective positive ecosystem which also consists of a excellent governance environment, expansion of community consensus and as a result will lead to better technological innovation and development.

Nebulas will actively develop a unique token Economy of its own and will continue to build a better collaboration platform where every participant will benefit fairly.

2.3 Nebulas Token Economy - NAX

As a public chain, Nebulas will establish an ecosystem framework based on its own strengths and characteristics. We aim to build a system of fairness, validation, collabo-

rative innovation, incentive contribution, stimulating positive ecosystem development, strong community consensus and developing unique public chain technology. The core logic of NAX and application scenarios are described in detail in the following sections.

3 Economic Design of the NAX Token

3.1 Design Goal

While the NAX token has been designed to increase ecosystem activity, it's primary goal is to create a unique token economy where all can participate in voting, governance and even node selection for network decentralization. With these goals in mind, the core design of a public chain's token economy should conform to certain principles and objectives such as fair benefits to participants, positive incentives, logical simplicity and diverse utilization scenarios.

By creating a token economy with these characteristics, the token naturally has a higher value which thereby promotes the development and expansion of the public chain and will make the entire ecosystem more dynamic. To sum up, NAX's design goals include:

- (a) fair benefits
- (b) positive incentives
- (c) simple and easy to understand
- (d) high utility
- (e) smart and effective

3.2 Core Logic

3.2.1 Equity Fairness and Legitimacy

The effectiveness of a public chain's token economy comes from the fairness and legitimacy of asset acquisition. The requirements for acquiring assets should be simple, transparent and an identical process for the vast majority of people. In a public token economy, the assets owned are relatively fair and substantiated and due to this, the

primary way to obtain equity of a token via a Pledging (staking) method is in line with the above requirements. Equity obtainment must not be due to unclear requirements or loopholes existing which lead to the phenomenon of poor asset allocation. The overall result of obtainment must be conducive to improved ecosystem development on the public chain.

Within the Nebulas ecosystem, the Pledging (staking) process of NAS to obtain NAX and its benefits are fair and equitable within the Nebulas Eco-Certified economy.

3.2.2 Nebulas Smart Pledge

Traditionally, the pledge method used requires users to transfer their assets into smart contracts for temporary custody and asset security is controlled via the smart contract. Unfortunately, security issues leading to compromised assets via smart contracts is not uncommon. For example in 2016, the DAO project on Ethereum was compromised and attackers used contract loopholes to claim assets which caused a huge economic losses for investors and made them doubt the safety of smart contracts. Due to this, pledging also puts great pressure on public chain project parties since a large number of assets are kept in a smart contract which makes them targets. Due to this, the management and security of smart contracts is a large development bottleneck. All assets on the blockchain are genuine and pledging simply locks in the liquidity of that asset - it does not validate the ownership of the asset (although it can be retrieved by calling the contract method) once transferred to the contract.

For NAX asset obtainment via staking, we propose a new mechanism entitled "Nebulas Smart Staking" which records the locking of liquidity via a smart contract between the Nebulas address owner and the pledge contract while ensuring the assets are still owned by the user. The role of the pledge contract is to simply verify the validity of the user's pledge by randomly checking the on-chain contract status and the pledging address. A pledge is considered valid when the balance of the pledging address is equal or greater to the amount pledged to the smart contract.

The advantages of the Nebula Smart Pledge include:

- (a) guarantees the user's asset identification
- (b) motivates more users to participate in pledging
- (c) asset security decentralization
- (d) securitization and separation of asset liquidity

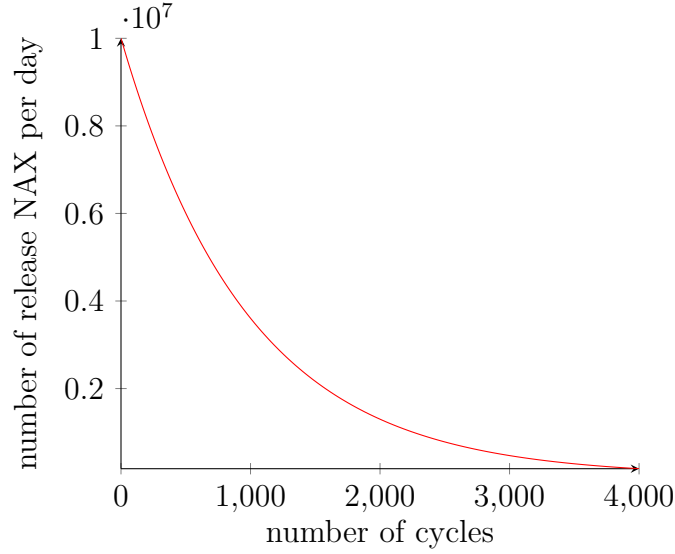


Figure 1: Daily release NAX number and period relationship

3.2.3 NAX Extended Model - NDM

As mentioned above, on the basis of safeguarding the equity and legitimacy of assets, and ensuring the inviolable ownership of pledged assets, the user contributes the liquidity of their assets and in return, they obtain corresponding ecological rights and interests. We call this new mode of token issuance "NDM" (Nebulas Devotional Mining).

The maximum amount of NAX tokens projected for release is 10 billion(10^{10}) with an issuance cycle of every 6,000 blocks (approximately once per day tokens will be distributed). The number of tokens issued per cycle decreases with an attenuation coefficient of $\mu = 0.999$ (reduction of 0.001% every cycle) which leads to distribution completion in about 12 years. The number of issued NAX changes every cycle as shown in 1. The cumulative issued NAX number as shown in 2.

3.2.4 Dynamic Distribution Model

The dynamic distribution model referst to the fact that on the basis of issuance, some variables will be introduced to promote positive ecosystem growth. During the initial stage of NAX, we will introduce multiple variables which will control distribution such as pledge rate influence factor and a dynamically adjusted distribution ratio based on the to the rise and fall (quantity) of pledged assets. Any undistributed NAX for a cycle will be rolled over to the following cycle leading to greater distribution based

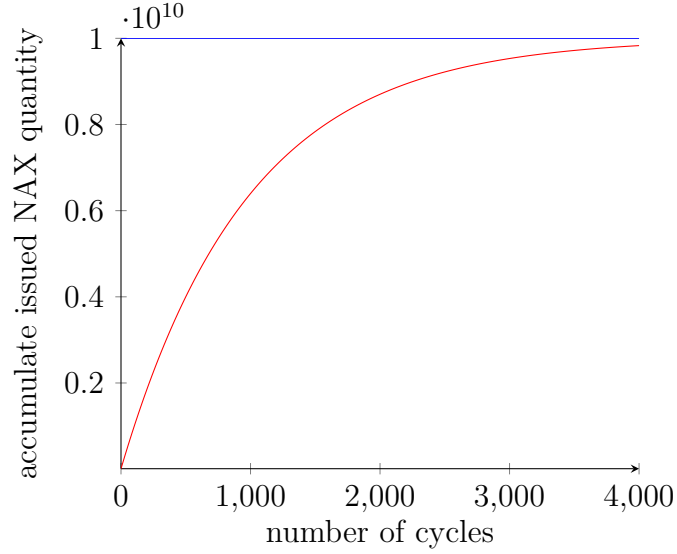


Figure 2: Accumulate issued NAX quantity and period relationship

on the variables. As needed in the future, we will also introduce a more dynamic distribution model.

Therefore, for each period of i , the system will issue C_i NAX to addresses currently pledging. When the system distributes NAX, it will determine a distribution coefficient λ_i based on the current pledge rate level r (the total amount of pledged NAS / total NAS circulation) and distribute $C_i \lambda_i$ ($0 < \lambda_i < 1$) NAX. Remaining undistributed $C_i(1 - \lambda)$ NAX will roll over which in turn increases the potential total amount of tokens issued for the following cycle. Therefore, the i period issuance pool $C_i = C_0 \mu^i + C_{i-1}(1 - \lambda_{i-1})$ consists of two parts: The first part is the basic distribution and each period is continuously attenuated with an attenuation coefficient of μ . The second part is the remainder of the previous issuance pool.

Among them, the distribution coefficient λ_i and the pledge rate r_i function relationship as shown in the following formula. For specific parameters, please refer to the appendix. The function relationship is shown in 3.

$$\lambda_i = l r_i^3 + m r_i^2 + n r_i \quad (1)$$

3.2.5 Distribution model in cycle

During a distribution cycle, different number of pledge cycles will result in different distribution weights. The system determines the final NAX distribution amount based

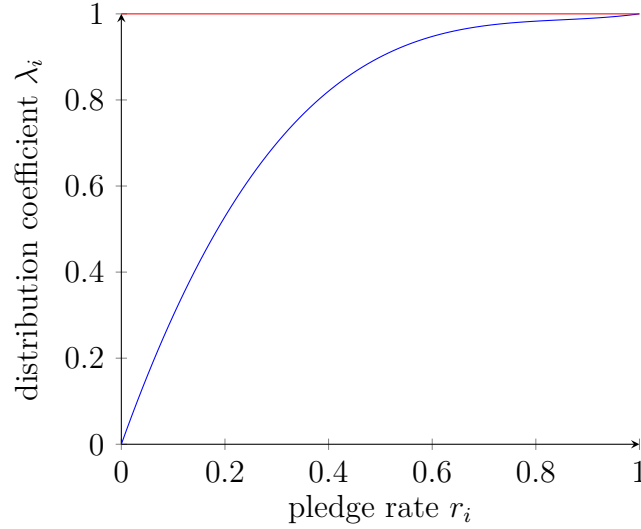


Figure 3: Relationship between distribution coefficient and pledge rate

on the pledge quantity of each pledged user $V_{i,j}$ and the pledge weight $f(T_{i,j})$. If the N address is validly pledging (retaining enough assets) during the i period, the j address pledge is $V_{i,j}$ and the effective pledge period is $T_{i,j}$. Therefore, the number of NAX tokens that the address can be distributed to is $K_{i,j}$ as shown in the following formula.

$$K_{i,j} = \frac{V_{i,j} f(T_{i,j})}{\sum_j V_{i,j} f(T_{i,j})} \lambda_i C_i \quad (2)$$

Where $f(T_{i,j})$ is the effective weight function for the pledge of the i user j . The relationship between the pledge weight and the number of pledge cycles is as follows (the function relationship is shown in 4).

$$f(T) = 1 - \frac{\sqrt{(aT + b)^2 + c^2} - (aT + b)}{2} \quad (3)$$

The parameters a , b , c , etc... in the formula are discussed in the appendix. In general, within the same cycle, the system allocates the total amount of additional issuance tokens according to the number of pledges and the corresponding length of the pledge. In order to achieve a fair result, the more pledges and the longer the pledge, the higher the issuance number will be. At the same time, this method makes new pledge users more motivated while motivating existing pledges since the existing addresses weight will be retained at a considerable level. The design will reach the following scenarios:

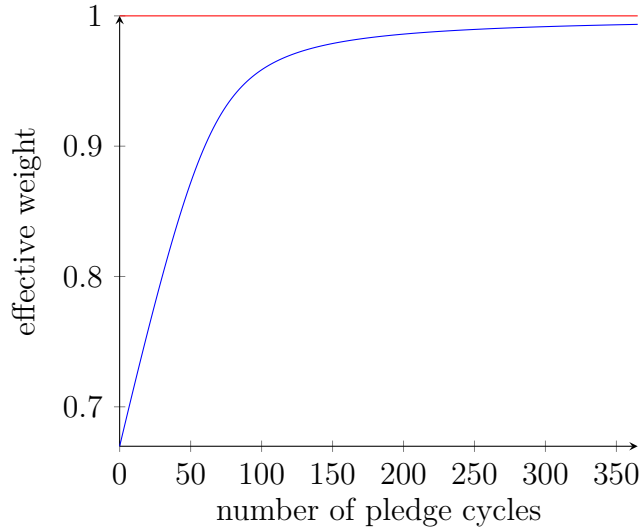


Figure 4: Relationship between the effective weight of the pledge and the number of pledge cycles

- (a) Early users involved in pledge have a greater probability of receiving more issuance.
- (b) As the pledge rate increases, the number of system issuance will increase accordingly to encourage more people to join the pledge.

3.2.6 Foundation Fees

In order to enable the Nebulas Foundation to have more capabilities and initiative in ecosystem investment, incubation, support, activities, etc..., the additional issuance of 5% will be transferred to NAX. The addresses managed by the foundation are subject to public scrutiny as well as its usage. The specific contents will be disclosed in the future.

3.3 Contract Framework

NAX is an extensible NRC20 contract consisting of a set of contracts which manage data and parameters of the entire framework via multi-signature contracts as shown in detail in 5.

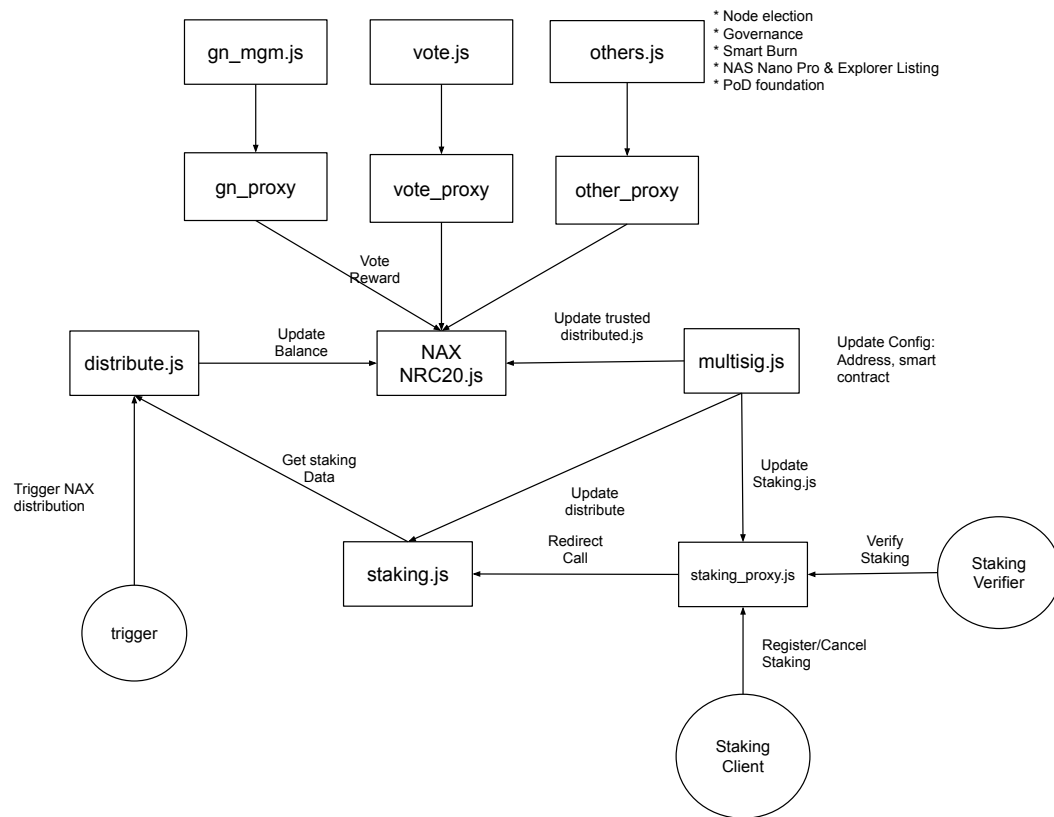


Figure 5: NAX contract component schematic

4 Present and Future Application Scenarios

During the design of the NAX token model, we focused on creating a effective issuance model which respects fairness, legitimacy and authority of the asset. Combined with the ecological characteristics of Nebulas, we chose to distribute more incentives to application scenarios. For example, motivation and utilization scenarios in application scenarios can be varied, diverse, and unique.

In this chapter, we will look at some prospects for existing or upcoming scenarios within Nebulas. By reviewing the scenarios, we can clearly demonstrate the tandem role of NAX within the Nebulas ecosystem.

4.1 Ecosystem Contribution Incentive

In the Nebulas white paper, the contribution-proof consensus algorithm Proof of Devotion (PoD) and the vision of Nebulas was shared: "Fair value for all via decentralized collaboration" and combined with the launch of the Go Nebulas platform in early 2019, Nebulas has constantly explored ecosystem contribution. These have all been important steps for Nebulas to move further towards the creation of the Autonomous Metanet. To this end, we put forward a unique pledge investment fund as a proof of equity incentive which can be applied to different scenarios.

The specific operation Pledging is to fund the project investment (usually in the form of NAS). The NAX equity of this part of the fund pledge will be used as the NAX incentive equity fund for ecosystem scenario.

4.1.1 Go Nebulas Incentive

The Nebulas Foundation will invest no less than 3 million in NAS to fund projects on the Go Nebulas platform and if needed, will be ready to invest additional funds on demand. This amount of money can also be invested in pledging and the resulting equity will be used to Incentivize the large and small contributions of users that are made on the Go Nebulas platform. For example, in addition to receiving NAS funds as a reward, they will also receive NAX incentives under the rules established by the Go Nebulas platform as an equity right contribution to the Nebulas ecosystem. The corresponding rights and governance can be exercised in the Nebulas ecosystem. Detailed incentives will be developed by Go Nebulas' operations team managers and community participants.

Incentives can be divided into the following categories:

- (a) core infrastructure
- (b) market expansion
- (c) promotion
- (d) creating proposals and participation

In addition to being an important means of investing within community building and receiving NAX incentives, the Go Nebulas platform is an important use-case scenario for NAX. Utility scenarios include (but not limited to) the following categories:

- (a) create and initiating a proposal
- (b) passing and rejecting proposals
- (c) pledge towards the progress of the project

4.1.2 Foundation Core Member Incentive

Members of the Nebulas Foundation core team which includes part-time staff will receive NAX benefits from the Foundation's pledge as additional contribution in addition to receiving their appropriate salary.

4.2 On-chain Governance Scenario

Within the Nebulas ecosystem, there will be a variety of community selection and election activities. For each event, we will encourage greater participation and during events, different methods of NAX voting will be used such as destroying or returning utilized NAT which will motivate users for their participation.

For example a vote that will soon be proposed will be how to handle the 35 million NAS community reserve fund. The Nebulas Foundation has proposed to destroy this fund and we will ask the community to contribute options on the destruction (partially or fully). One possible solution is to launch a NAX utilized monthly vote to decide how much of the fund to be destroyed every month. For example, if $\alpha\%$, $\alpha\%$ is the current NAS pledge rate in the share of liquidity. Of course, the community can also provide a more effective program and then jointly decide the processing of these assets.

4.3 Node Campaign

With the advancement of PoD development, the decentralization of Nebulas is an inevitable path. NAX will likely become a mechanism and credential for the Nebulas node campaign. It can effectively combine PoD technology innovation into the foundation and direction of the new consensus algorithm. The possible ways for a node to proceed are as follows:

- (a) node candidates are selected via NAX vote.
- (b) participants in the node campaign will need to destroy a corresponding amount of NAX and Pledge NAS.
- (c) the community can crowdfund NAX to become a node and receive the benefits of being a node.

4.4 Ecosystem Advancement

Developed by the Nebulas Foundation, the ecosystem products are an important element for the ecological use of the Nebulas blockchain. These products include the current and future Nebulas products incubated by the Foundation, such as NAS nano Pro, NAS nano, Web Explorer, Nebulas DEX, etc... As NextDAO advances and community governance progresses, there will be many more NRC20 tokens and governance projects within the community. These new assets have a strong demand these ecosystem tools. With limited resources and in order to have Nebulas ecosystem related products developed more improved projects, it is possible to use NAX as a platform to select excellent project tools and funding. These funds can also be used for activities and incentives for ecosystem projects. Funding is used to invest in the construction of the platform.

5 summary

In order to better realize the concept, vision and align with the characteristics of Nebulas' own ecosystem, Nebulas proposes a economy that adapts to its own philosophy and development. Throughout this document, we analyzed the fairness, legitimacy, power, and motivation of NAX throughout Nebulas' philosophy, ecology, development, collaboration, and governance. This is a demonstration and a beginning of NextDAO's

direction. During the process, more unique and valuable ideas will emerge and as such, we expect the community to join in enriching the content and utilization of NextDAO.

References

- [1] S. Nakamoto, “Bitcoin: A Peer-to-Peer Electronic Cash System,” www.Bitcoin.org, p. 9, 2008.
- [2] “Nabulas Technical Whitepaper.” <https://nebulas.io/docs/NebulasTechnicalWhitepaper.pdf>. 2018-04-01.
- [3] “Tragedy of the Commons.” https://en.wikipedia.org/wiki/Tragedy_of_the_commons.

Appendix A NAX Analysis

A.1 Circulation Analysis

Since the unissued portion of each issuance cycle is rolled into the following cycle and the total circulation supply is a fixed amount, the cycle issuance can be derived. If total issuance amount is 10 billion (10^{10}) NAX, then the scale of the 0th release cycle is as follows:

$$\sum_{i,j} K_{i,j} = \sum_i C_0 \mu^i = \frac{C_0}{1 - \mu} \quad (4)$$

Set the upper bound to 10 billion (10^{10}) and solve for $C_0 = 10^{10}(1 - \mu) = 1.0 \times 10^7$.

A.2 Distribution Ratio and Pledge Rate Relationship

The relationship between the ratio of issuance and the pledge rate, as shown in the figure 3. According to token demand, the value of the distribution ratio is between 0 and 1. For example, when the pledge rate is 30%, the ratio of the issuance is 70% and when the pledge rate is 50%, the ratio of issuance is 90%. Where $l = 1.52$, $m = -3.88$, $n = 3.36$.

A.3 The Relationship Between Pledge Weight and Age

In order to encourage all to participate in pledging early and not to negatively effect the enthusiasm of new pledge users, we designed functions that will give benefits to early users relative to new users. The distribution weights vary depending on pledge age, however as the number of completed distribution cycles increase, the difference will be negligible. After 90 distribution cycles, the weight will stabilize, reaching 1.

In order to encourage new user participation in pledging, their weight does not start from 0.0 but instead from a initial level of 0.67. Therefore, according to the above equation 3, we can review the corresponding coefficients, where $a = 0.005$, $b = -0.3$, $c = 0.2$, the function is shown in 4.

It can be seen that the value of the effective weight is between 0.67 and 1; as active pledge cycles increase, the weight increases until it reaches it's maximum weight of 1. After 30 pledge cycles (about 1 month), the effective weight is 0.8, after 60 pledge cycles (about 2 months), the effective weight is 0.9 and after 90 pledge cycles (about 3

months), the effective weight is 0.95.

A.4 The Impact of Pledge Age and Distribution

In the case of the same number of pledges, the age of the initial pledge time will have an impact on the income but the magnitude of this effect is not very obvious. Below we give an example of the simulated effect as shown in the figure 6. Note: This figure is only for comparative reference and does not reflect actual revenue. In the case, the actual income is also related to the overall pledge quantity and address.

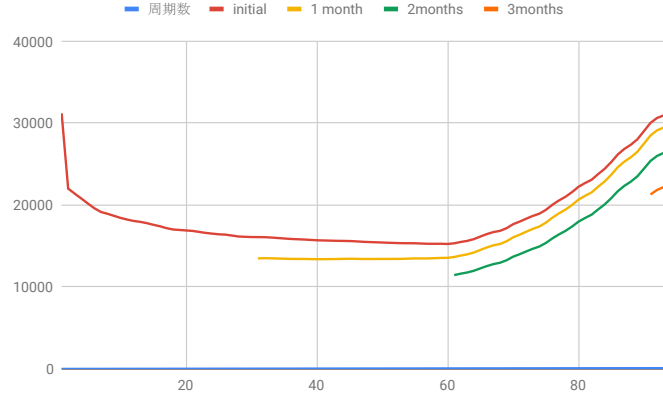


Figure 6: The effect of pledge start time on revenue

A.5 Initial Issuance Strategy

Since our issuance method introduces a rollover distribution method, in order to make an early bird effect for those who initially pledge, we will issue the first issuance from C_1 and roll the full amount of C_0 to the first issuance cycle.

Appendix B Change Log

- 0.0.1 Release.