Proof of Stake Velocity: Building the Social Currency of the Digital Age

Larry Ren*
ren@reddcoin.com
www.reddcoin.com

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Abstract

Proof of Stake Velocity (PoSV) is proposed as an alternative to Proof of Work (PoW) and Proof of Stake (PoS) to secure the peer-to-peer network and confirm transactions of Reddcoin, a cryptocurrency created specifically to facilitate social interactions in the digital age. PoSV is designed to encourage both ownership (Stake) and activity (Velocity) which directly correspond to the two main functions of Reddcoin as a real currency: store of value and medium of exchange. Reddcoin can also function as the unit of account in heterogeneous social context. The technological aspects of PoSV are presented after a detailed review of existing designs. The economic aspects of Reddcoin are then analysed. Finally the unique position of Reddcoin as a digital social currency in the competitive landscape of cryptocurrencies is discussed.

1 Introduction

Bitcoin is among today's most discussed and controversial topics. Ever since Satoshi's seminal paper [9] in 2008, Bitcoin has evolved from a technological experiment embraced by a small group of computer enthusiasts to what some today consider to be the most important innovation since Internet. Most recently, there are new variants of Bitcoin, called *altcoins*, created everyday and a whole new industry of altcoin trading exchanges, mining pools, gaming websites emerged. Few topics today are more polarising than cryptocurrency. Some merits of cryptocurrency touted by technologists are considered sins by economists. Cryptocurrency is considered a movement by believers and a fad by disbelievers. Instead of an open and honest discussion involving all sides, what we have witnessed is a dialogue of the deaf, in which each camp justifies its own intellectual laziness by pointing to the intellectual laziness of the other camps. This is one

*The lead developer of Reddcoin, a.k.a. "laudney" PGP Public Key

of the main obstacles that prevent cryptocurrency from being accepted by the general public.

What do we really know about this evolution? Is cryptocurrency just a technological breakthrough or also an economic one [7]? Is *mining* cryptocurrency a progress or retrogression [6]? Is cryptocurrency meant to replace government and financial institutions or complement them? Is cryptocurrency designed for hoarding or spending? And, the most fundamental question of all: is cryptocurrency real currency or just virtual property for speculation [13]?

So far innovation in the cryptocurrency world has been almost exclusively technical. Technologists have proposed improvement on various aspects of Bitcoin, such as new hash functions [11] to replace SHA256 and new mechanism [4] to replace Proof-of-Work. There have been very few cryptocurrencies designed to address the economic and social aspects of being a real currency. Reddcoin, at the time of writing, seems to be only one.

We write this paper with three goals in mind: 1) to give a broad overview of the current issues around cryptocurrency, both technological and economic, which might not have been foreseen by the original designers. 2) to address these issues with proposals which require coordinated changes in both low-level network protocol and high-level economic and social ecosystem. 3) to encourage a more open and objective discussion of cryptocurrency by the general public and promote a more complete thinking for future innovation in cryptocurrency world.

The rest of the paper is organised as follows. Section 2 describes in detail the merits and drawbacks of Proof-of-Work (PoW) and Proof-of-Stake (PoS) from both technological and economic points of view. PoSV is then proposed to address those drawbacks in the specific context of a digital social currency. The technological design choices of PoSV are given in broad strokes. More detailed technical analyses will be presented in a companion paper [12]. Section 3 addresses the most common criticisms by economists on cryptocurrency and shows how Reddcoin and PoSV together provide new answers and new opportunities for social research in general. Section 4 emphasises the main differences between Reddcoin, a digital social currency which focuses on integration with human social interactions and aims to concretise and quantify people's intangible asset of social influence, and the much more common digital commercial currencies which aim to facilitate transactions of goods and services and offer protection from hyperinflation.

2 Technology

A cryptocurrency uses principles of cryptography to implement a distributed, decentralised and secure cash system. It solves the problem of double-spending in a distributed ledger by introducing a mechanism to secure the network against 51% attacks and Distributed Denial of Service (DDoS) attacks. The underlying principle of such a mechanism is the necessity of expending resources when confirming transactions. Once confirmed, transactions become irreversible because

it's practically infeasible for any attacker to have access to the huge amount of resource required to modify them. Different mechanisms use different types of resources.

2.1 Proof of Work

A Proof-of-Work (PoW) is a piece of data which is costly to produce so as to satisfy certain requirements but is trivial to verify. Bitcoin uses the Hashcash PoW [1]. Mining, the process of producing PoW, plays the central role in creating, distributing and securing Bitcoin and many its variants. The most common criticism of PoW mining is its massive waste of energy. At the time of writing, the total daily *revenue* of mining Bitcoin is around 1.8 million USD. Depending on the aggregate profit margin and the fraction of overall cost that electricity accounts for, we estimate the daily total electricity cost at between 200K and 500K USD. In addition to this wastefulness, there are several more reasons why mining remains a very controversial aspect of PoW cryptocurrencies.

2.1.1 Mining Arms Race

Mining is by nature extremely competitive. Mining costs include initial expenditure on equipment plus on-going energy cost. Miners are predominantly rational profit seekers. Their top concern is how long it takes to recover the initial cost, i.e. the length of Return on Investment (ROI). During the very early age of Bitcoin, mining was carried out by CPU. When mining later became available on graphics cards (GPU), mining on CPU became immediately loss-making. As Bitcoin price continued to soar, mining operation witnessed a mini industrial revolution. Application Specific Integrated Circuit (ASIC) designed to carry out PoW computation at several magnitude higher speed and lower energy cost started to emerge and soon rendered GPU mining obsolete. This relentless arms race causes constant worry among average miners who usually fail to recuperate initial investment and cannot afford continuous hardware upgrade.

Bitcoin uses SHA256 [10] as the hash function in PoW and is the first to experience this arms race. The same arms race is happening to cryptocurrencies that use the Scrypt hash function [11]. Scrypt was initially touted as "ASIC-resistant" due to its heavier memory usage. In reality, ASIC-resistance is one of the most misleading and over-abused marketing slogans in the cryptocurrency world. The correct word is "ASIC-ignored". ASIC can be designed and manufactured to perform all hash functions. The entry barrier is not technical but financial. Unless there is sufficient market demand for mining Scrypt-based cryptocurrencies, it's simply financially unprofitable for manufacturers to invest in the production of such ASICs. While Scrypt is under the threat of ASIC, many cryptocurrencies have been created to use alternative hash functions such as Scrypt-N, Scrypt-Jane and X11. These cryptocurrencies all market themselves as the "latest and best generation of" ASIC-resistance when this resistance is entirely dependent on being a minority. It's deeply self-contradictory

for a cryptocurrency to pitch ASIC-resistance as its main merit to gain wide adoption when this sole merit depends on it being unpopular.

In theory, it can be preferable to have separation between mining a cryptocurrency and using it. It's more efficient to leave mining operation to specialists who use their domain knowledge to achieve economy of scale. This is indeed the case for Bitcoin, the most established cryptocurrency. However, for many newly created variants, average GPU-miners make up the vast majority of user communities and the fear of ASIC directly threatens their social fabric.

2.1.2 Miner Incentive

Miners provide a paid service to cryptocurrency networks. They are all profit seekers first and foremost. At a fixed cost, it's perfectly rational for them to mine the most profitable cryptocurrency and sell it quickly on market to limit exposure to price risks. Hence were born the so-called "multipools" which fully automate this process. Multipools create two new problems in the cryptocurrency world.

First, the profit-seeking by multipools pushes many cryptocurrency prices to just above mining production cost. As mining production costs inevitably go down due to technological advances, many cryptocurrency prices suffer from downward death spiral, which hurts the morale of the corresponding communities. Second, multipools employ strategies that exploit the lag in readjustment of difficulty of PoW. Multipools switch to a cryptocurrency with low difficulty and keep mining it while its difficulty gradually catches up. The moment the difficulty rises to its fair value, multipools switch again. As a consequence, multipools mine blocks at a significantly lower average difficulty than other miners. Although from a pure Darwinian point of view multipools help improve market efficiency and filter out the weakest, they do force most cryptocurrencies to focus on extremely short-term interests rather than long-term growth and innovation.

2.1.3 Manufacturers of ASIC Mining Equipment

To be the most profitable miner, one must be the first to get hold of the latest equipment that offers the highest hash rate per unit of cost. Therefore manufacturers of ASIC mining equipment have strong financial incentive to use their own product for mining first and only start shipping equipment to buyers after mining profitability drops enough. This inherent conflict of interests has profound impact on every aspect of the mining business. For example, the vast majority of manufacturers ask for prepayment in exchange for a promise. The actual delivery is usually delayed by months, which reduces mining profitability for their buyers to almost zero. Manufacturers often offer no refund for shipping delay or product defect in their terms and conditions, effectively eliminating their own liabilities and openly exploiting the desperation of buyers. All these frustrations reduce the confidence of average miners and undermine the soundness of PoW mining as the guardian of cryptocurrencies' decentralised networks.

2.2 Proof of Stake

Proof-of-Stake (PoS) is an alternative to PoW first introduced in Peercoin [4]. The resource used by PoS is "coin age": currency amount times holding period. Similar to energy, coin age as a resource is expensive to amass in huge quantity. For an attacker to accumulate enough coin age to attack the distributed network, he either has to buy on open market a large amount of the very currency he's trying to attack, driving up its price during the process and diminishing his economic incentive, or hold coins for a very long time, reducing the frequency of his own attacks.

One useful feature of PoS is the significant saving in energy consumption. Another main feature is the better alignment of incentives between miners and stakeholders because miners are now the stakeholders. PoS however has several limitations:

2.2.1 Initial Distribution

PoS by construction relies on a fair and wide distribution of a cryptocurrency but doesn't deal with the *logistical* issue of how to achieve this fair distribution in the first place. By comparison, mining in PoW, despite all its drawbacks, also serves as a potent channel of distribution. This chicken-and-egg problem was and remains a major challenge for all PoS cryptocurrencies. So far there have been two popular workarounds: a) "pre-mine", i.e. similar to subscription to stock IPO in financial markets and b) a hybrid system of PoW and PoS with PoW gradually fading away after an initial period.

The main criticism of "pre-mine" for PoS coins is its lack of guarantee of either fair or wide adoption. The vast majority of "pre-mine" turned out to be fraud. For those which were not, investors and speculators with deep pockets can easily control a large stake in the currency, transforming its nature into more as a speculative vehicle than a currency. Over-concentration of stakes also increases the security risk of the decentralised network.

The PoW-PoS hybrid system alleviates these concerns by running PoW and PoS in parallel. PoW mining works as both a steady distribution channel and a fall-back network security mechanism. As PoW block rewards go down over time, PoS has enough time to move to the spotlight.

Unfortunately, it doesn't matter what particular model a PoS cryptocurrency uses for initial distribution. The mere knowledge by the public that a cryptocurrency will eventually rely on PoS compromises its ability to achieve a fair and wide distribution. This is the inherent paradox of Proof-of-Stake.

2.2.2 Hoarding

The entire PoS network depends on coin age as the scarce resource. Coin age can only be earned by holding coins. To earn coin age at a higher rate than others, one must hold more coins. Coin age is consumed when a coin is spent in a transaction. PoS mining requires a user to repeatedly send coins to herself, thus consuming his reserve of coin age in exchange for probabilistic winning

a PoS block reward without reducing the size of the holding. Coins spent in transactions facing other users also have their coin age reset to zero but this consumption of coin age is outside the scope of PoS mining, unqualified for block rewards and is considered a "waste" by most PoS stakeholders.

It now becomes clear that PoS has been designed to encourage hoarding and discourage spending. Some PoS coins, such as Peercoin, openly declare their philosophy to "function more as a long-term store of value than medium of exchange." In this sense, PoS coins are created to be *collectibles* rather than currencies. Scarcity is a necessary but insufficient condition for collectibles to have value. Collectibles must also offer some form of utility such as aesthetics and historic significance. Considering the fact that anyone can access and modify the source code of PoS coins and potentially offer an improved version, in theory there is infinite supply. The scarcity condition doesn't hold. It remains an unsolved puzzle where PoS coins marketed as collectibles derive their value from.

2.2.3 Full Nodes

PoS transforms all stakeholders into miners. All they need to do to collect interest rate is to leave their wallets running and connected to the PoS network and participate in the confirmation of transactions. Wallets which stay online for extended periods of time are called *full nodes*. Staying online seems to be a rather simple requirement. So it comes as quite a surprise that PoS coins tend to suffer from insufficient number of full nodes. This seeming paradox can be explained by two reasons.

First, coin age equals number of coins times holding period. It doesn't matter whether a wallet is connected to the PoS network during the holding period. An offline wallet accumulates coin age at the same rate as an online one. The only difference is that an always-online wallet receives block rewards in a fashion that's more evenly spread out over time while an occasionally-online wallet receives block rewards in a few concentrated clusters. This difference alone is insufficient to encourage most stakeholders to stay online.

Second, it's commonly perceived by average PoS stakeholders that running wallets and staying connected for long periods of time significantly increases security risk. This was a particularly grave concern when early versions of PoS wallets didn't support wallet passphrase during mining. Since then there has been workaround to reduce the security risk.

By considering the two reasons above, an average PoS stakeholder tend to make the rational decision of connecting to PoS network only sporadically. The lack of sufficient number of full nodes can result in higher risk of security breach on PoS networks.

2.2.4 Mining on Multiple Forks

In PoS mining, each stakeholder spends coin age while looking for the next valid block. If another stakeholder finds a valid block first, the coin age consumed in

the unsuccessful attempt is fully reimbursed.

Forks do happen on all distributed networks of cryptocurrencies. PoW addresses this issue by enforcing at protocol level that the blockchain with the largest sum of difficulty always wins. This allows all the nodes on the network to converge on a consensus rapidly. Miners all have the clear incentive to mine blocks only for the most difficult blockchain. Mining for any other fork is almost guaranteed to be wasteful. The situation is very different when it comes to PoS.

When there are multiple forks on a PoS network, by the nature of the blockchain, a stakeholder has the same stake replicated across all the forks. Technically the stakeholder can simultaneously mine on all these forks by running multiple copies of the wallet. What causes the biggest trouble is the fact that PoS protocol picks a winning blockchain based on length. And length of a blockchain in a decentralised network heavily depends on timing. It can be quite common for different subsets of the network to have different ideas about which blockchain is the longest while the information is still being propagated. The lack of synchronisation of network time further complicates it. It's a much less robust way, compared to PoW, to reach a consensus. PoS can't use the sum of difficulty in blockchains as the criteria for chain selection because difficulty in PoS is adjusted by each stakeholder based on their consumption of coin age and therefore remains local knowledge. There is no network-wide agreed-upon block difficulty.

When stakeholders on PoS networks find it difficult to pick the blockchain winner, they have the incentive to "bet on all horses" by simultaneously mining on all the forks. This significantly aggravates network security. Most PoS coins alleviate, but don't solve, this problem by enforcing "duplicate stake detection" at client wallet level but not at protocol level. They also argue that in practice the financial rewards for multi-fork miners are small enough to deter such attempts.

2.3 Proof of Stake Velocity

2.3.1 What is Velocity of Money

The velocity of money is the frequency at which one unit of currency flows through an economy while being used by members of the society within a given time period [3]. All else being equal, a higher velocity of money indicates a more flourishing economy, richer members and a healthier financial system. The formula to measure velocity of money in a given time frame is the follow:

$$V_T = \frac{nT}{M}$$

where V_T is the velocity of money; nT is the aggregate notional of transactions and M is total amount of money in circulation. In an economy, we can also replace nT with nQ which is the nominal national or domestic product. In other words, given a fixed amount of money in circulation, velocity of money must be increased in order to increase the size of the economy.

2.3.2 Higher Velocity for A Better Economy

The vast majority of the drawbacks of PoW and PoS aren't due to flaws in technical designs but the disconnect from the *economic* and *social* aspects of being a real currency. It's fair to say that most cryptocurrencies are created as technological products but "mis-sold" as currencies. PoSV builds upon the strength of PoS and introduces new features to address its flaws. PoSV is designed to encourage both ownership (Stake) and activity (Velocity), the two main criteria of being a social currency. It must be emphasised that PoSV is designed specifically for the digital social currency *Reddcoin* and is never intended to serve as a drop-in replacement for other cryptocurrencies that don't share the same economic and social goals. PoSV should be evaluated as a piece in the Reddcoin ecosystem and not stand-alone.

Given a fixed amount of coin, coin age is calculated as a function of time. Let's denote this function the *coin-aging function*. The form of the coin-aging function is of ultimate importance. It not only decides the growth rate of coin age as a resource over time via its first derivative, but also decides the *utility function* of stakeholders. The main limitations of PoS, too much incentive for hoarding and too little incentive for staying online, result from the fact that the form of its coin-aging function is linear. The linear form leads to a constant coin age growth rate and a utility function that disobeys the law of diminishing returns.

Changing the form of coin-aging function has profound impact. For example, let's assume coin-aging function in PoSV is an exponential decay function. The coin age growth rate gradually decreases with time. The exponential decay constant is chosen to achieve a particular half-life such as 1 month. Each coin accumulates one coin day per calendar day during the first month, half a coin day per calendar day during the second month, a fourth of a coin day per calendar day during the third month etc. As the holding period of a coin approaches infinity, the total accumulated coin age asymptotically approaches 2 coin months.

This exponential decay function dramatically changes stakeholders' incentives. New coin accumulates coin age at much higher rate than stale ones. With a fine-tuned half-life, PoSV encourages stakeholders to be *active* in moving their holding, either by mining or transacting with counterparties, both of which increase money velocity and improve the health of the Reddcoin economy. Stakeholders are also encouraged to stay online and contribute to verifying transactions on the PoSV network. The asymptotic limit of coin age due to exponential decay function provides extra security for the network. The maximum amount of coin age a stakeholder can earn now equals coin amount times twice the half-life. This significantly increases the difficulty for 51% attacks.

The coin-aging function can take on other forms. Linear and exponential decay functions are both monotonic. What about trigonometric functions which are non-monotonic and periodic? Non-monotonicity produces positive and negative growth rate of coin age at different points in time which along with periodicity translate into rewarding and penalising holding with a seasonal pattern.

This can be used to fine-tune the seasonality in money velocity. The bottom line is that PoSV is designed to accommodate different forms of coin-aging functions in order to implement the necessary monetary policies in the Reddcoin economy.

To alleviate the problem of mining on multiple forks, PoSV helps the nodes to reach a quicker consensus by giving preference to the head block with the largest sum of coin day spent among all the transactions.

3 Economics

There has been extensive economics debate about Bitcoin. Most economists remain unconvinced of Bitcoin's status as a real currency. Reddcoin and PoSV are designed to address some of those concerns and offer new angles to reexamine the questions.

3.1 Medium of Exchange

There is largely consensus on Bitcoin's function as a medium of exchange. In fact, almost all the merits of Bitcoin talked about today boil down to how it acts as a better medium of exchange, e.g. global reach, lower fees, much quicker transaction and easy to use. However, the fact that the Bitcoin network must be secured by "mining" which expends real resources (energy) is considered by many economists to be a drastic retrogression [6] - a retrogression that Adam Smith scorned at in his immortal work *The Wealth of Nations* written in 1776. By comparison, PoSV and PoS mining require little energy consumption and can be done by any average user on any computer and even mobile device.

3.2 Unit of Account

Many economists point out that Bitcoin cannot be used as the base currency for accounting or tax-reporting and therefore fails as a unit of account. Interestingly, the german finance ministry has officially classified Bitcoin as a unit of account. More and more merchants start to accept Bitcoin for payment. Especially in the world of cryptocurrencies, Bitcoin has assumed the special status of a *reserve currency* and is the choice of denomination for more and more goods and services. Reddcoin and PoSV bring a whole new question: what is the "unit of account" for human social interactions, if any?

Currently social interactions are quantified in different ways on different social networks. On Facebook, it may be measured in the number of *Like* and *Share*; on Twitter, the number of *retweets*; on Amazon, the number and quality of product reviews; on blogs and forums, the number of posts and replies. The total lack of a universal yardstick makes it impossible to measure and compare social interactions in heterogenous context. In other words, there is no unit of account for human social interactions right now. Social influence remains a significant yet opaque asset.

Reddcoin is created to fill this gap by becoming the first digital currency integrated with all major social networks and serving as the "unit of account" for social interactions in the digital age. Inside the distributed ledger of Reddcoin, transactions can be interpreted not only in pure financial terms but also as proxies for human behaviours. Researchers in social sciences have long been looking for a way to track, organise and study human social behaviours on large scales. Reddcoin offers a unique global platform for these areas of research and open up new possibilities for value-add services.

3.3 Store of Value

Economists are largely skeptical of Bitcoin's function as a store of value. They compare Bitcoin with gold and US dollars and point out its lack of a fundamental floor of the value [2]:

> Underpinning the value of gold is that if all else fails you can use it to make pretty things. Underpinning the value of the dollar is a combination of (a) the fact that you can use them to pay your taxes to the U.S. government, and (b) that the Federal Reserve is a potential dollar sink and has promised to buy them back and extinguish them if their real value starts to sink at (much) more than 2% per year. Placing a floor on the value of Bitcoins is what, exactly?

PoSV, PoW or PoS by itself doesn't provide a fundamental floor for the value of a cryptocurrency. However, Reddcoin, the digital social currency that PoSV is specifically designed for, does enjoy a floor of its value due to its aim to function as the global reserve currency of human social influence. Humans are by nature social animals. Social activities are embedded into the very fabric of societies. As Aristotle famously pointed out in *Politics*:

> Society is something that precedes the individual. Anyone who either cannot lead the common life or is so self-sufficient as not to need to, and therefore does not partake of society, is either a beast or a god.

Based on Aristotle's insight, underpinning the value of Reddcoin is simply its utility of helping humans be human.

3.4 Deflation vs Inflation

Any discussion of monetary system is incomplete without discussing inflation. Bitcoin and many of its variants were created with a deflation model in which the total quantity of the cryptocurrency is capped. In effect, Bitcoin has created a modern digital version of the gold standard world in which the money supply is fixed rather than subject to increase via printing press.

Bitcoin advocates believe deflation is a virtue by preserving the value of Bitcoin versus inflationary fiat currencies and thus making it a better store of value. Bitcoin price has indeed soared in the last few years, further validating the merit of deflation in its supporters' mind.

However, deflation and a soaring price both provide strong incentives for people to hoard Bitcoin rather than spending it. Indeed, according to [8], as much as 64% of Bitcoin was never spent in 2013. To make matters worse, prices of goods and services when measured in Bitcoin have plunged; the Bitcoin economy has in effect suffered a major depression [5].

PoS and PoSV both employ an inflation model with fixed nominal interest rate. For example Peercoin adopts a nominal interest rate of 1% per annum compared to PoSV's 5%. Central banks in developed countries, e.g. Bank of England, European Central Bank and Federal Reserve, have a long-term inflation target of around 2%. PoSV chooses 5% because Reddcoin, as the digital social currency, should encourage more spending, i.e. social interactions, than other cryptocurrencies which do not share this goal. Also given the global nature of social networks which involve users in both developed and emerging markets, 5% seems to strike the balance. The monetary system of Reddcoin is not created to make people who hold money rich, but to facilitate transactions and make the Reddcoin economy as a whole rich.

4 Digital Social Currency

4.1 Social vs Commercial

A commercial currency is the most common form of currency. Its main function is to facilitate transactions in exchange for goods and services. Bitcoin and its variants have been pushed as the latest innovation of commercial currencies and compete head-to-head with fiat currencies, such as USD and EUR, for shares of commercial transactions in the global economy.

A social currency is of an entirely different nature. According to Wikipedia:

> Social currency is a common term that can be understood as the entirety of actual and potential resources which arise from the presence in social networks and communities, may they be digital or offline. It derives from Pierre Bourdieu's social capital theory and is about increasing one's sense of community, granting access to information and knowledge, helping to form one's identity, and providing status and recognition.

Very recently, a small but growing number of companies have come to embrace the concept of "social currency", allowing customers to pay via Facebook posts, Twitter tweets and other social media content. However the lack of a yardstick to measure the "fair value" of social media content and influence is the main obstacle. To our knowledge, Reddcoin is the only digital social currency

that was created, designed and continuously evolves to become the "reserve currency" of people's social interactions. Reddcoin has two main objectives: 1) to concretise and quantify one's intangible asset of social influence, and 2) to facilitate social interactions within and between social networks, both online and offline. Reddcoin doesn't compete with commercial currencies, fiat or digital, but rather complement them. Merchant support is encouraged, especially when the commercial activities form parts of a collective social experience. But the social aspect will always remain the utmost focus of Reddcoin.

The three most important assets in the ecosystem of Reddcoin are brand, community and infrastructure. Reddcoin developers always go to great length to create a brand that's professional, friendly and consistent. Great care is taken to foster a community that share a clear long-term mission and the same set of values of being friendly, helpful, generous, caring and rational. All system infrastructure is built with special emphasis on providing a uniform, simple and secure user experience.

4.2 Transition from PoW to PoSV

Reddcoin was launched in January 2014 and is still using PoW. Since the very beginning, Reddcoin has been distributed to a large and diverse user base through multiple channels that include one of the very few successful and honest Initial Public Coin Offering (IPCO), mining, trading on multiple exchanges, community promotion events, generous giveaways and user tipping on multiple social networks such as Reddit, Twitter and Twitch TV. Reddcoin stakeholders now include people from almost 100 countries, with diverse background, age and interests.

At the time of writing, according to information at http://bitinfocharts.com, Reddcoin has a fairer wealth distribution per wallet address than all the top cryptocurrencies such as Bitcoin, Litecoin, Dogecoin and Peercoin. Reddcoin also has 2 - 3 times more coin age spent today than all the other PoW cryptocurrencies. Reddcoin, without PoSV, is already the currency with the fairest stake ownership and the highest monetary velocity. In coming months, Reddcoin will gradually transition from PoW to PoSV with new features added at incremental pace.

4.3 Hard to Clone

There is no shortcut to cloning Reddcoin. In particular, the clone cannot adopt PoSV from inception because, as discussed in section 2, the mere knowledge of the eventual adoption of PoSV or PoS will lead to people hoarding from the very beginning. To achieve a fair and wide distribution, an element of surprise at protocol level plus dedicated efforts at community level are both indispensable. Reddcoin's existing brand, community, infrastructure and the publication of this paper make it very difficult to duplicate what has already been achieved.

5 Conclusion

We have proposed Proof-of-Stake-Velocity (PoSV) as an alternative to Proof-of-Work (PoW) and Proof-of-Stake (PoS). We started by going through all the major drawbacks of PoW and PoS and then showed how PoSV significantly reduces the wastefulness of mining, eliminates mining arms race, averts the threat of multipools and ASICs, avoids the inherent conflict of interests by ASIC manufacturers, introduces new forms of coin-aging functions to discourage hoarding and encourage spending and greater contribution to the network. General concerns by economists toward cryptocurrency were discussed and addressed in light of the recent development of Reddcoin and PoSV. In particular, Reddcoin is well positioned to fill the niche of a digital social currency that's tightly integrated with human social interactions and acts as the yardstick to concretise and quantify people's intangible asset of social influence.

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