TOKENIZED PEER-TO-PEER ADVERTISING ON THE BLOCKCHAIN

The Power Of Viral Marketing

by
Lee Pennington
Vijay Kandy

https://vyral.network

Outline

1. Introduction

a. Terminology

b. Centralized Referral Programs

c. Immutable Decentralized Referral Systems

2. Reward Systems On the Blockchain

a. Vyral Chains: Referral Trees & Nodes

b. Vyral Master Nodes: Referral Master Nodes on the Blockchain

c. Vyral Keys: Referral Keys on the Blockchain

d. Myetherwallet.com Implementation via Data Field

e. Metamask Implementation

3. Reward Mechanisms

a. Costs Associated with Rewards

b. Direct

c. Geometric

d. Shapely

e. Testing & Critical Mass

4. Tokenization of Non-Monetary Reward Systems

a. Usability of Traditional Rewards

b. Tokenization of Rewards

c. Stakeholder, Employee & Customer Dynamics

d. Mass Media Applications

e. Case Studies: DropBox, Airbnb & PayPal

5. Vyral Token Sales on the Ethereum Blockchain

a. The Vyral Referral System

b. Vyral Key

c. Vyral Reward Laws

d. Vyral Contribution Period

e. How to Make a Vyral Contribution

6. SHARE Token Use Cases

a. Rewards in SHARE Tokens

b. Standard Vyral Smart Contracts for Token Sales

7. Conclusion

Introduction

Blockchain technologies are positioned to disrupt traditional advertising models. New paradigms transform the consumer into an advertiser who earns via Peer-to-Peer Advertising through blockchain referral systems & into vested stakeholders through tokenization of rewards. The long-term effect of this disruption is multifold:

1. Advertising becomes more transparent through the immutable laws of the blockchain.

2. Tokenization of reward systems increases the incentive to participate in Peer-to-Peer Advertising & drives its growth.

3. Peer-to-Peer Advertising, the highest-converting form of advertising, becomes the dominant form of marketing while the effectiveness of traditional advertising channels continues to decrease.

4. A significant portion of the value assigned to traditional advertising channels is transferred to customers who act as advertisers & become vested stakeholders due to brand tokens.

5. The lines between a customer, employee & stakeholder vanish.

The first implementation of Vyral & arguably the most important implementation is directly into token sales to transform how marketing for token sales is completed resulting in a “Vyral effect” for the top technologies, channeling ad spend back to the community supporting the project & increasing the speed of mass adoption for blockchain projects. Naturally, this technological implementation is directly integrated into the Vyral token sale.

Terminology

Peer-to-Peer Advertising - Community advertising happening directly from person to person such as “word of mouth” compared to institutionalized channels such as TV, print or paid ads.

Vyral Token Sale - Token sale integrating Vyral’s VRC20 technology directly into its smart contract.

Vyral Chain - Network of referrals on the blockchain created as Peer-to-Peer Advertising occurs & spreads; for example, if Sally contributes to a token sale, refers Amy & Amy contributes then Amy is added to a Vyral Chain, which connects her to Sally because of Sally’s Vyral Key Amy used when contributing.

Vyral Key - a code input into a transaction read by the smart contract to correctly attribute a referral to the correct referer & connect the referral to a Vyral Chain; for example, Amy was referred to a token sale by Sally using Sally’s Vyral Key to correctly attribute any referral bonus to Sally; once the transaction is completed which adds Amy to a Vyral Chain under Sally, Amy receives her own Vyral Key to bring other participants into that Vyral Chain.

Vyral Master Nodes - once a participant joins a Vyral Chain they become a Vyral Master Node, which gives them the ability to bring other participants into that Vyral Chain and earn rewards for these actions; both Amy & Sally in the above examples are Vyral Master Nodes.

Qualifying Action - a specific action that results in a participant joining a Vyral Chain and becoming a Vyral Master Node; for example, when Sally sends the initial transaction to a Vyral Smart Contract specifying Amy’s Vyral Key, she has completed the Qualifying Action that results in her becoming a part of that Vyral Chain.

Vyral Smart Contracts - a smart contract with the Vyral technology & library embedded into it resulting in the creation of a Vyral Chain as new participants join and governed by its immutable Vyral Reward Laws.

Vyral Reward Laws - laws governing how rewards are distributed for certain actions such as a referral resulting in a new participant completing a Qualifying Action to become a Vyral Master Node at which point a reward is distributed automatically based on the Vyral Rewards Laws written into the Vyral Smart Contract; once the Vyral Smart Contract is deployed the Vyral Reward Laws are immutable.

Action-Based Mining - distribution of rewards within a blockchain ecosystem via actions such as referrals rather than traditional mining; a referral usually constitutes this action in a Vyral Chain.

Sybil Attack - also known as false-name manipulations, an instance when one user purchases multiple copies of a product under duplicate identities to increase their reward.

VRC20 - standard smart contract integrating a blockchain referral system directly into the smart contract to create a Vyral Chain with the usage of Vyral Keys.

Centralized Referral Programs

Companies employ several types of referral programs to attract customers. Although these referral programs do not have immutability, decentralization & other blockchain characteristics; nevertheless, they are effective. Selected programs are discussed below to demonstrate effectiveness before a discussion of how the specific reward mechanisms work on the blockchain in a decentralized and immutable manner.

Credit for Future Services

Amazon and Google are prime examples of this program. Customers receive a $100 reward from Google for signing up their cloud services or ad exchange platform. The $100 is not cash but rather a credit for future services to incentivize platform usage while having a cushioned impact on the company's financials because of non-cash structure.

In-Game Credits

World of Warcraft offers players a chance to invite a friend to play by providing a Recruit a Friend button in the game. Similar to the above, credits are earned to be used in the game; however, these credits have no replication cost unlike Amazon or Google's services thus have no financial impact on the company.

Product Based Rewards

Dropbox offers extra storage for specific tasks such as inviting another user or installing Dropbox app on a smartphone. This results in additional usage of the product & increases customer loyalty & adoption in addition to the referrals this generates.

Although effective, the above programs do have certain flaws and imperfections that can be transformed using blockchain technologies to increase the size of the reward for the participant without putting additional financial strain on the company.

Immutable Decentralized Referral Systems

Referral systems which govern the current world of Peer-to-Peer Advertising already exist but are inadequate in their current state to scale and allow Peer-to-Peer Advertising to become the dominant form of marketing that re-distributes that value assigned to traditional channels back to the consumer acting as a brand ambassador.

Obstacles with current centralized peer-to-peer referral systems include:

1. Middle men who seize a portion of the monetary value but add limited real value.
2. Fraudulent programs & middle men who have the ability & often times unjustly confiscate funds from referrers.
3. Subset of secret or undefined rules resulting in incentive programs which lack transparency.
4. Lack of liquidity for referral programs where the reward is focused on the system resulting in customers who would like to be brand ambassadors but have limited additional use for an additional quantity of the product to become disincentivized to perform Peer-to-Peer Advertising.
5. Separation of roles between stakeholders, employees & customers & misaligned incentives.
6. Fraudulent activity such as sybil attacks from participants.

Per the above, the challenges are not only from originators & middle-men but from participants themselves who attempt to exploit the rewards via sybil attacks. A sybil attack is when one user purchases multiple copies of a product under duplicate identities to increase their reward. For example, a user can create two identities, the second with a referral from the first. Because the seller is unaware of the underlying network, detecting false identities is difficult. For each referral made through the second identity, both identities capture some reward.

Not all systems exhibit all of the above flaws; however, most of the above are present in each system to a certain degree in all current referral systems.

The blockchain offers several features, which result in a new generation of peer-to-peer referral systems better positioned to rapidly grow & disrupt traditional advertising models:

1. No middle men resulting in a fairer transfer of value between all parties.

2. Decentralized rules governing the generation of rewards thus resulting in a fair transfer of value for performing specific actions.

3. Clear & immutable laws governing each system leading to full transparency.

4. Liquidity via tokenization resulting in customers who have no use for larger quantities of the brand's product to have the option to trade tokens on an exchange for cryptocurrencies or to eventually exchange into fiat currencies; this leads to greater adoption and higher incentives for more individuals to participate in a company's reward program.

5. Integration of roles between stakeholders, employees & customers since customers have the ability to become a brand ambassador which traditionally was the role of the marketing department and due to tokenization of the reward system or a company's product/service, they also become a vested stakeholder because the value of that token increases as the success of the company increases thus also incentivizing the same customer to help the company succeed.

6. Reward mechanisms which are sybil-proof and not vulnerable to forging identities on behalf of the users.

Reward Systems On the Blockchain

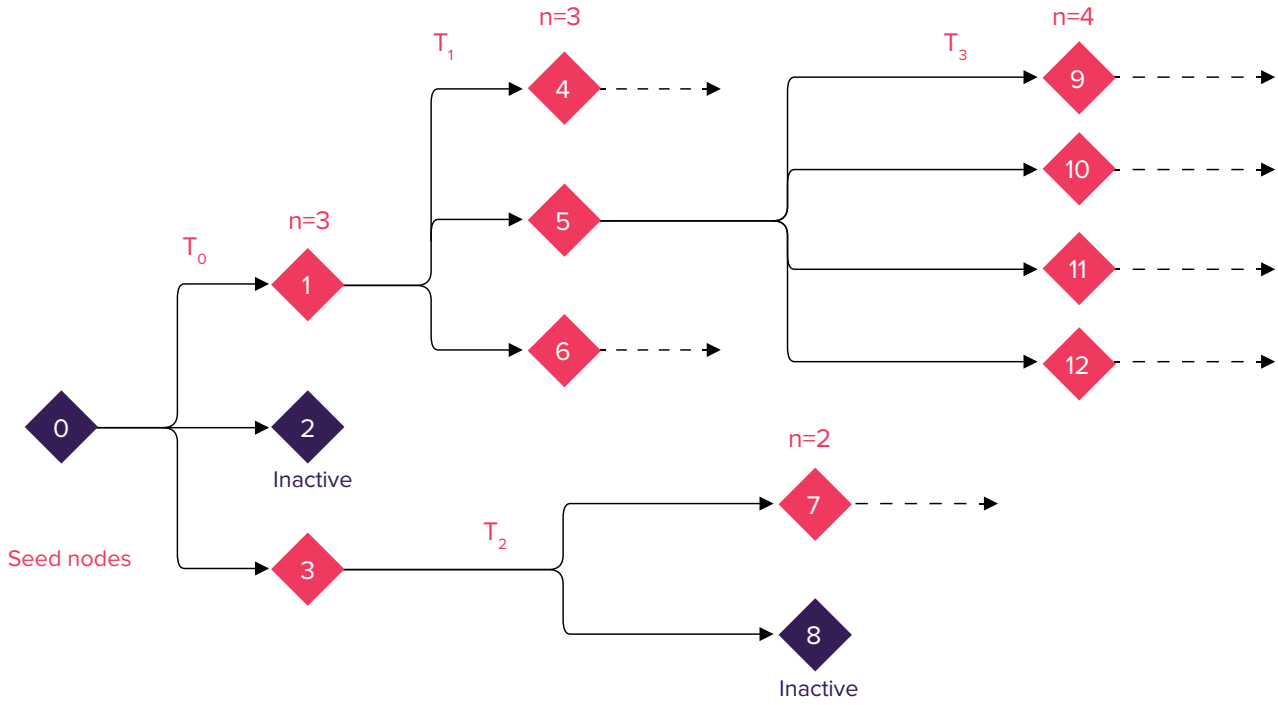
The blockchain offers technology to implement reward systems with immutable laws. Because it is a chain, there is an ability to also map the interconnectedness of various referrals via this chain & create a system of rewards based on this. Additionally, nodes in this blockchain can have specific properties all feasible with the current state of blockchain technologies.

The fundamental idea behind Peer-to-Peer Advertising is that a user Alice, who already purchased the product, is rewarded for referrals, i.e., for purchases made by another user, Bob as a result of Alice's promotion. The reward mechanism associated with Peer-to-Peer Advertising may take various forms. In particular, Alice may be rewarded for both purchases made by Bob and for Bob's own referrals in a recursive manner. Several such reward mechanisms are presented below along with a framework on how to implement Peer-to-Peer Advertising on the blockchain.

Vyral Chains: Referral Trees & Nodes

Referrals can be modeled using a directed referral tree T . Each node in T corresponds to a buyer. Tree T has a directed edge from v to u if u buys the product as a result of a referral from v. A reward mechanism takes a referral tree T and determines the reward, R(v), each node v ∈ T gets.

A Vyral Chain is a referral tree on the blockchain. Each participant that joins a campaign is represented as a node in the referral tree (T) and a directed edge from a node u ∈ T to node v ∈ T indicates that u was v's referrer.



In this referral tree, each of the numbers is a node. Each node has n children, the individuals whom he or she has referred. Other than the first node, every node has ancestors which are the chain of individuals whom have referred them.

Implemented onto the blockchain, the referral tree becomes a Vyral Chain and nodes with the ability to have children become Vyral Master Nodes.

```
library Referral {

    struct Node {
        /// This node was referred by...
        address referrer;
        /// Invitees (and their shares) of this node
        mapping (address => uint) invitees;
        /// Store keys separately
        address[] inviteeIndex;
        /// Reward accumulated
        uint shares;
    }

    struct Tree {
        /// Nodes
        mapping (address => Referral.Node) nodes;
        /// stores keys separately
        address[] treeIndex;
    }

    // ... public methods ...
}
```


VYRAL
VYRAL

Vyral Master Nodes: Referral Master Nodes on the Blockchain

Different nodes in the referral tree can have different properties. For example, the first level of Vyral Master Nodes can earn higher referral rewards solely because they are a higher level than other nodes. In the specific example of the Vyral Token Sale, all Vyral Master Nodes have the same reward mechanism.

Vyral Keys: Referral Keys on the Blockchain

Each Vyral Master Node is assigned an ID and this ID is hashed to create the node's referral key known as a Vyral Key. In order for a Vyral Master Node to have additional children nodes underneath, those individuals must join using the referral node's Vyral Key. If an individual joins the Vyral Chain without submitting the specific Vyral Key, they will not earn a reward they would have otherwise earned by entering the Vyral Key to incentivize proper usage of Vyral Keys.

```
function addInvitee (
    Tree storage self,
    address _referrer,
    address _invitee,
    uint _shares
)
    internal
{
    Node memory inviteeNode;
    inviteeNode.referrer = _referrer;
    inviteeNode.shares = _shares;
    self.nodes[_invitee] = inviteeNode;
    self.treeIndex.push(_invitee);

    self.nodes[_referrer].invitees[_invitee] = _shares;
    self.nodes[_referrer].inviteeIndex.push(_invitee);
}
```

Additionally, the Vyral Smart Contract owner may create an HTML interface where nodes can easily lookup:

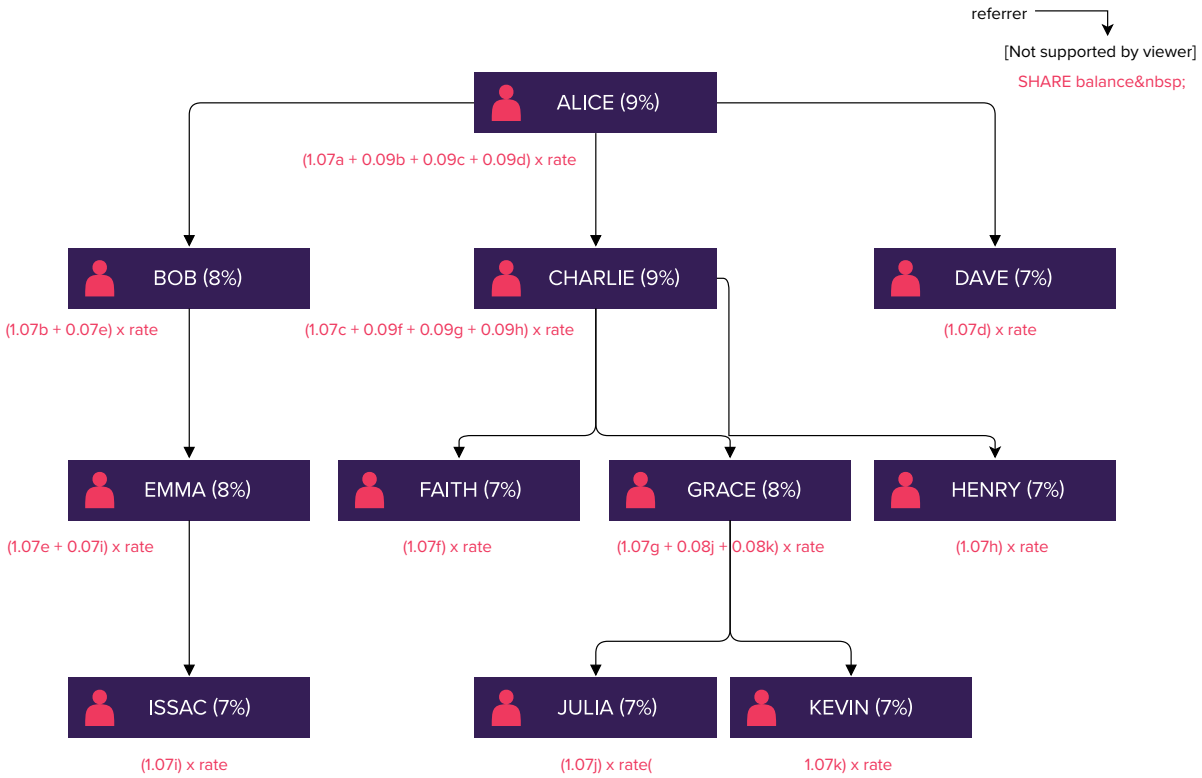
1. Validity of Vyral Keys prior to completing an action where they join the Vyral Network.

2. One's own Vyral Key by inputting in the case of the Ethereum blockchain one's ETH address.

Qualifying Action Referral Mechanism

Joining the Vyral Chain is defined by an individual becoming a Vyral Master Node within the Vyral Chain. In order to become a Vyral Master Node, the individual first needs to complete a predefined action by sending an Ethereum transaction to a Vyral Smart Contract. Once the transaction is mined this signals validity of the action and the individual joins the Vyral Chain as a Vyral Master Node.

Once a Vyral Master Node, the individual can refer others for rewards. Once those referred individuals complete the Qualifying Action, they become children underneath the referring Vyral Master Node.



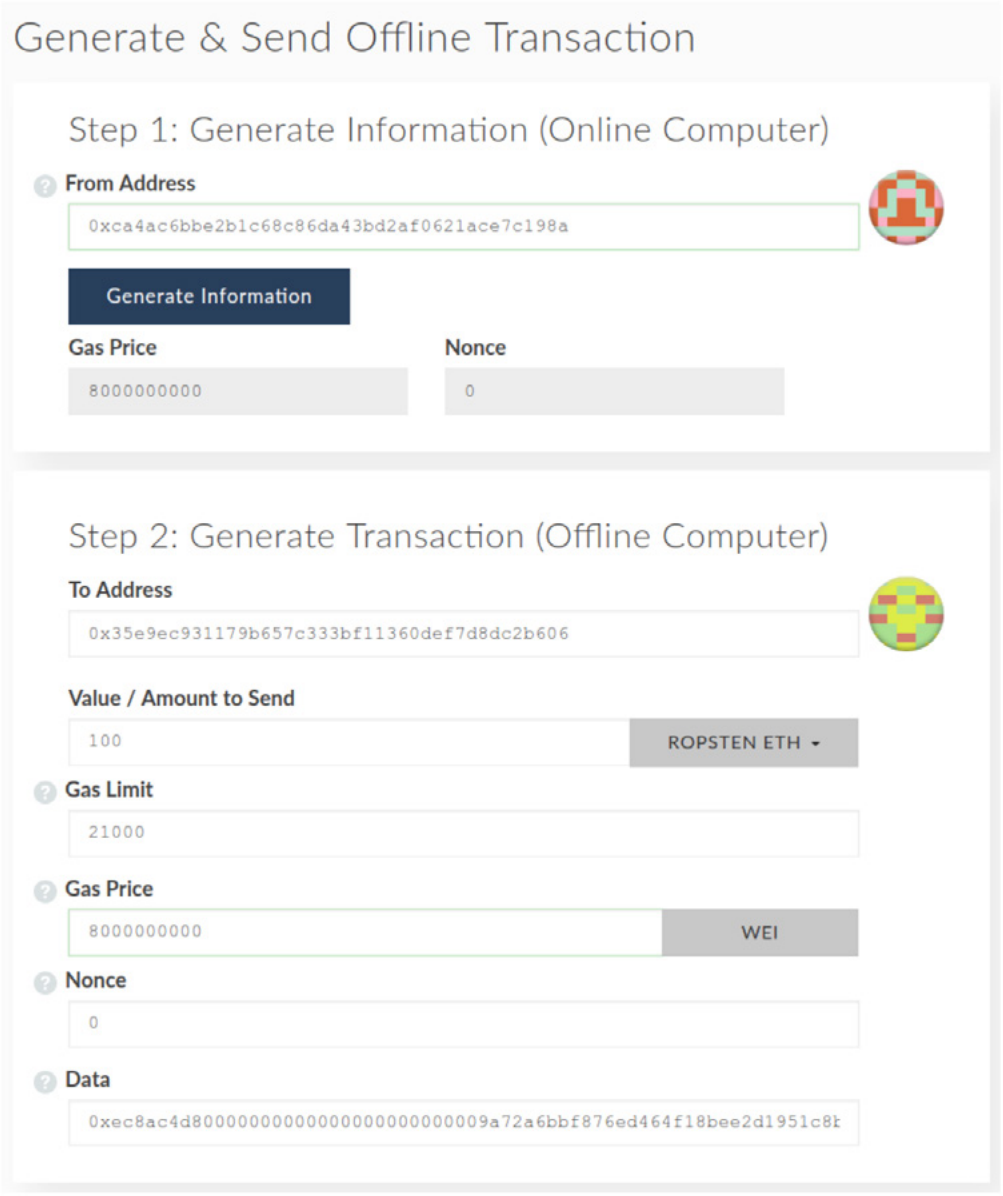

```
function payoff(
    Referral.Tree storage self,
    address _referrer,
    uint _shares
)
    public
    returns (uint)
{
    Referral.Node memory node = self.nodes[_referrer];
    uint bonus = getBonusPercentage(node.inviteeIndex.length);
    uint reward = _shares.mul(bonus).div(100);

    return reward;
}
```

Myetherwallet.com Implementation via Data Field

By sending a transaction to a Vyral Smart Contract, an individual can complete the Qualifying Action to prove that he or she is joining the Vyral Chain. On the Ethereum blockchain, this would be a transaction denominated either in Ether or an ERC20 token. Using myetherwallet.com, the individual can place the Vyral Key received from his referrer into the Add Data field. For e.g., if the referral key received is

`0xec8ac4d8000000000000000000000000009a72a6bbf876ed464f18bee2d1951c8b8ef6d0ab` ,

then paste the referral key into Data field as shown below.



The Vyral Smart Contract then takes this data and adds the sender to the Vyral Chain as a Vyral Master Node thus making the sender a child of the referrer & crediting both the referrer & sender any respective rewards based on the Vyral Reward Laws which govern that specific Vyral Smart Contract.

```
function buyTokens(
    address _ referrer
)
    public
    payable
    isAtLeastMinPurchase
    isBelowHardCap
    isAfter(saleStartTime)
    isBefore(saleEndTime)
    isNotHalted
    inStatus(Status.SaleStarted)
{
    address buyer = msg.sender;
    uint weiReceived = msg.value;
    uint shares = weiReceived * SHARES _ PER _ ETH;

    // Transfer funds to wallet
    wallet.transfer(msg.value);

    // Enough to buy any tokens?
    require(shares > 0);

    // Cannot purchase more tokens than what's available
    require(shares <= token.balanceOf(this));

    // Running totals
    weiRaised = weiRaised.add(weiReceived);

    // Transfer tokens to buyer
    token.transfer(buyer, shares);

    // Add to referral tree to payout rewards
    uint reward = campaign.join( _ referrer, buyer, shares);

    // Log event
    LogPurchase( _ referrer, reward, buyer, weiReceived);
}
```

Metamask Implementation

Metamask allows an injection of code and to pass variables automatically thus a referrer can leverage the usage of links without having to give direct instructions to the sender to include his Vyral Key in the Add Data field of the transaction.

This allows the usage of shortened URLs (pretty links) and simplifies the process for participants to join Vyral Chains.

Reward Mechanisms

Action-Based Mining is the concept where various actions result in a reward. Rather than traditional mining where miners compete to solve a puzzle & receive a pre-defined reward if they are successful, here each node in the network becomes a miner and has the ability to earn a reward by adding additional nodes to the network. Action-Based Mining results in the growth of the network. These actions range from the most basic one being a transaction that serves as the Qualifying Action to other actions in the future that can result in Vyral Chains such as social shares, views & joining communities.

We present three popular reward mechanisms -- Direct, Geometric, Shapely -- and a new reward mechanism we introduced for Vyral campaigns.

Vyral Reward

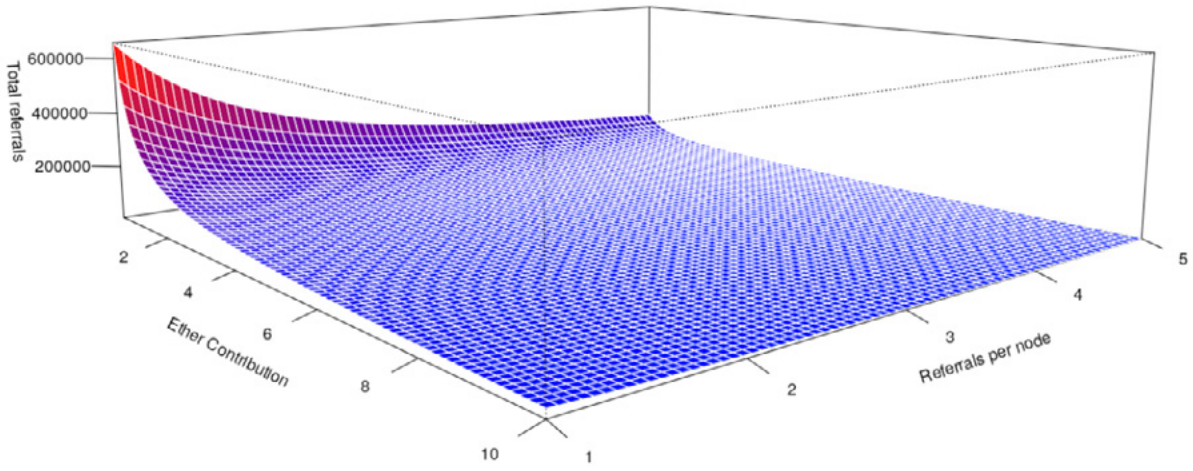
Each reward has a respective cost. For example, in the example of Dropbox launching their incentive system where each referrer and referee receive let's say 1GB of storage each upon the referee joining the network, the cost to Dropbox would be 2GB of storage. Since each GB has some sort of cost even if minimal, there is always a real cost associated with each reward.

For any given node, the cost function is given by the formula:

$$1.07 \times contribution \times rate + \sum_{k=1}^{n} bonus \times contribution_k \times rate$$

In the specific example of the Vyral Token Sale, the rate is the SHARE token exchange rate for 1 ETH and contribution represents a child node's contribution. Rewards range from 7% to 33% depending on the number of invitees that joined the Vyral Chain using the referrer's Vyral Key.

Campaign coast analytics



Cost of campaign if every node node in the tree refers just 1 other node and receives 7% bonus

The cost of the tree can be calculated as follows. As an example for the cost analysis, 222,222,222 SHARE tokens are allocated as reward bonuses. Assuming a maximum possible bonus tier of 27%, if each node has k children then the cost of the tree is given by the inequation:

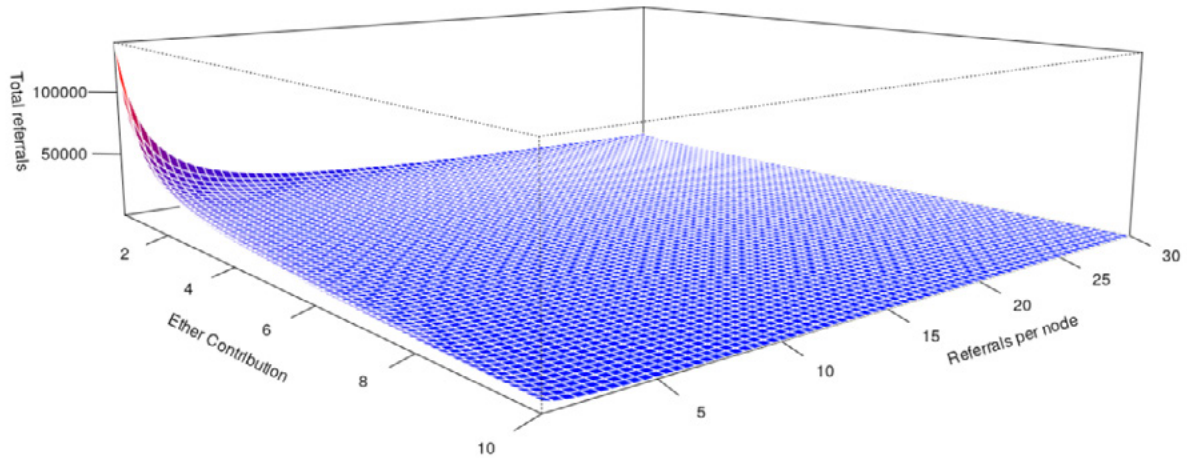
$$N \times (0.27 \times contribution \times k) \leq \frac{222222222}{exchangerate}$$

where N is the total number of nodes in a referral tree and exchange rate is 1 ETH = 4825 SHARE tokens.

We wish to maximize N, the number of nodes in a referral tree while lowering the costs. So rearranging the inequation we get:

$$N \leq \frac{23028}{bonus \times contribution \times k}$$

Campaign coast analytics



Cost analysis of referral tree for a maximum possible bonus of 33%

Note, this is not indicative of the specific parameters of the Vyral Token Sale.

Direct Reward

In a direct referral linked to the buyer through other direct referrals. For example, if Alice refers Bob and then Bob refers Charlie, Alice is rewarded for Bob's purchases and Bob is rewarded for Charlie's purchases.

A practical example of the direct reward mechanism is the Dropbox referral program which offers 500MB of extra free space to the referrer and the invitee. Since a fixed amount is awarded for each referral, we can say that Dropbox values each referral at 1GB per user. The current Dropbox mechanism is fair to the invitee: the invitee gets the same reward as the referrer. However it is not fair to nodes who bring many descendants, as a node is compensated only for direct referrals but not for the nodes her descendants bring in.

Geometric Reward

One type of a reward mechanism that satisfies the subtree constraint, the budget constraint, unbounded rewards, and monotonicity is the geometric reward mechanism. In a geometric reward mechanism, node u receives a reward ab for each direct referral and a^ib for each i-indirect referral for all $i>1$. In general, if a node $u \in T$ appears in position k in sequence $S(\psi)$, then receives the following payment:

$$\sum_{j \in S(\psi_i)} \frac{reward}{2^{(|S(\psi_i)|-k+1)}}$$

A practical example of geometric reward mechanism is the winning algorithm behind DARPA's Red Balloon Challenge[1] of 2009. The challenge is to identify the locations of 10 balloons spread across the continental USA. It's impossible for any individual to travel to all the places and the competition was time-critical. The winning team's approach was based on the idea that achieving large-scale mobilization towards a task requires (*a*) diffusion of information about the tasks through social networks; and (*b*) provision of incentives for individuals to act, both towards the task and towards the recruitment of other individuals.

[1] http://archive.darpa.mil/networkchallenge/

Shapely Reward

In a Shapley reward mechanism, a node *u* receives the average, taken over all orders of the nodes, of what she would have received under the marginal reward mechanism. The marginal contribution of a node *u* ∈ T is denoted by *mc(u,T)* , and defined as the difference in value that is caused when *u* joins *T*. The Shapely reward for is given by:

$$\frac{1}{n!}\sum_{j\in S(\psi_i)} mc(i, T_i^{S(\psi_i)})$$

In simple terms, in Shapely reward mechanism, the value of a referral is distributed in equal shares among the invitee and all of her ancestors.

All of the above are possible reward mechanisms that can be modeled via Vyral Token Sales on the blockchain.

Testing & Critical Mass

One of the goals of this framework on the blockchain is for others to test out these types of systems. Only over time with the testing of various systems Vyral Reward Laws governing the Vyral Smart Contract will virality be optimized. Arguably, since each smart contract owner may have a slightly altered goal, the Vyral Reward Laws can only be optimized on a case by case basis.

Nevertheless, the important aspect is to reach critical mass with the Vyral Smart Contract where growth occurs naturally & is stimulated by the children apart of the Vyral Chain without artificial stimulation.

Tokenization of Non-Monetary Reward Systems

Historically, incentivization systems have had two categories where a) they rewarded actions financially whether as a percentage of a sale or fixed cost per action or b) they rewarded actions via their product.

For example, in the case of affiliate systems, rewards are financial where referrers receive a % of a sale or fixed dollar amount per action. There have been many negative connotations with the affiliate industry & generally the industry has a poor reputation because of the aggressive tactics used & scams by every participant in the ecosystem from customers to referrers all the way to middlemen operating affiliate networks.

In the case of corporate referral systems that are generally accepted, the company gives as a reward their product or credit to use within their system. Dropbox gave away free storage, PayPal when using their system & Airbnb credit when booking through their system.

Blockchain technologies introduced tokenization of a company's product or service & secondary markets for these tokens. This radical shift allows for a third incentive system based on the blockchain & tokenized rewards which significantly increases the incentive to become an active participant in a company's reward program while providing transparency and fairness via smart contract technology for all participants in the ecosystem.

Usability of Traditional Rewards

In the case of classic referral systems where companies give away their product or credit to use within their system, these systems work well when:

a) the reward is of value or at least perceived value and

b) the marginal reward is perceived to be more valuable than the perceived marginal effort required to earn the additional reward

It's a case of economics. In economics, a firm continues to sell as long as the following condition is satisfied:

Marginal Profit > Marginal Cost

In this case regarding referrals, a the participant continues to be active earning rewards as long as the following condition is satisfied:

Perceived Marginal Reward > Perceived Marginal Effort

The Participant will stop once Reward Maximization occurs (just like a firm will stop selling when Profit Maximization occurs) at the point when:

Perceived Marginal Reward = Perceived Marginal Effort

Note that value is perceived as participants in the system do not always act logically hence the perception of the situation is more influential than the actual result. For example, let's say a participant, Amy, believes she may one day need additional storage in the case of Dropbox even though this day will never come. Amy's perception may lead her to continue to attempt to earn rewards of free storage even though Amy will never use them. Amy desires to earn more of the reward because Amy will use it or Amy believes she will use it and believes that the reward is higher than the effort.

However, every consumer has a consumption limit, which is again perceived. The incentive to participate automatically ceases to exist once the point where additional rewards do not result in additional benefit because a participant's consumption of the product has a limit.

If,

ΣRewards > Perceived Lifetime Consumption

then,

Perceived Marginal Reward = 0

At that point even if the Perceived Marginal Effort is small, it is not logical for the participant to be active since the Perceived Marginal Reward is zero because any additional reward becomes a surplus that is subsequently wasted and cannot be converted to anything of significant value for the participant.

For example, although Amy may be a strong believer in Dropbox and the product, Amy can only consume so much free storage. If Amy is not a power user and only stores personal files that might be a Perceived Lifetime Consumption of a maximum of 300 GB. If Amy has already earned 350 GB of free storage, regardless if Amy continues to earn additional free storage and Amy's account has 350 GB of storage, her motivation to refer other customers has now decreased because Amy cannot sell off that storage, use it or do anything with it that would result in the conversion of the storage into value for Amy. However, if she perceives that one day she may become a videographer and need 900 GB she may still continue although her dream is unrealistic and she will never actually become a videographer and use this additional storage.

If Dropbox chose to offer cash instead of storage or allow a participant to trade in storage earned for cash, Amy would continue to be active even after her Perceived Lifetime Consumption was reached since she could earn additional value for being active. However, this could put a heavy strain on the profitability of Dropbox and could result in Dropbox incurring significant & unpredictable costs.

Tokenization of Rewards

Tokenizing rewards produces drastic changes in the behavior of participants without straining a company's finances.

If an ecosystem on the blockchain for Dropbox's free storage is consider where the storage is tokenized then this provides a framework to accomplish all of the goals.

Firstly, the surplus rewards in the traditional model are now more easily usable and can be used with Dropbox in this example for a wide range of products and services rather than only redeeming the free storage.

Secondly, similar to the traditional model, they can be used with the company for the actual product.

Thirdly, tokenization transforms Amy, the customer, who has become a de facto employee via the Peer-to-Peer Advertising efforts she is doing for Dropbox also into a vested Dropbox stakeholder. Since the value of the brand's token fluctuates based on the success of Dropbox, Amy the stakeholder has the option to hold onto the token because she believes in the brand and that the value of the token relative to other stores of value will increase. This incentivizes Amy the stakeholder to perform additional actions outside of actions where she just receives reward tokens because she can now influence the success of the company and is motivated to help. Although the value of a token representing gigabytes of cloud storage should logically not fluctuate with the success of Dropbox since the token does not represent any profit interests, the reality is that it will because the Dropbox may create new use cases for the token & benefits for its holders & the cloud storage experience at Dropbox may be better than its competitors.

Because of decentralized exchanges, the liquidity of reward tokens especially if built on a blockchain such as Ethereum is instant as long as participants decide to trade.

Stakeholder, Employee & Customer Dynamics

Transforming Amy the customer & advertiser into Amy the vested stakeholder is an important implication. Long-term these reward systems are not just a new way to distribute rewards & create incentive programs but they alter the dynamic between participants inside these ecosystems. The lines blur and eventually vanish between stakeholder, employee & customer.

The current model is flawed. Every party has a different set of incentives and often those incentives clash resulting in wasted resources on trying to align incentives rather than leaders of the company focusing on the product & overall happiness of participants in the ecosystem.

The future model changes these dynamics. In fact, it allows more free movement between roles. A customer who originally was solely a customer can become a brand ambassador. If he or she is exceptional at their job & become an extremely influential brand ambassador their power increases with both the work they are completing and the rewards they are accumulating. Since those rewards are tokens, eventually that ambassador might become more powerful and have accumulated more tokens than leaders within that business because of these free markets and can have a very significant impact on the direction of the company and also the value of the underlying tokens.

Mass Media Applications

While disrupting legacy marketing channels such as broadcast TV, radio, and print, these use cases are supported by Vyral & blockchain technologies.

For example, the current model for large campaigns via TV, radio or print can also use these referrals in a similar manner as present-day centralized referral systems where tracking occurs and the traffic source can be tied to the result.

Even though the Vyral Key is lengthy in its native form & must be input into the Qualifying Action meaning transaction, it is simply used in conjunction with a method that passes data such as MetaMask.

URL's can be be made human readable where the shortened URL redirects to a longer url and passes data including the Referral Key and makes the Qualifying Action simpler than by having the new participant memorize or copy a Referral Key before joining the Vyral Chain.

https://vyral.network

Case Studies: DropBox, Airbnb & PayPal

Dropbox's campaign shows us how could a company, only using its own products, attract new advertisers to itself. The logic was simple, Dropbox would give their users 100 MB per new user they could get registered via referral links. Even with its limited bonus structure, Dropbox managed to become one of the big players in the industry, if not the biggest. Their referral system permanently increased sign-ups by 60% & 35% of daily sign-ups are via the referral program. In Sept 2008, the service had 100,000 registered user & by Jan 2010 (15 mos.)

the service had 4,000,000, primarily achieved through a referral system.

In the case of Airbnb, the popular hospitality service is much more than a revolutionary venue and has an incredible creative marketing team. Besides their viral campaigns, they also count on a strong referral system gives rewards both ways, US$ 30 to the referral and US$ 25 to the referee, but also tops it up when the referee uses the platform's services for the first time, granting the referral more US$ 75. So, only by giving away some of its profit, AirBnB shows us yet again that a little can get you a lot.

PayPal managed to achieve significant growth but how did PayPal manage to become from nothing to the most known and cherished system of all? PayPal did a simple campaign using the famous mouth to mouth propaganda, with some millennial appeal, the platform started its referral system giving away US$ 30 for each person referred, as long as this same person would register and use its services. The platform was able to triplicate its user base not spending much rewarding its users and now is the very first in the industry. Referrals helped PayPal achieve 7 to 10% daily growth, catapulting their user base to over 100 million members.

On the blockchain where storage, real estate & PayPal credit can be tokenized and the laws of this referral system are immutable, the rate of growth is likely to increase and result in more aligned incentives.

Vyral Token Sales on the Ethereum Blockchain

One of the best use cases of the Vyral Smart Contract is for an initial contribution period.

Naturally, it became apparent that to complete a contribution period, the Vyral Smart Contract technology would need to be used as a first use case of the technology & also to ascertain actual data for the further development of future Vyral Smart Contracts & their optimization.

Vyral's native token is SHARE.

The Vyral Referral System

The system works in that each contributor during the contribution period becomes a Vyral Master Node in the system once they have sent Ether to the Vyral Token Contract.

Vyral Key

A referrer's ETH address is their Vyral Key. Each Vyral Master Node also has a Raw Vyral Key. This Raw Vyral Key is given to potential "children" prospects of the node. If those prospects also contribute to the Vyral Token Contract and specify the Vyral Key then they become a child & also have a node with a subsequent Vyral Key.

A Vyral Master Node's Raw Vyral Key is their ETH address formatted slightly differently as follows:

0x| 4 bytes | 12 bytes of zeroes | 20 bytes of address |

0xec8ac4d8000000000000000000000009a72a6bbf876ed464f18bee2d1951c8b8ef6d0ab

If the referrer node's ETH address is **0x9a72a6bbf876ed464f18bee2d1951c8b8ef6d0ab** then the above is their Raw Vyral Key.

The code to create the Raw Vyral Key data field is as follows:

```
let abi = require('ethereumjs-abi');
let referrer = "0x9a72a6bbf876ed464f18bee2d1951c8b8ef6d0ab";
let viralKey = abi.methodID('buyTokens', ['address']).toString('hex')
+
          abi.rawEncode(['address'], [referrer]).toString('hex');
```

The Vyral Smart Contract decodes the Raw Vyral Key sent during the Qualifying Action, looks up the Vyral Master Node associated with the Vyral Key and credits rewards appropriately based on the specific Vyral Reward Laws.

Vyral Reward Laws

For the first Vyral Smart Contract, the method was chosen where the reward is split between the two parties where the referred party earns a flat reward for using a Vyral Key and the referring party earns a varying reward depending on the number of individuals they have referred.

Vyral Contribution Period

Because of the uniqueness of the Vyral system, the contribution period also necessitates unique characteristics. Rather than being a simple contribution period, it will have two parts with two separate caps. The reason for this is to ensure that the Vyral Referral System can actually be implemented.

In the case of many token sales even with relatively large caps, they are over in under an hour. Since one must first be a Vyral Master Node within the Vyral Chain to receive a Vyral Key, it is not possible to start referring other prospective children until one is a Vyral Master Node. In the case of a token sale that is over in under one hour, each of the Vyral Master Nodes would then become single nodes without children.

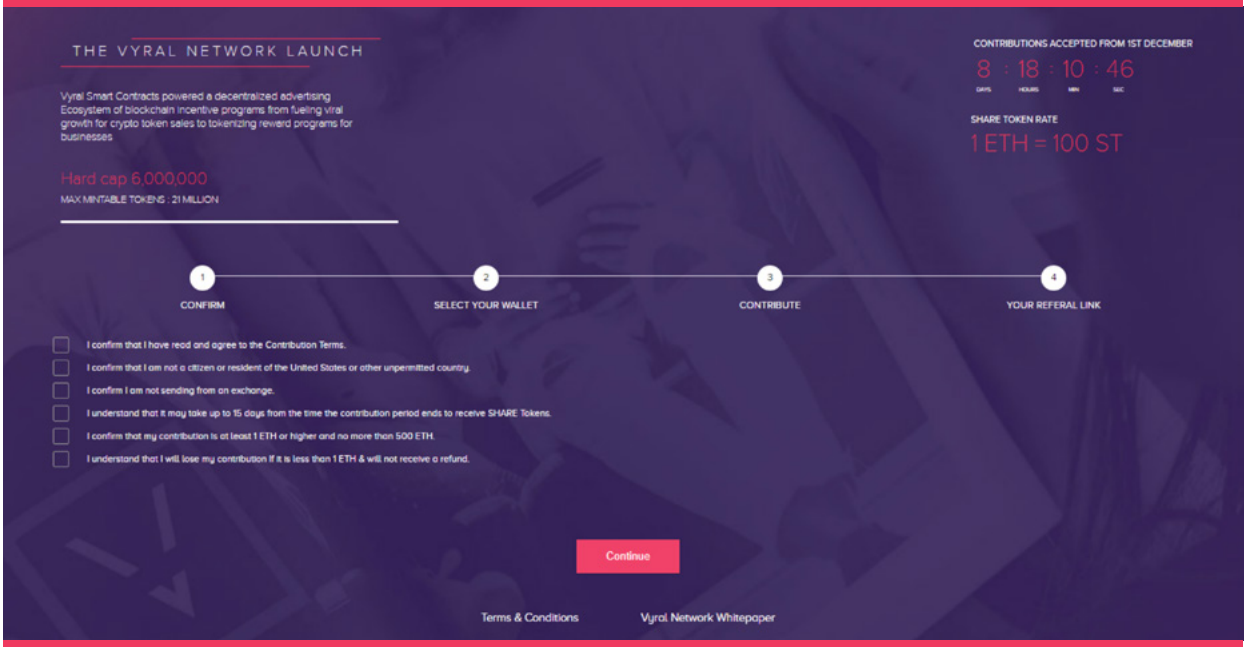
In order to mitigate this, the Vyral Contribution Period shall be split up into two phases where Phase I will be the Vyral Master Node phase. Each contributor will have a Vyral Master Node & because they are early adopters these Vyral Master Nodes will have an additional bonus attached to them. This phase will be run until the hard cap, the time limit or the set number of Vyral Master Nodes is reached. If for whatever reason either of the caps are not reached then Phase I will automatically end.

Referrals are allowed in Phase I if there is time & the token sale does not sell out instantly. After the end of Phase I there will be a “cool off” phase of a set number of days to allow the Vyral Master Nodes to share within their networks and prepare for Phase II.

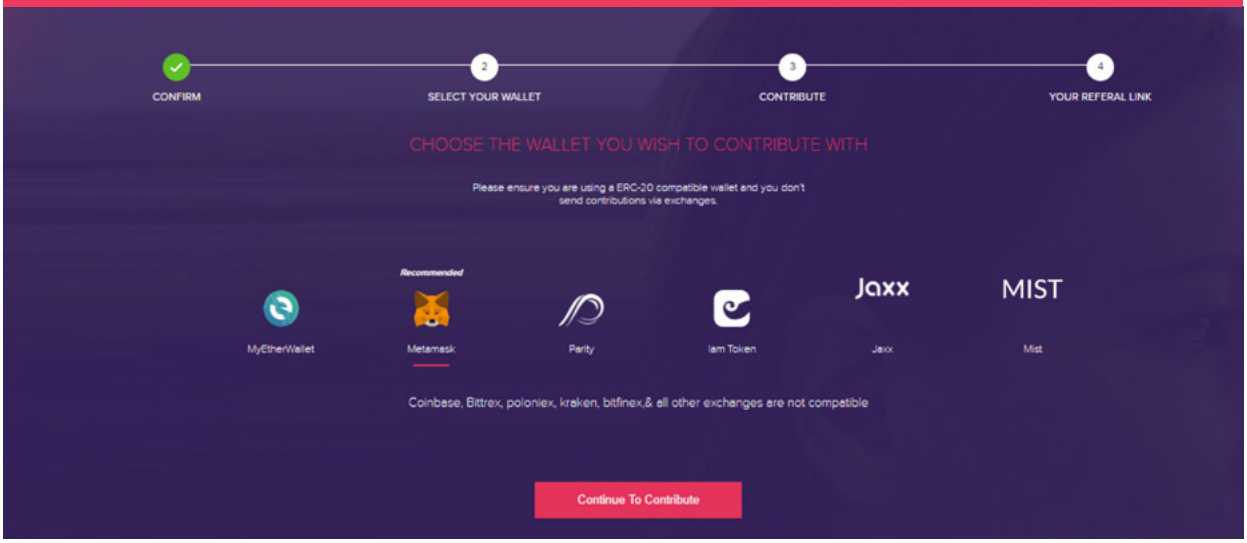
Phase II, the Vyral Reward Phase, will last for a set period of time for the rest of the overall hard cap. Vyral Master Nodes will be able to refer prospective children to join the Vyral Chain. This will provide time for the actual Vyral Tree to grow & for the Vyral Smart Contract technology to be used.

How to Make a Vyral Transaction

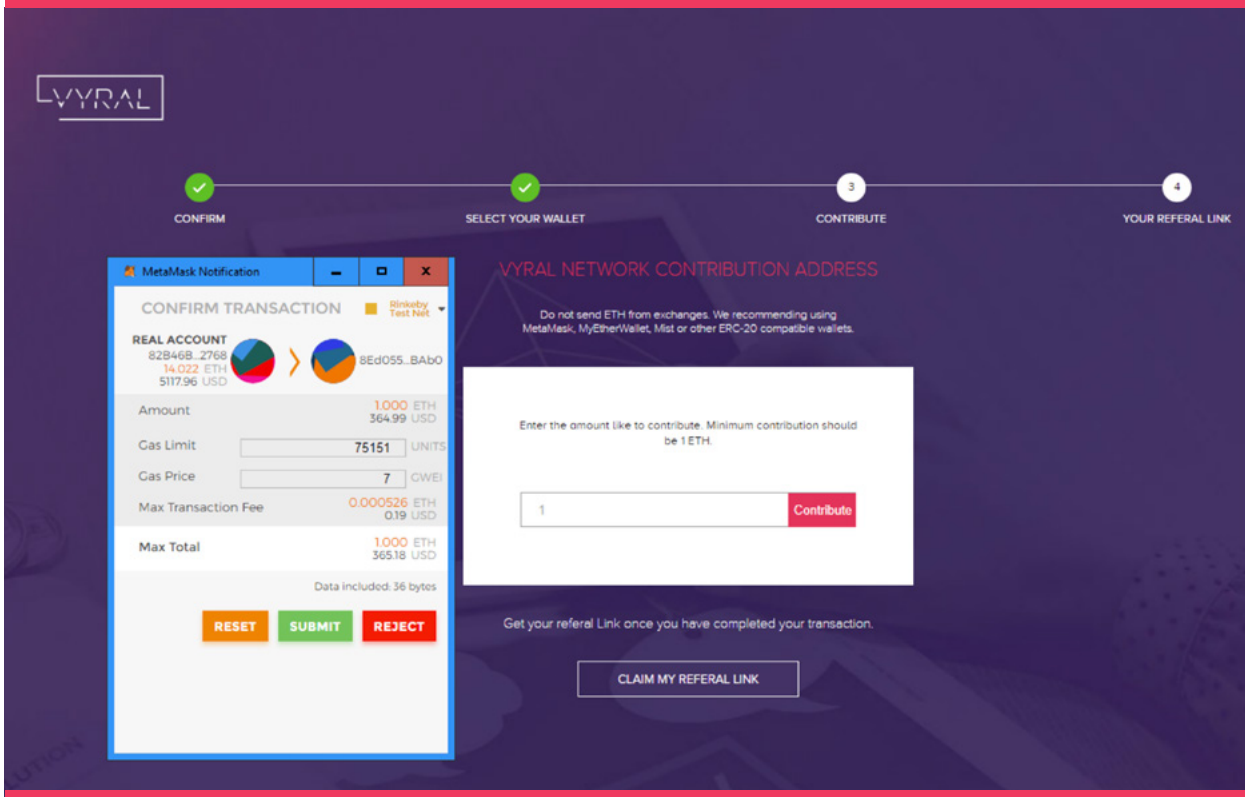
1 The sender must agree to all the terms and conditions before they contribute

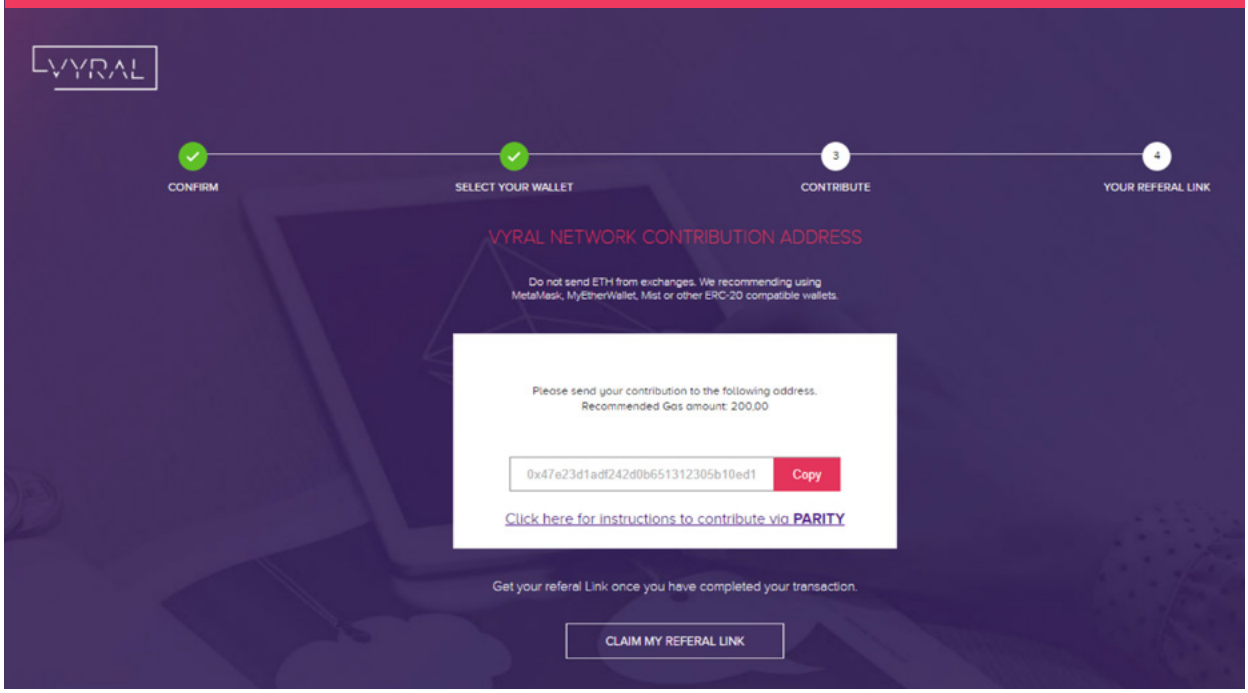


2 Next the sender selects the wallet to be used for the contribution. The sender can contribute via any Ether wallet but not via an exchange. It is recommended to use Metamask. If the sender is referred via any existing contributor apart of the Vyral Chain, both the referring party and the referred party will be rewarded referral tokens.



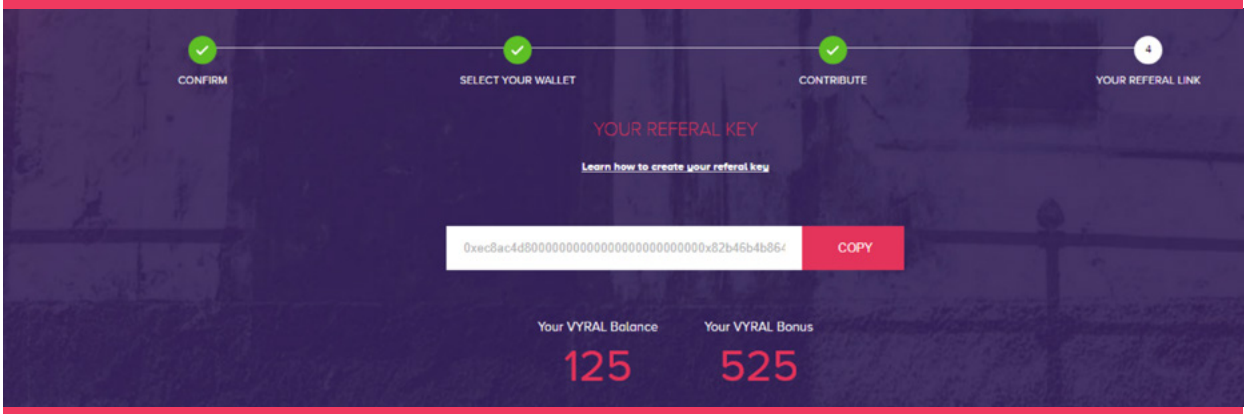
3 If the sender selects Metamask, the sender will be asked to enter the amount they would like to contribute. In the case of the Vyral Token Sale, a minimum contribution of 1 Ether is required. If the sender selects any other wallet, they may copy the contribution wallet address and contribute to that address via their preferred wallet.





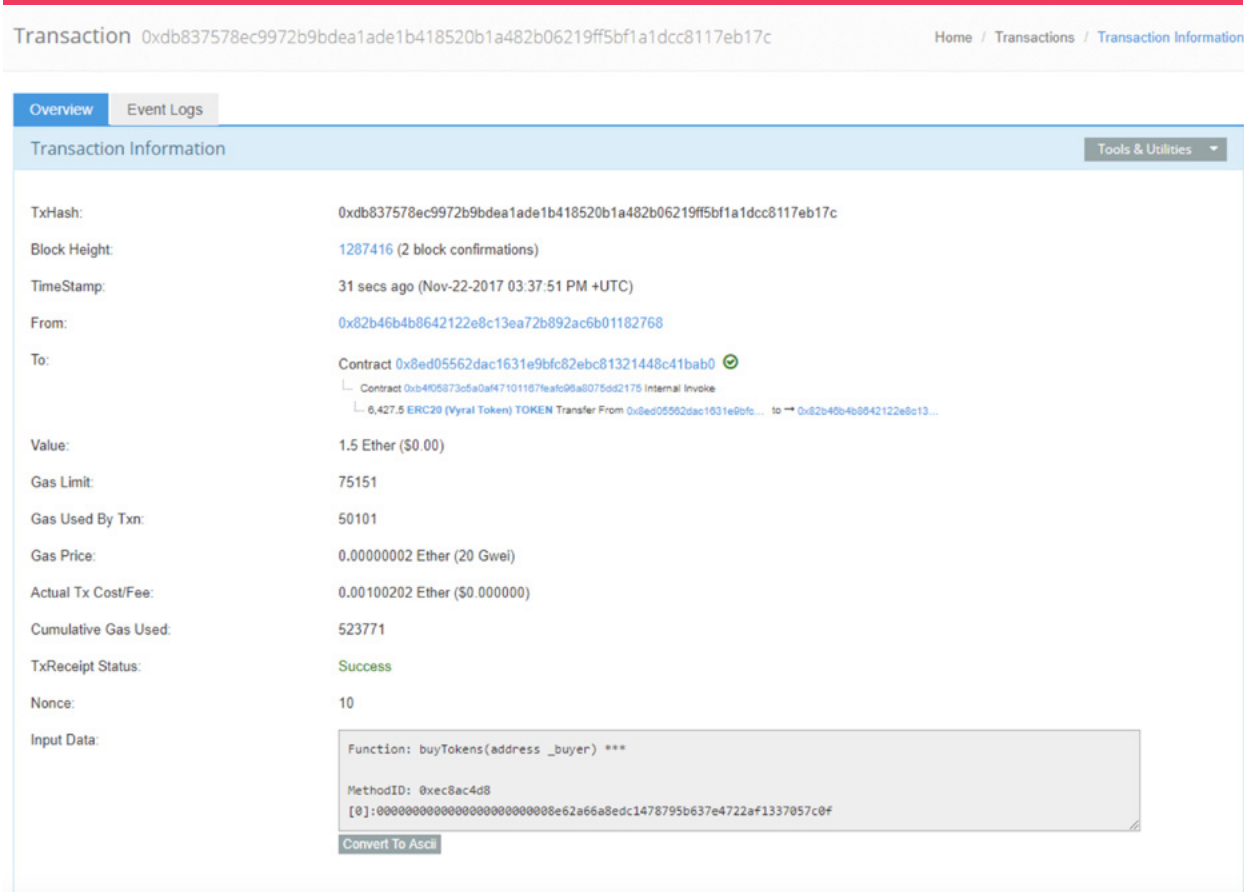
4

Once transaction is completed, the sender is allotted the tokens and turns into a Vyral Master Node. The sender can now go ahead and copy their referral key which they can share with others and whenever a new sender uses the referral key to make a contribution, the referring party will be awarded the referral bonus tokens. If the original sender had used Metamask for the contribution, their Metamask wallet address will be used to create their Referral Key. Otherwise the original sender will be asked to enter the Wallet Address from which they sent their contribution.



5

The sender can check the status of their transaction on Etherscan like below:



SHARE Token Use Cases

Rewards in SHARE Tokens

When businesses approach Vyral to launch their own reward programs, these businesses will be incentivized for their reward programs to be seeded with SHARE tokens where the rewards to be distributed will be in SHARE.

Standard Vyral Smart Contracts for Token Sales

Vyral provides instant utility for SHARE tokens for purchasers. After a purchase, SHARE tokens are distributed to a purchaser's wallet. In case they are purchased at a point in time where there is a lock up period, Vyral will accept SHARE via an additional mechanism immediately to use Vyral products and services.

#1 Use Case

Custom Vyral Smart Contracts & DAPP

Purchasers of SHARE can instantly use the token to create a Vyral Smart Contract. This includes both more complex versions of the Vyral Smart Contract that involve working directly with the Vyral team and simpler versions that integrate our code base. In all cases, SHARE tokens are required for custom development and to deploy the smart contract.

In the first scenario, these Vyral Smart Contracts may result in a level of complexity beyond the scope of the Vyral DAPP such as in the case of corporate clients or complex token sales, these will involve custom development. To use Vyral technology, the SHARE token purchaser fills out a form including various specs for their Vyral Smart Contract. Such specs include:

- Token supply
- Vesting
- Vyral Bounty Program specifics
- Hard caps
- Other information to create the smart contract and integrate Vyral technology

In the case where SHARE tokens are purchased and they are locked up because the initial contribution period is not concluded, the purchaser must sign a transaction that proves they are the owner of the ETH address that purchased the respective SHARE tokens and that they own enough SHARE tokens to pay for the Vyral technology.

Once SHARE tokens are no longer locked up the purchaser can immediately make payment after inputting the respective specifications. Potential additional SHARE tokens will be required if the complexity of the smart contract exceeds normal scope.

After the end of the lock up period, purchasers can create their own Vyral Smart Contract using the Vyral DAPP. Payment to deploy the smart contract is only in SHARE. Unique reward variables can be set when deploying a new Vyral Smart Contract but the ability to customize is limited and additionally further development to deploy a usable smart contract can be required.

SHARE tokens are the only form of payment to create these standardised viral smart contracts through the Vyral DAPP. This then allows the customer to create their own smart contracts by changing certain variables & making them unique to their business. This allows companies to have a smart contract on the blockchain incorporating Vyral technology, without having to do significant development.

An example of a company that is a purchaser of SHARE tokens is a blockchain company planning to complete a token sale such as AdBank (https://adbank.network/). At the time of writing, AdBank was contemplating completing a token sale and desired to integrate Vyral technology into its crowdsale contract. The specifics of the smart contract could be where the referring party receives a 5% bonus for referring a token purchaser & the token purchaser also receives 5% in the native AdBank token. 1,000,000 SHARE tokens would need to be used by AdBank in order for this smart contract to be deployed by the Vyral team. The above numbers are for example purposes only.

#2 Use Case

Vyral Smart Contract Seeding

Rewards for the Vyral Smart Contract can be seeded using SHARE tokens. Vyral may offer a matching program to incentivize seeding via SHARE tokens in the beginning phases. This results in the rewards for token purchasers to be denominated in SHARE rather than the native token of the company deploying the Vyral Smart Contract. This would most likely be done in cases where the company deploying the smart contract is in a related field and the token purchasers could then earn SHARE tokens as a bonus because those purchasers would be interested in using those SHARE tokens for Use Case #1 with Vyral.

#3 Use Case

Vyral Token Sales

Token sales leveraging Vyral Smart Contracts will be shared to the Vyral community, on the Vyral website & other channels. Vyral will make the best effort to:

a) incentivize the token creator to accept SHARE tokens in addition to other crypto such as Ether

b) to give a discount for token sale purchases in SHARE in relation to purchases in other cryptos

c) to give a further discount for genesis ETH addresses that participated in the initial SHARE token sale rather than acquiring SHARE post-token sale.

Conclusion

Blockchain technologies have provided an outlet to radically change marketing and incentivize the community to engage in the advertising of a product, service or token sale they believe in rather than letting traditional channels influence our opinion. Immutability & tradeability revolutionize the impact & penetration of these Peer-to-Peer Advertising allowing the separation of roles to vanish & the rewards associated with advertising to be attributed back to the community rather than to large institutions managing mass campaigns.

With the first implementation directly into token sales, the growth potential of blockchain token sales becomes immense. The Vyral Token Sale is the first case study & will provide data to be analyzed in order to optimize specific reward mechanisms for growth.

References

Double Geometric Method: Hopping-Proof, Low-Variance Reward System, https://bitcointalk.org/index.php?topic=39497.0.

Douceur, John R., and Thomas Moscibroda. “Lottery Trees.” ACM SIGCOMM Computer Communication Review, vol. 37, no. 4, Jan. 2007, p. 121., doi:10.1145/1282427.1282395.

Drucker, Fabio A., and Lisa K. Fleischer. “Simpler Sybil-Proof Mechanisms for Multi-Level Marketing.” Proceedings of the 13th ACM Conference on Electronic Commerce - EC ‘12, 2012, doi:10.1145/2229012.2229046.

Emek, Yuval, et al. “Mechanisms for Multi-Level Marketing.” Proceedings of the 12th ACM Conference on Electronic Commerce - EC ‘11, 2011, doi:10.1145/1993574.1993606.

Gomez-Rodriguez, Manuel, et al. “Influence Estimation and Maximization in Continuous-Time Diffusion Networks.” ACM Transactions on Information Systems, vol. 34, no. 2, Aug. 2016, pp. 1–33., doi:10.1145/2824253.

Kotnis, Bhushan, and Joy Kuri. “Cost Effective Campaigning in Social Networks.” Physica A: Statistical Mechanics and Its Applications, vol. 450, 2016, pp. 670–681., doi:10.1016/j.physa.2015.12.127.

Lv, Yuezhou, and Thomas Moscibroda. “Fair and Resilient Incentive Tree Mechanisms.” Proceedings of the 2013 ACM Symposium on Principles of Distributed Computing - PODC ‘13, 2013, doi:10.1145/2484239.2484252.

Pickard, G., et al. “Time-Critical Social Mobilization.” Science, vol. 334, no. 6055, 2011, pp. 509–512., doi:10.1126/science.1205869.

Rahwan, Talal, et al. “Towards a Fair Allocation of Rewards in Multi-Level Marketing.” [1404.0542] Towards a Fair Allocation of Rewards in Multi-Level Marketing, 2 Apr. 2014, arxiv.org/abs/1404.0542.

VYRAL

TOKENIZED PEER-TO-PEER ADVERTISING ON THE BLOCKCHAIN

The Power Of Viral Marketing

by
Lee Pennington
Vijay Kandy

https://vyral.network