



Kin Rewards Engine

REQUEST FOR COMMENT (RFC)



Kik Interactive, Inc.
June 2017

VERSION 1.0

Overview

As laid out in the [Kin white paper](#), the goal of the Kin cryptocurrency is to create an alternative ecosystem of digital services that is compelling for consumers, and is fair and open for developers. To achieve this goal, Kin needs to economically align a large group of partners, developers, and users to work together to form an ecosystem.

This document proposes a technical implementation for the Kin Rewards Engine using cryptographic tokens to create economic incentives for participants, allowing them to integrate with the Kin cryptocurrency and ecosystem. Below, we explain how to navigate the implementation in a way that is resistant to the abuse and economic vulnerabilities inherent in a decentralized network context. This is a starting point of a productive discussion with the blockchain community, and feedback and comments are welcome. We are also working with research and advisory teams to propose alternative models and improve on this one. To join the discussion, visit the [Kin Foundation Github repository](#), our [#technology channel on Telegram](#), or our subreddit at [/r/KinFoundation](#).

This document is the first in a series of request for comment (RFC) documents planned for Kin.

After releasing an RFC on each of these subjects, feedback will be collected from the community of Kin enthusiasts and integrated into a technical paper that will complete the final implementation plan for Kin.

Table of Contents

Overview	2
The participants	4
Users	4
Capitalists	4
Digital service developers	4
The Kin Rewards Engine formula	5
TDR - Total Daily Reward	5
Formulae and calculations	
SSE _i : Size of an economy of a single digital service	6
TSE: Overall size of the Kin Ecosystem	6
Putting it all together	7
Model analysis: incentivized behaviors	10
Rewards Engine vulnerability analysis	10
Creating large volumes of fake transactions	10
Creating fake users	10
Creating large numbers of fake digital services	10
Capitalists voting for themselves	11
Digital service developers voting for themselves	12
Users voting for themselves	12
Conclusion	13
Appendix	14
A. Kin rewards as alternative to taxation	14
B. Balance between capitalists and regular users	14
C. Subjecting reward eligibility to acceptance of foundation terms	15

The participants

The definition of the Kin Rewards Engine mainly focuses on the behavior and incentives of three archetypes of actors in the Kin economy: users, capitalists, and digital service developers.

Users

Users adopt digital services for their day-to-day utility. When users join a digital service such as a messaging or social media application, they both provide and receive value within the service. Examples include receiving advice in a fashion app, hosting or joining a clan in an online video game, or hosting or joining a themed group chat in a messaging application. The Kin Ecosystem will facilitate fair compensation to users for the value they bring into the digital economy. The more digital services exist where users can exchange value, and the more value they exchange in each of those services, the larger and more valuable the overall Kin Ecosystem and economy becomes.

Capitalists

Capitalists are individuals with significant holdings of Kin, used primarily for investment purposes. They constitute a minority of participants in the ecosystem. Their main interest is to realize a return by selling Kin on secondary markets. Capitalists are an important aspect of the Kin economy because they facilitate wide distribution of the currency, liquidity to its markets, and – as early investors – are generally aligned with Kin for its long-term success.

Digital service developers

Developers are individuals or companies that create digital services and applications for consumers in verticals such as fashion, gaming, live video streaming, photo sharing, and many more. For the Kin Ecosystem to thrive, developers should have incentives to constantly innovate and improve their products, making them more useful, enjoyable, and valuable to users and customers.

The main purpose of the Rewards Engine is to economically incentivize digital service developers to create valuable digital services for users in the Kin Ecosystem. This allows them to make a fair return based on the number of users of their services.

The Kin Rewards Engine formula

In general, the Kin Rewards Engine will issue a daily reward to developers based on a measure of the Kin economy inside of each digital service.

Let i be a digital service eligible for rewards and R_i be the daily reward it will receive on a particular day. Then:

$$R_i = \text{TDR} \cdot (\text{SSE}_i / \text{TSE})$$

where TDR stands for "Total Daily Reward," SSE for Size of Service Economy, TSE for Total Size of Economy. The calculations for these variables are described below.

TDR - Total Daily Reward

Sixty percent of all Kin that will ever exist, or six trillion Kin, was put into the reserves of the Kin Foundation. Each day, once the Rewards Engine is up and running, $d=0.061\%$ of the remaining reserves will be put into circulation (for a total of 20 percent of remaining reserves every year). Of these newly issued Kin, three-fourths will be allocated as rewards and the remaining one-fourth as a marketing and operations budget for the Kin Foundation.

Kik is expected to be the largest digital service in its ecosystem. Kik is committed to Kin and wants Kin to thrive and to promote its adoption by digital services. To enable this goal, Kik will opt out of participation in the rewards mechanism for no less than 12 months from time of the Rewards Engine launch, passing it on to 3rd party developers of Kik bots.

FORMULAE AND CALCULATIONS

Let R_n be the Kin Foundation reserve on day n ;

$$R_0 = 6,000,000,000,000$$

Let V_n be the amount vested on day n :

$$V_n = R_n \cdot d$$

$$R_n = R_{n-1} \cdot (1-d) = R_0 \cdot (1-d)^n$$

For example, let's assume the first day of Kin Rewards Engine is January 1, 2018, and calculate the rewards on March 12, 2019:

- March 12, 2019 is the 435th day of the Kin Rewards Engine.
- Kin in reserve is $R_{435} = R_0 \cdot (1-d)^{435} = 4,601,252,295,287$.
- Kin that vests on March 12, 2019 is $V_{435} = R_{435} \cdot d = 2,806,763,900$.
- Rewards on March 12, 2019 totals to $2,806,763,900 \cdot 3/4 = 2,105,072,925$.

If, for example, the exchange rate for Kin was \$0.000185 on March 12th, 2019, for a total market cap of \$1 billion (active circulation = $10,000,000,000,000 - R_{435} \approx 5.4 \cdot 10^{12}$), the total daily reward on March 12, 2019 would be equivalent to \$389,828.

SSE_i: Size of an economy of a single digital service

The goal of the Kin Ecosystem is to create a vibrant and growing ecosystem of digital services where consumers can go to earn and spend Kin in ways they find valuable. To evaluate the contribution of each digital service to the overall Kin Ecosystem, we propose finding an algorithm that reasonably measures the “size” of each economy, using a simple but secure methodology that reduces the potential for abuse and gaming.

For example, a simple measure of the amount of economic activity within a digital service could be the total number of transactions that occur in it over the course of a day. However, this algorithm is immediately vulnerable to attacks. Since Kin can virtually change hands thousands of times in 24 hours, it is easy for an attacker to artificially inflate the number of transactions in a particular digital service.

Another simple measure could be the amount of Kin held by all the users of each digital service (“sum of stake”). This measure is much more costly to inflate as long as users are mapped in a one-to-one fashion to a service so that no user’s stake is counted more than once. However, this measure does not take into account economic activity within a digital service, which is what the system would like to encourage and incentivize.

Consequently, a hybrid measure is proposed: Each user is attributed to a single service in which she transacted while the Rewards Engine rewards services in proportion to the total stake of their users. Like the sum of stake, this method is hard to attack from a transaction volume perspective, yet it also takes into account the economic activity within each service.

In cases where a user makes transactions in more than one digital service, their stake will be credited for the service in which their transaction value was greatest (their “most preferred service”). In case of a draw between several services, one will be selected at random.

TSE: Overall size of the Kin Ecosystem

The measure for the size of the entire Kin economy is defined to be the sum of economies of all digital services, or, equivalently, the sum of the stake of all users that participated in Kin transactions over the course of the day.

Putting it all together

Consider the following simplified case, in which the entire Kin ecosystem has only three active users (Emma, Ryan, and Kaitlyn) and only three digital services (“Fashion,” a photo pinning app developed by Ethan; “Music,” a streaming music service developed by Madison; and “Sports,” a sports forum developed by Daniel).

Ethan, the developer of the “Fashion” digital service, wants to know how much daily reward to expect on March 12, 2019.

Kin balance at the start of March 12, 2019:

Emma	610
Ryan	190
Kaitlyn	10,000
Ethan	200
Madison	250
Daniel	600

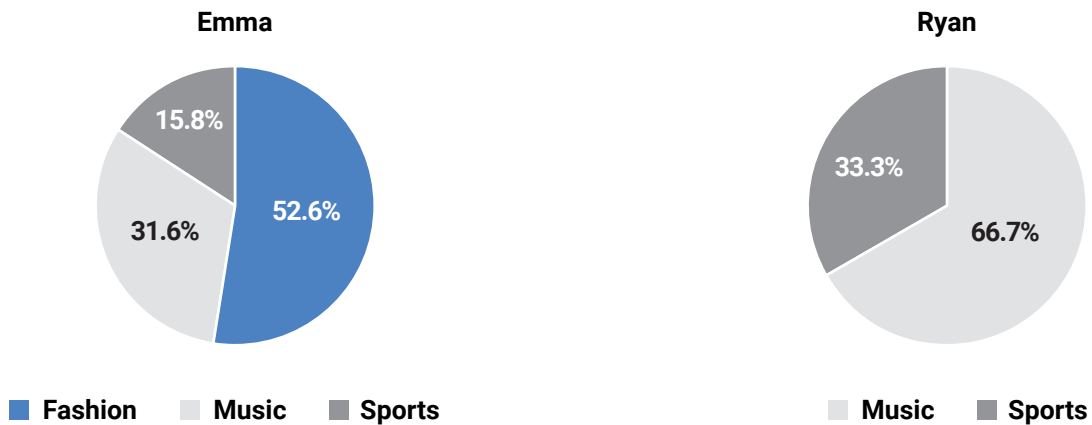
On March 12, 2019, users made the following transactions under the labeled digital services:

“Fashion”	“Music”	“Sports”
Emma paid Ethan 100 kin for Fashion Advice.	Emma paid Ryan 50 kin for songs he created. Ryan paid Emma 10 kin to subscribe to her radio channel.	Ryan paid 30 kin to Emma to read her premium post.

- Kaitlyn did not make any transactions on that day.

The association of users to their “most preferred service of the day” would be calculated in the following way:

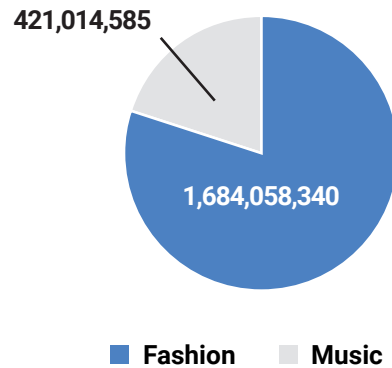
- Emma will be associated with the “Fashion” digital service. (since her spending 100 kin in “Fashion” > her earning 60 kin in “Music” > her earning 30 kin in “Sports”).
- Ryan will be associated with the “Music” digital service (since his spending 60 kin in “Music” > his spending 30 kin in “Sports”).
- Kaitlyn is not associated with any service (since she made no transactions).
- Ethan will be associated with “Fashion” (since he earned 100 kin in “Fashion”), even though he is the developer of this service.



Kin balance at the end of the day:

Emma	500
Ryan	200
Kaitlyn	10,000
Ethan	300
Madison	250
Daniel	600

As calculated in the previous section, the total reward on day 435 is 2,105,072,925 kin. Let us assume Kin has a total market capitalization of \$1 billion. This reward is equivalent to \$389,828. Then:



- **Total economy:** The size of the entire ecosystem is calculated as the total sum of stake held by users who participated in transactions that day: 1,000 kin (Emma, Ryan and Ethan).
- **Fashion:** This service will receive 80 percent (800/1000) of the Daily Reward, or 1,684,058,340 kin, because the stake held by its associated users (Emma and Ethan) sums to 800 kin. The value of this reward is equivalent to \$311,862.
- **Music:** This service will get the remaining 20 percent (200/1000) of the Daily Reward, or 421,014,585 kin. The value of this reward is equivalent to \$77,965.

Model analysis: incentivized behaviors

Rewards are distributed among digital service developers to directly incentivize the following behaviors:

- To promote economic activity within their service, as only users that were involved in Kin transactions in that digital service will be counted towards the service's payout at the end of that reward period.
- To promote the growth of the value of transactions initiated by their users. Since members of multiple digital services become associated with the service in which the largest share of their transaction volumes took place, developers compete on facilitating the largest share for each user.
- To innovate forms of micropayments and recurring transactions. The rewards are proportional to the holdings held by users, but only take into account users who transacted in the 24 hour rewards period prior to the reward allocation. From the digital service provider's perspective, a user who made no transactions in a given period of time can be seen as ripe low-hanging fruit.

Rewards Engine vulnerability analysis

Below are some of the possible attack vectors that were considered.

Creating large volumes of fake transactions

Transaction volume only affects the choice of a user's most preferred digital service, when he was active in more than one service. Users who want to deliberately manipulate the choice of their "most preferred service" can do this by sending one large transaction daily. Generating a large volume of fake transactions will not provide any advantage.

Creating fake users

Creating a large number of fake user accounts will not provide any voting advantage to an attacker, as the availability of accounts does not itself increase stake.

Creating large numbers of fake digital services

Creating a large number of fake digital services and generating fake transactions inside each one will not provide significant advantage, since every user may only vote for a single digital service each 24 hour period.

Capitalists voting for themselves

A trivial method for a holder of large stake of Kin is triggering large transactions to herself, directly or indirectly, and associating them with a digital service she owns. Her service would gain rewards in proportion to her stake's size relative to the entire economy, even though it may not have contributed an exchange of goods and services to the economy. Such behavior will be referred to as self-voting.

Note that even when such a scheme is attempted, it may not be an "attack" on the system because (1) nobody in the ecosystem is harmed by this behavior, and (2) there is no theoretical return on such scheme, beyond aversion of loss. Note that each reward payout event is an inflationary event, in the sense that it increases the supply of Kin without corresponding increase in demand, causing a momentary devaluation of all Kin in circulation. Capitalists voting for themselves are merely offsetting the effect of this inflation rather than making real returns.

Although there are means that can be applied to prevent capitalists from self-voting, indirect manipulations (such as revenue sharing with mainstream services) cannot be entirely eliminated. It is reasonable to assume that capitalists are sophisticated and self-serving, and that they will attempt such manipulations.

Given the possibility of such manipulation, the impact of manipulation must be analyzed to determine whether it will be below an acceptable threshold. There are two ways these manipulations undermine the effectiveness of the Rewards Engine and could prevent it from achieving its goals:

1. Self-voting may skew the allocation of the rewards, effectively skewing target incentives of the system.
2. Self-voting dilutes the rewards for legitimate participants.

Skewing of incentives can be prevented by organizational oversight. The Kin Foundation will be vetting participating services and should bar infringing services. On the other hand, it should allow services that share the entirety of the rewards with its users in proportion to each user's contribution. This will channel capitalists to use specialized anti-inflation tools and keep them away from dealing with real services, possibly skewing their incentives. (Read more on suggested terms for eligible services in ["Appendix"](#).)

Dilution of the rewards will occur but needs to be controlled so as not to shrink the rewards given to legitimate digital services. The key is in the balance between Kin stake held by capitalists to that held by users: assuming all capitalists and all users make transactions every day, the reward will be divided among them in proportion to their stake.

A state in which the majority of rewards go to capitalists' self-voting is one where the majority of Kin is held by capitalists. Capitalists create demand for Kin when their expectation is for its

value to increase. Beyond short-term trends, such expectation can only be related to expected growth of the economy (via growth in user-base, in frequency of transactions and/or in value of transactions). But, all factors creating the expectation for growth are impacted by scarcity of Kin. In the long run, if most Kin is held by capitalists, they should expect decreased growth, pushing some capitalists to sell their Kin until the system re-balances with fewer capitalists and more Kin held by users.

Digital service developers voting for themselves

This potential problem becomes more noticeable as more Kin finds its way into the hands of digital service developers. Can this grow out of check? Will most Kin be held ultimately by digital service developers?

This is a special case of “[Capitalists voting for themselves](#)”. In addition to the threats discussed above, when digital services developers act as capitalists, another type of damage is caused to the ecosystem: under-investment in the development of digital services.

If there is sufficient competition between digital services, services that will not be investing their capital in further improvements are bound to be left behind.

If there exists a dominant service that is not threatened by competition, holding on to most Kin would slow down the economy, resulting in devaluation of the currency; the dominant service suffers the greatest damage for such devaluation. This serves as a disincentive against such behavior.

Users voting for themselves

If all users behave like capitalists and vote for themselves, the required balance between capitalists and users will not be maintained, possibly resulting in dilution of the effect of the rewards.

Most likely, for the average user this will not be worth the effort. Reward is proportional to user holdings and the vast majority of users will own relatively small amounts. The effective gains from this action will normally not justify the risk of giving a stranger access to one’s wallet.

This problem could become worse if a digital service is created whose prime purpose is to provide this service in an automatic and simple way. This can be mitigated by a vetting process of digital services applying to participate in the rewards; the Kin Foundation should require all such services to adhere to a set of rules, preventing such behavior. Such mechanism is discussed in “[C. Subjecting reward eligibility to acceptance of foundation terms](#)”.

Conclusion

The goal of the Kin Rewards Engine is to economically align a large group of developers to work together to build an alternative ecosystem of digital services – an ecosystem that is both compelling and open. To achieve this goal, a simple yet non-gameable rewards algorithm is needed. Developing this algorithm will take time and will require a safe and iterative approach.

Therefore, this algorithm will initially be administered manually, in a transparent process. As new learnings occur, the model can be iterated and fine-tuned, in full transparency and cooperation with the community. The ultimate goal is to make the administration of this algorithm fully automatic and decentralized, guaranteeing developers a fair, open, and lucrative playing field on which to build and grow their digital services.

Comments and discussion are welcome. To join the discussion, please visit the [Kin Foundation Github repository](#), our [#technology channel on Telegram](#), or our subreddit at [r/KinFoundation](#).

Appendix

A. Kin rewards as alternative to taxation

Reward distribution events essentially cause a momentary devaluation of currency in circulation. Economic models (of “inflation taxes”) show that this inflow of value to the digital service providers is parallel to taxation. In other words, issuing rewards to digital service developers has a similar effect to that of collecting property taxes in their favor: the value of the currency in users’ wallets decreases, while the developers of the services they use are receiving funds.

In this metaphor, digital services are parallel to real-world nation-states. And within this metaphor, optimal terms for allocation of public services have been set: services for the digital life (states) compete on the right to tax users (citizens), who have perfect freedom to move to wherever they get the best services in return for their taxes.

B. Balance between capitalists and regular users

For Kin to succeed, a healthy balance between the amount of capitalists and regular users needs to exist. Capitalists are providing the liquidity to markets and exchanges, and reducing the friction of trade. Regular users are the ones creating the real economy. Growth in user base has increasing returns: more users in the ecosystem create more valuable services being traded and higher demand for such services, in a virtuous circle leading to the entire ecosystem’s growth.

This balance is also required for the effectiveness of the Rewards Engine. If one assumes capitalists always vote for themselves to protect from inflation, the part of reward payout that is proportional to their total Kin holdings will not effectively be used to carry out the reward objective. The effective part of the reward is proportional to the total holdings of all regular users in the ecosystem. Using the tax analogy above, capitalists can dodge taxes, leaving only regular users to be taxed. Digital services should only compete on getting regular users to join.

Could the ecosystem reach a steady state in which all Kin is held by capitalists, or all is held by regular users?

At Kin’s launch, capitalists may be in abundance. Therefore, getting to a state of absence of capitalists could only be the result of speculators selling their Kin as they expect long-term inflation. This could be the case if the growth of the economic activity in the Kin Ecosystem is lower than the expected influx of currency. However, the influx of Kin is decreasing by 20 percent each year; additionally, in case of prolonged inflation it is reasonable to expect that the Kin Foundation will adjust its policy and further decrease the annual influx. Therefore the possibility of this case in steady state seems improbable.

Absence of common users could occur if capitalists are holding on to their stake and expecting that its value will increase. Quantitative monetary theory predicts that if the amount of currency is not reduced, deflation will be matched by reduced production or reduced velocity of money (the frequency of money changing hands). Real-world experience with fiat currencies confirms this prediction. So if only capitalists are driving the demand for the currency, the demand will remain at a constant level. On the other hand, increase in supply is assured as a guaranteed annual influx of 20 percent of the reserve. As demand remains at a constant level versus an increasing supply, currency prices will drop, driving some of the capitalists to realize their holdings. Our conclusion is therefore that this case is possible for the short run but improbable at steady state.

Can the Kin Foundation intervene if the system arrives at an imbalance?

Substantial portion of the Kin allocated as reserve for the Kin Foundation can be used for marketing purposes. This provides the foundation with freedom to address imbalance between capitalists and non-capitalists. For example, if the system suffers from a lack of regular users, the foundation can boost participation in the economy by giving away small amounts of “free” Kin to users who are verified as real.

C. Subjecting reward eligibility to acceptance of foundation terms

Should digital services be approved for reward eligibility on an individual basis?

Rewards are paid to digital service developers. The majority of attempts to game the Rewards Engine are expected to be using digital services that abuse the system.

Consider, for example, a stub service whose sole purpose is to let users to pocket their contribution to the service’s reward. It can do that by automatically generating large transaction volumes, sending Kin in a circle (leaving each user with their balance at the end of the day) and dividing the rewards between its users in proportion to their holdings. The large transaction volumes causes the stub service to be identified as each user’s most preferred service, preventing the reward from the services the user really uses. **Should the Kin Foundation attempt to ban such practice?**

Such unwanted behavior can be curbed by requiring that digital services conform to a set rules of conduct; services must accept the rules to be eligible to receive rewards.

A way to achieve this is by forming a federation that will vote on the eligibility of every digital service that wants to join the rewards program. Another option is for joining to remain open for all, with the federation voting on expelling members proven to infringe the rules. As usual, votes are weighted by Kin holdings of federation members. By making the largest stakeholders in Kin members of this federation, consensus votes can be guaranteed to have the best interest of the network and the overall value of Kin in mind. Any Kin holder should be able to become a federation member. This particularly makes sense for digital service developers, such as Kik itself.