



Receive Access Ecosystem (RAE)

Rewarding Network Effects to Content Creators

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1. Problem

There is a growing gap between the value content creators provide to the networks owned by digital platforms compared to the compensation those content creators receive. This dynamic negatively impacts both content creators and the platform's customers in obvious and not so obvious ways. Content creators are hindered by inadequate financial compensation; customers are implicitly hindered because they miss out on content that creators never produce—because the lack of adequate financial compensation stifles their ability to create. To understand why this value gap exists, it is imperative to understand how networks consolidate and accrue value.

Current digital networks require the enlistment of a Trusted Third Party (TTP), e.g., digital platforms like YouTube, to achieve market consolidation and spur network effects. The digital platform must output a high number of resources in the early life of the network. The dynamic nature of digital networks leads to an inability for the digital platform to accurately predict the content creators' lifetime value to the network from present-day data. Furthermore, even when the value of the content creator is known to the digital platform, the digital platform may obfuscate it in order to obtain or maintain a more favorable deal with the content creator. The asymmetry of the flow of information between content creator and the digital platform may beget lengthy negotiations. More importantly, the asymmetry impedes the ability of content creators to coordinate or unionize against the

digital platform. The imbalance also robs content creators and consumers of the value gained from competitive collaboration. Content creators are isolated, pitted against each other as competitors, even though coordinated collaboration increases in value as the network grows. Worse yet, the rules of the system can change at any time, as companies implement *their* rules at *their* sole discretion. Dominant digital platforms have all the bargaining power, leaving content creators with little to no leverage. In this paper, we will show the described inefficiencies of the current digital platform model are fundamental flaws and that a new model is necessary to prevent the continued commoditization without the sufficient compensation of content creators and, more broadly, Intellectual Property owners.

2. Background

2.1 Aggregation Theory

With the advent of and improvements to the Internet, distribution of goods shifted from physical to digital. Digital networks no longer required physical goods, such as CDs and DVDs, nor did they necessitate the ancillary support of warehouses, shipping channels, or brick-and-mortar storefronts. Digital distribution has the benefits of zero distribution and transaction costs. [1] These two market shifts enabled digital networks to massively scale.

Solving the complexity of the supply chain was no longer a valuable source of opportunity. Instead, digital platform companies focus now on user experience for differentiation. The goal in the digital landscape is to create the best user experience, creating more demand from customers. The growth in customers for the digital platform company attracts more suppliers, enhancing the user experience, propelling further growth in customers—and a virtuous cycle commences.

The virtuous cycle above can be directly attributed to digital network effects taking hold. Network effects—the phenomenon whereby a product or service gains additional value as more people use it—appear in multiple facets. While network effects exist in older networks such as telephones or fax machines, digital network effects allow for faster adoption and scalability. The most recognizable types of digital network effects today are social network effects, e.g., Facebook and Twitter, and marketplace network effects, e.g., Spotify and YouTube. These digital networks have the additional dynamic of being controlled by one centralized digital platform company, and the stronger the network effects that take hold, the more value the businesses that harness them accrue.

In this new paradigm, digital platform companies which enter this virtuous cycle are able to aggregate content at the fastest rate. By aggregating the greatest amount of content with the best user experience, the digital platform gains the most customers. The platform now has the most resources to offer creators the best rate, driving market consolidation. And, with no physical limitations on the content, the digital platform company can expand globally. The digital platform dominant in user experience ends up in a winner-take-all (or -most) scenario.

Once market consolidation occurs, the dominant digital platform exerts leverage on content creators. This leverage exists because it becomes too costly for the content creators to exist outside of the dominant digital platform for two reasons. First, content creators will make more money with the dominant platform. For example, if the content

creator is paid per view, the bigger customer base offers more views to monetize. If the platform negotiates for the rights of the content regardless of views, the dominant platform can always pay the highest price because the content is *actually* worth more to it than the second biggest platform because of network effects. Second, the digital platform owns the customer relationship, and the content creators rely on the digital platform to stay connected to their fans and for new fans to discover their content.

Over time, the digital platform commoditizes the creator's content through the offering of discovery of similar content to customers. The customer's relationship shifts from an affinity for the content creator toward an affinity for the platform. This shift leads to the platform owning the customer relationship, allowing the platform to exert maximum leverage on each content creator. Finally, when the dominant platform achieves a near monopoly, it changes the rules to more favorable terms for itself, as there is no realistic competition bidding for the creator's content.

2.2 The Creator's Dilemma

When a digital platform creates a digital network, the value of the network synergistically increases with the addition of each content creator. Conversely, each content creator's leverage with the digital platform decreases with additional content creators joining the network. This inverse relationship results in the value of the network to increase exponentially, however the value distributed to the creators responsible for this growth is minimal or even nonexistent. It should be noted that when the creator's leverage is highest, i.e., the first content creator on the network, the digital platform has no value to exchange because the market has yet to be consolidated. When the market is consolidated and the value of the network is at its height, the content creator has minimal leverage.

The main reason the value of the digital network grows at such a fast pace is the emergence of digital network effects. According to Aggregation Theory, the strength of these digital network effects increases when digital platforms enhance customer experience by offering content discovery. For example, if a customer is watching a certain type of genre of the content creator, the discovery algorithm is more likely to recommend content creators who offer similar or ancillary content. While network effects can take hold in a digital platform that does not offer discovery, digital platforms that offer better discovery to customers accelerate the digital network effects.

Although network effects are the rallying cry of investors and executives, they work against the content creators. As more customers join, the digital platform's competition is eventually eliminated, leading to the winner-take-all (or -most) result of Aggregation Theory. Once the digital platform becomes dominant, it is near impossible for any content creator to meaningfully exist outside of the network. Furthermore, digital platform's content discovery features benefit the consumer, however, this in turn fortifies its leverage over the content creator. Discovery in and of itself should not be blamed for creating an unbalanced system of compensation for creators. The problem emerges when discovery is offered without proper compensation for the creators' contributions.

When content creators are in a market that has been consolidated by a digital platform that utilizes digital network effects and discovery, they are trapped in the "Creator's Dilemma." These content creators are continuously crucial for the success or even mere existence of the network. However, as the success of the platform takes hold the

digital platform has the means and interest to prevent content creators from tapping into their fair share of their contribution.

2.3 A Cooperative Game

Cooperative game theory focuses on predicting which group of players (coalitions) will form, the actions that these coalitions will take, and more importantly the resulting collective payoffs. In digital networks, each content creator and the digital platform are the players within their cooperative game. An assumption in cooperative game theory is that the grand coalition, i.e., a coalition of all players, will manifest. [2]

Thus, by applying cooperative game theory, it is assumed that a grand coalition of content creators will lead to the highest payoff; today this occurs when digital networks reach market consolidation. In digital networks this grand coalition is assembled by means of a digital platform aggregating content as a TTP. The value accretion from this market consolidation and digital network effects is siphoned away almost entirely by the digital platform, despite the fact that the digital platform relies fully on the content creators for content as the value proposition to the customer. In this cooperative game superadditivity is exhibited. Superadditivity in this context can be distilled to the inequality:

$$v(S) + v(T) \leq v(S \cup T)$$

for any $S \subset N, T \subset N$ and $S \cap T = \emptyset$

The pair (N, v) where $N = \{1, \dots, n\}$ is a finite set of players and v is a function associating a real value $v(S)$ or $v(T)$ to each subset S of N or T of N such that $v(\emptyset) = 0$.

The practical application of this inequality is clearer for digital networks by labeling the players:

N = The set of content creators

S = Content Creator 1

T = Content Creator 2

$$\begin{aligned} & \text{value(Content Creator 1)} + \text{value(Content Creator 2)} \\ & \leq \text{value(Content Creator 1} \cup \text{Content Creator 2)} \end{aligned}$$

In other words, with each creator who is added to the network, the network at the *very least* adds the value each creator possesses independent of the network. In practice, the digital platform generally adds more net value to the network than the creator has outside of it. The greater the difference between these two values, the stronger the incentive and capability for the digital platform to consolidate.

How can the players' payoffs in this grand coalition be allocated in a fair manner? For digital networks to run in the most efficient manner, the value accretion from digital network effects must be fairly attributed. Current digital platform reward models take one of two approaches. One approach is to reward for individual content usage, completely

ignoring network effects. While this approach simplifies the system, its inefficiency increases as the scaling networks' proportion of value accretion shifts towards the value generated by network effects. The platform within this model hoards all of the network effects for itself.

The second approach is to create forward-facing reward structures, estimating value on the value of the content creator's addition to the network. Unfortunately, the dynamic nature of digital networks makes rewarding for future work imprecise. This approach will either under-reward or over-reward content creators and thus beget network inefficiencies. Furthermore, this approach is impractical at scale. To clarify, when content creators are over-rewarded, they are siphoning rewards away from other deserving content creators. When the deserving content creators are under-rewarded, they will have less incentive and fewer resources to create content that the network values.

3. Previous Systems Are Inadequate

3.1 Dominant Digital Platforms Are Gatekeepers

Dominant digital platforms leverage discovery, acting as gatekeepers dictating how and when content creators stay connected to their current fans and consumers. Similarly, the digital platforms constrict how the content creators are found by new consumers. The power of the gatekeeper increases as the networks mature.

Content creators are further hindered through information asymmetry when negotiating with a digital platform. Content creators do not know the impact their content has on the larger network. The digital platform enjoys a much clearer picture, with access to all of the data obfuscated from the content creators. The digital platform will win any negotiation between itself and any content creator within the network, even the most powerful one.

3.2 Market Forces Drive New Digital Platforms to Dominant Digital Platforms

Due to how coalitions are formed and valued in digital networks, it becomes exceedingly difficult for single, or even groups of content creators, to reside outside of the dominant network. New digital platforms looking to challenge the status quo face a more difficult bootstrapping problem as the size of the dominant digital platform increases. With the new digital platform's minimal traction, the dominant digital platform is able to acquire the network of smaller digital platforms in a mutually beneficial deal.

Returning to this inequality:

$$v(S) + v(T) \leq v(S \cup T)$$

We can assign $v(S)$ as the new digital platform's network value, and $v(T)$ as the dominant digital platform's network value. [3]

Rewriting the inequality as:

$$v(S \cup T) - (v(S) + v(T)) \geq 0$$

We can see the dominant digital platform will at least be neutral to the acquisition, and as the difference on the left side of this inequality increases, the higher the premium the dominant digital platform is able to offer to acquire the new digital platform. From the new digital platform's perspective, the acquisition premium offered is the highest value their network will be acquired for in the current time period, making rejection of the offer difficult.

For example, in 2014 Facebook purchased WhatsApp in one of the largest acquisitions in Silicon Valley history. The messaging application company brought in \$15.921 million in revenue in the first half of 2014. [5] The acquisition price Facebook purchased WhatsApp for was \$19 billion. The reason was the user network and user growth. [6] WhatsApp's network would soon reach 1 billion monthly active users, and gaining quickly on the size of Facebook's 1.39 billion monthly active users, with quicker growth. Early attempts at valuing the network were modeled through Metcalfe's Law. Other models have also been applied, such as $n \log n$, i.e., Odlyzko's Law. [7] A study in 2014 showed that Facebook's value best mapped to Metcalfe's Law, with revenue increasing quadratically as a function of monthly active users. [8] As the dominant digital platform, Facebook was shrewd in offering a purchase price for WhatsApp nearly double that of Google, the second-highest offer, and WhatsApp as the new digital platform was unable to refuse.

Dominant digital platforms receive outsized benefits in the current dynamic. The vast majority of new networks and new digital platforms will face an increasingly harder bootstrapping phase as the dominant digital platform's network grows stronger. Even if a new digital platform may be able to battle to scale, it will eventually drive the marketplace towards consolidation.

This consolidation allows dominant digital platforms at scale to extract higher amounts of value from their content creators while the content creators are condemned to join the dominant digital platform. Thus, counterintuitively, market forces—generally lauded as a solution for correcting the described network inefficiencies—actually make the dynamic worse; the forces drive networks to consolidate, accelerating network effects, compounding the Creator's Dilemma.

4. The New Model

4.1 Introduction

The main objective of the new model's solution is to have a network that accurately rewards all network participants for the full value of their contributions. When this objective is achieved, the network's efficiency will drive its growth closer to the grand coalition. To achieve this goal, the network has to align the self-interest of each content creator and the digital platform(s) with the growth of the network. During this process we need to break with the traditional model of the digital platform acting as the Trusted Third Party (TTP) owning and controlling the network in its sole self-interest.

4.2 Requirements of the Solution

If these six requirements are achieved, network participants will be aligned in a manner that incentivizes adoption, bootstrapping the network to a state where it achieves digital network effects.

The Solution must:

1. Remove control of the network from the digital platform(s) (TTP)
2. Offer no single point of control or failure of the network
3. Publish verifiable network rules that are predetermined and difficult to change
4. As a network, be able to receive, process, and send value to contributing network participants
5. Allow competing digital platforms to contribute and benefit from the network
6. Incorporate a sustainable business model

4.3 Components of the Solution

4.3.1 The Network, the Digital Platform, and the Business Model

We propose a solution with the introduction of the RAE Ecosystem. The RAE Ecosystem satisfies the requirements by:

1. Replacing the digital network, currently owned and controlled by a digital platform (TTP), with a decentralized group of federated servers that interact with smart contracts on a public blockchain
2. Making it difficult or near impossible to purchase the RAE Ecosystem due to its decentralized structure
3. Ensuring that the protocol is difficult to change by utilizing smart contracts on a public blockchain
4. Transmitting and distributing value through burn and mint functions in smart contracts verifiable on a public blockchain
5. Creating an open development environment for digital platforms to utilize the RAE Ecosystem

6. Using a direct-to-consumer content subscription model

Rokfin will operate the first of many digital platforms to utilize the RAE Ecosystem. Outside of initial support and development necessary to get the distributed RAE Ecosystem launched and operational, Rokfin will play no long-term role in the management of the RAE Ecosystem or the RAE Token nor a significant role in their ongoing operation.

The digital platforms that connect to the RAE Ecosystem will use a subscription model. In this model, consumers are required to pay to access premium content. Selling content in a subscription service is a proven model that transcends medium: both old and new media, from cable TV to digital media, use it.

4.3.2 The RAE Ecosystem

The RAE Ecosystem will function as a new, purpose-built layer on top of a public blockchain network. In order to resolve the Creator's Dilemma, the RAE Ecosystem is designed to separate control of the digital network from the control of digital platforms in an open and transparent way. Doing so better aligns the creators' and digital platforms' interests in a way that previous solutions have been unable to achieve.

The separation of the digital platform and the digital network, along with the utilization of the RAE Token, allows all of the value provided by content creators and other participants in the Ecosystem to be reflected in how those Ecosystem participants are rewarded. The RAE Token's value not only captures the independent use of the Ecosystem, but also captures the value generated by digital network effects. That is, as network effects take hold, the increase in the value of work performed on the Ecosystem by network participants is appropriately and automatically reflected in the compensation distributed to network participants in the form of RAE Tokens.

This new way for rewarding for work means that content creators and digital platforms benefit from their competitors joining the Ecosystem. Additionally, where the digital network is distributed, as the RAE Ecosystem will be, there is no ability for any one side of the overall digital market to gain control of the hosting and distribution functions of the digital network. Accordingly, Ecosystem participants are incentivized to work cooperatively, without a Trusted Third Party, in a way that resolves the Creator's Dilemma. The result is a better network model that more fairly rewards content creators, which in turn allows them to create more and better content that benefits consumers.

The RAE Ecosystem will consist of the following categories of participants:

Content creators: Content creators are able to upload content in various mediums to the Ecosystem. Initially, content will be centrally hosted. As the technology progresses to being able to handle scale, content will be able to be hosted on a distributed-content hosting network. When a creator's content is used by a digital platform and consumed by its customers, content creators are automatically compensated through the Ecosystem itself.

Digital platforms: Digital platforms will license content from creators through the Ecosystem and package and market that content through separate, custom-built

digital platforms. The digital platforms' user experience may take any form, from a Twitter- or YouTube-like platform, to a more traditional platform like the *New York Times*. The RAE Ecosystem will provide the back-end infrastructure for sourcing content from creators and compensating creators based on the measured benefit of that content to the digital platform. The digital platforms will independently design, build, and implement their own platforms, or utilize existing platforms, that will then interact with the RAE Ecosystem. The functioning of the Ecosystem is expected to be largely abstracted from the platform's consumers. Platforms will generally charge their own consumers a subscription fee for access to content sourced from the RAE Ecosystem. Digital platforms will have discretion over the fees they charge, but content creators control the price at which their content may be used by the platforms. Platforms are then required to pay that subscription price received from consumers for every customer's account into the Ecosystem in the form of RAE Tokens in order to access the content. Platforms are also required to feed subscriber data back to the Ecosystem for the sole purpose of reward distribution for content.

Federated servers: Federated servers are independently run servers running a database management system that will help perform the core functions of the RAE Ecosystem. These federated servers are responsible for: (1) monitoring the RAE Token smart contract for burn events and using that data to calculate the timing of minting and disbursements; (2) calling for and receiving the distribution data from the digital platforms; (3) using that distribution data as inputs to the minting smart contract to enact the minting period; and (4) monitoring the automated processes of the Ecosystem for signs of malfunction. Federated servers will be automatically compensated by the Ecosystem in the form of RAE Tokens for performing these services.

Consumers: The general public will be able to directly consume content on digital platforms that is sourced and managed through the RAE Ecosystem. Their user experience will be dictated by the particular platform through which they access content. In general, consumers are not expected to have any direct exposure to, or even understanding of the RAE Ecosystem. Consumers will generally be charged a subscription fee by the platform for access to premium content on the platform. That fee may be collected in many ways arranged by the digital platform, such as credit card, direct deposit, or any other form of payment chosen by the digital platform (as noted above, digital platforms are then required to pay an equivalent amount of Tokens to register this fee into the Ecosystem). While it is possible that a consumer could directly interact with the RAE Ecosystem, the RAE Ecosystem is not being designed or structured for this purpose.

The RAE Ecosystem will incorporate smart contracts that will automatically digest distribution information fed to the Ecosystem and automatically issue RAE Tokens as payment to content creators, digital platforms, and federated servers for their work performed on the Ecosystem. The reward split between content creators and digital platforms is coded into the smart contracts. The smart contracts will not be controlled by

any single participant in the RAE Ecosystem. The smart contracts will use a layered architecture in order to make the base contract permanent at initial launch, while allowing for upgrades to other smart contract layers during development and testing of the Ecosystem. The base smart contract will follow the ERC-20 token standard, the most widely supported Ethereum token standard. The base smart contract will use ERC-20Burnable and ERC-20Mintable functions. The smart contracts will be developed using the Open Zeppelin framework, a widely adopted framework for developing secure smart contracts which use standard, tested, and community-reviewed code.

The RAE Ecosystem will be launched in a three-stage process:

1. The Ecosystem will be launched in a centralized manner, with Rokfin playing the part of hosting and delivering content on behalf of the Ecosystem and operating the first federated servers. The goal of this phase is to enable development and testing of the Ecosystem’s functionality. Rokfin will be the only digital platform using the RAE Ecosystem.
2. In its second stage, independently owned federated servers will begin participating in the Ecosystem and begin operating as intended. Rokfin may still control a majority of the federated servers in order to ensure network security and availability. Additional digital platforms will be able to begin participating in the RAE Ecosystem. Rokfin will continue to host and deliver content on behalf of the Ecosystem.
3. In the third and final stage, the majority of federated servers will be independently owned and operated. The RAE Ecosystem itself will be able to host and deliver content uploaded by creators in an independent and distributed manner. All creator content previously hosted by Rokfin will be transferred to the RAE Ecosystem. Once this stage is reached, Rokfin will no longer have any greater control over the RAE Ecosystem and its operation than any other digital platform participating in the Ecosystem. Control over the Ecosystem will chiefly rest with the community of Ecosystem participants.

4.3.3 The RAE Token

The RAE Token is a fundamental part of the RAE Ecosystem that will enable the Ecosystem to function as designed and intended. The Tokens will form the native currency of the Ecosystem that will allow the Ecosystem to collect the value paid in by consumers to access through digital platforms the Ecosystem’s content and then automatically reward content creators, digital platforms, and federated servers for their work performed on the Ecosystem. By operating as a standard Ethereum-based ERC-20 token, the RAE Token will be able to interoperate with the largest and most tested network of smart contract–focused third-party tools and applications, including wallets, block explorers, and open-source libraries built on the Ethereum platform. For example, when an Ecosystem participant is compensated with RAE Tokens for contributions to the Ecosystem, any standard Ethereum token wallet will be able to receive, and later send, the RAE Token with relative ease. Furthermore, the security of the Ecosystem and its underlying smart contracts

is enhanced by using an established and widely adopted and reviewed open-source codebase.

RAE Tokens will operate on the RAE Ecosystem through two key functions: burn and mint. These functions are already built into the Open Zeppelin Framework utilizing the Ethereum protocol and will be utilized by the RAE Ecosystem and RAE Tokens for multiple purposes. A burn function involves transferring RAE Token(s) to a wallet address out of which it is incapable of being transferred. After a Token is transferred to such an address, it is functionally useless, as it can no longer be transferred or manipulated by anyone, and is referred to as having been “burned.” The burn function will be used by the RAE Ecosystem to receive payment from the digital platforms for access to the Ecosystem. The digital platforms are required to burn an equivalent amount of RAE Tokens to the value paid by subscribers to the digital platform for access to content sourced from the RAE Ecosystem. The RAE Ecosystem is able to validate that access to the Ecosystem’s content has been paid for by requiring digital platforms to burn Tokens in this manner. Note the result of the subscription payment and burn process creates a zero balance for the digital platforms; they are wholly compensated by RAE Token distributions from the minting periods.

The minting process will be used to pay participants in the RAE Ecosystem for their contributions. The Ecosystem’s smart contracts will create new RAE Tokens and disburse them to content creators, digital platforms, and federated servers at variable intervals. The intervals at which Tokens are minted and disbursed are determined by a transparent formula defined in the Ecosystem’s smart contracts. The timing of minting and disbursement will be calculated by the smart contract based on the volume of work performed across the Ecosystem as a whole. At each disbursement, the smart contracts will measure the contributions of each participant in the Ecosystem since the last disbursement based on the subscriber data fed to the Ecosystem by the digital platforms and processed by the federated servers. Ecosystem participants will be rewarded with new Tokens based on their measured work performed on the Ecosystem, and calculations for this work will include how creator content contributes to customer acquisition and retention, how many consumers were acquired and retained by the digital platform to pay subscription fees, and backend processing performed by federated servers.

4.3.4 Burn Calculation

In order to access content and for proper reward attribution for offering content on the RAE Ecosystem, each digital platform is required to call the burn function and burn an amount of RAE Tokens equivalent to the subscription price offered to customers for each use period. The conversion rate is based on secondary-market price discovery. Note the price of the RAE Token is not under control of Rokfin, Inc. or any other digital platform and may fluctuate in value as the market finds price discovery. In order to account for the price fluctuations of the RAE Token and for differing price points in the RAE Ecosystem, a second unit is necessary, the Fin, that is pegged to fiat currency (1 Fin = \$1 USD).

Two scenarios may help clarify this process:

Scenario 1) The current price of the RAE Token is \$25 USD, and the price of a digital platform's subscription is \$10, then the platform is required to burn 0.4 RAE Token per customer subscription.

Scenario 2) The RAE Token is priced at \$5, the digital platform for the same \$10 subscription price must burn 2 RAE Token.

In both examples, \$10 was the subscription cost, so 10 Fins of work were transmitted to the Ecosystem, with the only differentiator being how many RAE Tokens must be burned. The federated servers within the RAE Ecosystem monitor the RAE Token smart contract for burn emissions and tabulate the data for the timing of minting periods.

4.3.5 Minting Schedule

The total amount of RAEs ever minted will be 34,000,000. There is a half-life mechanism employed every 1,700 minting period blocks. The minting schedule distributes a fixed amount of RAE Tokens, initially 10,000 RAE Tokens per minting block. The minting timing is dynamic and is a rolling average of the previous minting blocks' Fins per day, with a target of minting of once per day

The burn-and-mint mechanisms work in tandem with the relationship of Fins and RAEs to capture the full value of the RAE Ecosystem's digital network. Once the current minting period reaches the required Fin amount, determined by the previous blocks rolling average, the federated servers initiate the minting function.

The attribution of rewards within the RAE Ecosystem will be disbursed according to the public algorithms employed by the digital platform offering the content. For Rokfin, this algorithm is dependent on the Shapley value [4], with inputs of the price of the content and how well the content acquires and retains customers based on their subscription and utilization behavior. The utilization behavior used for this process captures the value customers associate with content today, as well as for any content utilized in the past that positively influenced the customer to resubscribe.

For Royalty Reward Sample Calculations, see [Appendix A](#).

4.3.6 No Initial Coin Offering or Advanced Sales

RAE Tokens will not be distributed through an Initial Coin Offering (ICO) or any other sale by Rokfin or any other entity intended to raise funds for development or support of the RAE Ecosystem. Tokens are only created and distributed, including to Rokfin itself, in an automated, transparent, and predictable manner through use of the RAE Ecosystem itself. Once Tokens are earned through use of the RAE Ecosystem, Ecosystem participants will be capable of exchanging their earned Tokens for other digital assets or fiat currency on the secondary market, just as any holder of any Ethereum-based token can, and so that they can purchase other goods or services elsewhere.

Rokfin has obtained funding for the launch of its platform through traditional means and is not using advanced sales of RAE Tokens to fund its operations or development or support of the RAE Ecosystem. Furthermore, investors have not been granted tokens nor offered tokens at a discounted rate. Because RAE Tokens are not being

used and are not intended to be used to raise funds from third-party investors, RAE Tokens do not have the characteristics that have rendered other digital assets securities under federal law, nor do the tokens present the kinds of consumer protection issues the federal securities laws are designed and intended to address.

IMPORTANT NOTE: Because no RAE Tokens will be circulated ahead of the launch of the RAE Ecosystem, a one-time-use mechanism is required to enable Rokfin, as the first digital platform to participate in the Ecosystem, to begin distributing the content on the Ecosystem without having a store of existing RAE Tokens to pay for that access. Accordingly, for the first disbursement period only, which will be the first 30 days, the minting calculations will be a function of the total amount of Fins transmitted to the Ecosystem divided by 30 to establish the minting period's rolling average. After the 30-day period, the RAE Ecosystem will mint 30 blocks worth of RAE Tokens to be distributed to content creators. Rokfin will be awarded its share of Tokens from this 30-day period in advance. This is possible to calculate in advance because Rokfin will be the only digital platform participating in the Ecosystem over the first disbursement period and therefore will be entitled to the full share of Tokens available to digital platforms as defined in the smart contracts embedded in the Ecosystem. Rokfin will then use those tokens to pay for access to the Ecosystem's content as required over the first disbursement period. Rokfin will not be awarded additional Tokens from this initial 30-day period. This approach, essentially having the Ecosystem advance compensation to Rokfin in order for it to access the Ecosystem as the first digital platform, will allow the burn-and-mint cycle to launch without needing to artificially disburse RAE Tokens that have not been earned for participation in the Ecosystem. After the first 30 days (or fewer) of the Ecosystem's launch, RAE Tokens will be minted and distributed only as earned rewards for measured work previously done for the Ecosystem.

5. Conclusion

We propose a model that rewards digital network participants for the full value of their contributions generated by the network. We started with the desired goal of generating digital network effects, which provide a surplus of value, but is incomplete without resolving the Creator's Dilemma and accounting for the dynamic nature of digital networks and the unequal contributions of each content creator. To resolve the Creator's Dilemma, we propose the decentralized RAE Ecosystem where each network participant's financial self-interest aligns, producing stronger network effects and stronger network adoption. Through the lifecycle of the RAE Token, we account for the dynamic nature of digital networks. The burn process transmits value to the RAE Ecosystem; the mint process accurately distributes the rewards for each of the network participants' contributions to the digital network. The RAE Ecosystem is more trustworthy than previous systems because it is difficult to purchase, and the network rules are difficult to change. The RAE Ecosystem encourages competing digital platforms to participate, as it will further enhance digital network effects and utilizes a sustainable, subscription business model.

Appendix A

Royalty Rewards Sample Calculations: Monthly Subscription Service

Each subscriber pays an amount p_i and can access any piece of content that is priced at p_i or below. In this example, the RAE Ecosystem rewards creators who helped *acquire* the subscriber and *retain* the subscriber, i.e., creators who influence resubscription.

Customer Acquisition Royalty percentage ($CAR_pct(t_i)$) represents the percent of royalties distributed to creators who helped *acquire* the subscriber as a function of the number of months since last subscription date $t_i = t - t_0$. Clearly, $1 - CAR_pct(t_i)$ is the percent of royalties distributed to creators who helped *retain* the subscriber that month. We define $CAR_pct(t_i)$ as a decreasing exponential function over time (the longer the subscription, the lower the percent is for acquisition) so that:

1. 6 months after the subscription $CAR_pct(6) = 0.5$
2. The first month t_0 there are no royalties for retention, i.e., $CAR_pct(0) = 1$
3. As t_i grows, the percentage levels out to 5%, i.e., $\lim_{t \rightarrow \infty} CAR_pct(t) = 0.05$

Then, $CAR_pct(t_i)$ is defined as

$$CAR_pct(t_i) = .95e^{-.117t_i} + .05,$$

where t_i is the number of months since subscriber i initially subscribed.

Acquisition

Let $A_{FC}^i, A_{IB}^i, A_{LC}^i$ be the set of pieces of premium content attributed to the “first click,” the “in-between clicks,” and the “last click” respectively for a user i . Define the proportion of content consumption for one piece of content in a set A as:

$$prop(i, c) = \frac{views(i, c)}{\sum_{c \in A} views(i, c)}, \quad \forall c \in A$$

Then, the acquisition royalties for a piece of content c consumed by user i is defined as:

$$A(c, i) = CAR_{pct(t_i)} * \begin{cases} .4p_i * prop(i, c), & c \in A_{FC}^i \cup A_{LC}^i \\ .2p_i * prop(i, c), & c \in A_{IB}^i \\ 0 & o.w. \end{cases}$$

Let N be the number of subscribers who were acquired in a given month. Each creator C has a (potentially empty) set K^C of content attributed for acquisition in a given month. The acquisition royalty reward for creator C is

$$AR(C) = \sum_{i \in N} \sum_{c \in K^C} A(c, i),$$

Retention

Let C^i be the set of pieces of content consumed by subscriber i in a given month. Let $P^i = \{P_1, \dots, P_{n_i}\}$ be the distinct set of content that belong to each product package and $c \in C^i$ belong to. Each product package has different price points p_1, \dots, p_{n_i} so that $p_1 > p_2 > \dots > p_{n_i} > 0$. Each piece of content c consumed by user i belongs to one and only one package based on its price point, so there is a one-to-one mapping between c and p_k .

Let $m(P_k)$ be the marginal contribution of package P_k and defined by:

$$m(P_k) = \begin{cases} p_{k-1} - p_k & \text{if } k > n_i \\ p_{n_i} & \text{if } k = n_i \end{cases}$$

Given $c \in P_k$, the royalty retention rewards for a piece of content c and user i is:

$$R(c, i) = (1 - CAR_pct(t_i)) \sum_{j=k}^{n_i} m(P_j) \left(\frac{views(i, c)}{\sum_{c \in \{P_1, P_2, \dots, P_j\}} views(i, c)} \right)$$

Let \hat{N} be the number of subscribers who were retained in a given month. Each creator C has a (potentially empty) set L^C of content attributed for retention in a given month. The retention royalty reward for creator C is

$$RR(C) = \sum_{i \in \hat{N}} \sum_{c \in L^C} R(c, i)$$

Royalties

Total royalties to creator C is then,

$$TR(C) = AR(C) + RR(C),$$

and the proportion of royalties to C is

$$TT_PCT(C) = \frac{TR(C)}{\sum_C TR(C)}$$

Token Distribution

Denote the number of Tokens minted on a given month as M . Let q be the proportion of Tokens minted earned by all creators in a given month. Therefore $M(1 - q)$ is the number of Tokens minted earned by digital platforms(s) in a given month. The total number of Tokens minted earned by creator C :

$$T(C) = M * q * TT_PCT(C)$$

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