Channels

Whitepaper

Last updated: October 25, 2017

A new digital content market is described that attracts rich eclectic content by paying producers for their content and consumers for their attention. It uses a new cryptocurrency called ChannelCoin that harnesses market forces to motivate behaviors that benefit the whole community while remaining completely transparent. The "empty room" problem is addressed through the use of subsidies.

GOALS

1. An online place with eclectic content presented in a compelling way
2. A market that rewards high-quality content and advertising
3. A transparent system for rewarding decisions that serve the best interests of the overall network, rather than a single corporation

TABLE OF CONTENTS

BACKGROUND

The vast majority of internet content is supported by advertising. Advertisers purchase "space" through ad networks on producers' sites. Social networks like Facebook and Twitter are effectively ad networks themselves but do not normally pay anything to the content producers (the end-users who post on these networks).

In the case of websites, the ad networks, like Google, generate massive revenues from advertisers while most producers see modest income at best. Advertisers are very restricted in how they can advertise in these networks and producers are very restricted in the nature of content they can publish and expect to be able to sell advertising space.

Various attempts at online subscription-based content systems have mostly failed.

Google and Facebook operate completely opaque networks and act as effective monopolies grabbing the lion's share of advertising revenue.

We seek to disrupt this market.

APPROACH

We are designing a new digital content market called "Channels" that provides financial incentives for original content, leading to strong interest from users, and from there to strong incentives for advertisers. This positive feedback loop will drive steady growth in content, users, and advertising revenue.

Essential to this network is compelling content. The form is an essential part of the consumer experience and depends on what we call "cards" that support virtually any kind of content that could appear on the internet today. This is the opposite of Twitter, Facebook, and YouTube whose forms are restrictive.

Unlike existing social and content networks, Channels is not an ad network in the usual sense. Advertisers do not pay for space on this network. Instead, they pay individual consumers for their attention. Each time a consumer views promoted content, the promoter pays him or her a tiny amount. Consumers choose how much of their attention to sell to advertisers.

Unlike posters to social networks, those who create content for this network get paid for it. They are not paid by the network. They are paid directly by the consumers who view their content.

Each time a consumer views a post, a tiny transaction occurs between the consumer and the producer.

The network facilitates these transactions -- balancing what consumers earn from advertisers with what they spend on content that interests them. These transactions are made possible through a new cryptocurrency called ChannelCoin.

CONTENT MARKET

As a social network, Channels is roughly modeled on Twitter. But the term "social network" is vague and we prefer the name "content market". YouTube and Medium are content networks, but content is "free". YouTube presents mandatory ads in front of content. Medium has recently moved to a subscription model where a share of ad revenues are distributed to producers based on user-expressed interest ("claps").. They have social aspects, but their main purpose is to host, curate, and present content to consumers.

All content published on Channels is accessible by everyone. Consumers are presented with a feed of content based on the channels they follow and their viewing behavior. Any user can create a channel, publish content on it, promote their content if they choose and price it how they choose. Some of the content producers will be professionals and organizations seeking new ways to monetize content they already publish elsewhere.

There are no restrictions on accessing this network. To view content, you do not need to explicitly "sign up" or "sign in" to the network. Even without signing in, you can buy content and sell your attention. (You'll understand how this is possible later.)

There is no such thing as an "advertisement" per se in this network. Every card has a price -- positive, negative, or zero. That price can include a promotional component ("impressions") and/or a fee component ("click"). An "advertisement" pays a user for a spot in his feed or if that user opens it. Another card may also offer payment to appear in your feed, but expects you to pay to open it. Many variations are foreseeable.

As a consumer, your feed contains content from channels that you follow as well as content that the network injects with the aim of balancing your income and expenses. The network helps you maintain that balance. Consumers are free to pay for the content they consume even if they don't sell their attention to promoters as long as they maintain a balance above a certain threshold -- by making deposits into their network account, or spending some of their production or referral income.

Anyone can repost content to their own followers, receiving small "referral fees" out of the producer's revenue. (Only the first to repost a card into another's feed will receive the referral fee for that viewer.)

ACTIVE CARDS

Our first goal is to foster eclectic engaging content. YouTube can be engaging, but it only presents videos. Instagram only presents photos/videos. And Medium only presents writing. We want to unleash the creative ways that amazing content is presented on websites all over the internet. It takes a lot of work to find original sites and many of them do not meet ad networks' requirements. The cost of creating and maintaining a website also inhibits many people from publishing at all.

Channels uses "cards", created as [web components](#), which are emerging as the preferred tool to create new websites. Channels can deliver almost anything that can run in a web page.

So we kill two birds with one stone. Cards empower content producers to use the most powerful medium of expression we have today: the web. And by pulling cards together into a single network, this content is accessible to consumers and advertisers.

The network itself provides services that content producers can use to enable collaboration between card consumers. For example, a card can poll its viewers about their opinion on its content. The nature of this collaboration is extensive.

Even more important is that the network does not constrain the cards it will accept. Developers with basic web programming skills can create new types of cards and use them or offer them (for a share of resulting revenue) to other publishers.

Competition between producers will result in better content. Card technology enables more diversity in the content than is seen on any other content network. Certainly it can present videos, photos, and written articles. But it also opens the door to other forms of information and entertainment.

Consider the rise of data journalism where interactivity is a key part of the story. Cards can carry data-centric stories beautifully.

Think about jokes, games and puzzles. Cards have all the power needed to handle multiplayer online games or simple crossword puzzles.

Or how about cards that elegantly present interactive recipes, songs with lyrics, or how-to videos using VR. All of these are possible using cards.

We foresee content from major news and entertainment publishers appearing together beside the best amateur content and applications -- all within a single feed.

WHAT IS IT?
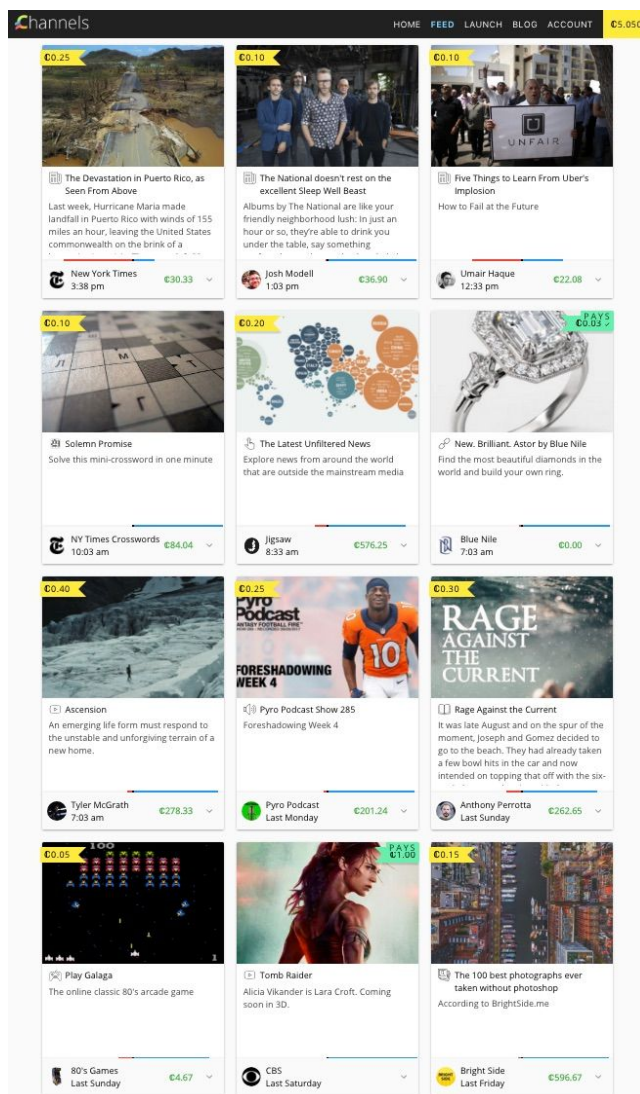
To understand Channels, take a look at what it may look like to a typical user.

You are seeing a feed containing a number of cards. Each card has a price tag telling the consumer how much they will pay if they open the card. Some price tags show that they "pay" the reader to view that card. If you tap on one of these cards, it will open in place and become interactive in whatever way is best suited to that content.

Each card also shows the total amount the producer has earned with this card.

Like most networks, you can "like", share, or comment on these cards.

In the banner of the Channels app, you see your current balance (in ChannelCoins). Each time that you open a card, you will see your balance decline or increase depending on the pricing on that card. Simply scrolling may result in your balance increasing because of payments to you for promoted content appearing in your feed.

If you scroll and never open cards, that is, never spend anything, you'll never see promoted content. If you open cards, you'll start to see promoted cards appearing in your feed. The network ensures that you see just enough promoted cards to cover your content consumption

fees. You can't earn money simply by opening cards offering rewards because the network will stop injecting them when your balance is above a threshold. (More on that later.)

To publish content to this network you post a card -- much like you would in Facebook, except that you first choose the type of card you want to use to best present your content, and you choose the price you expect to be paid. If you wish to advertise, you do exactly the same thing, except that you choose options so that you bid for how much you will pay to appear in feeds and how much you'll pay when someone opens your card. (You can also choose what audience you wish to target.)

ROLES

The network does not designate roles to different users. Any user can be a consumer, a content producer, and/or a content promoter as they wish. The network treats everyone the same way.

CONSUMERS

The first and most important role in this network is the consumer. Consumers pay for the content that interests them and are paid for content that is promoted to them if they choose to accept it. The network balances these amounts so that individual consumers don't need to worry about it. Unless you take explicit actions to pay for content, the amount of advertising you see will remain in proportion to the cost of the content you find.

Consumers can find a steady flow of content that they find engaging and informative.

PRODUCERS

Anyone can publish on this network and compete for the attention of consumers. The network is optimized for those who create better experiences for consumers. Producers price cards knowing that consumers can choose which channels to follow and which cards to open.

Producers set a "pricing level" (from 1 to 10) rather than an absolute price on a card. The network finds the "fair market value" for each pricing level based on overall promotion revenue, available subsidies, and transaction volume. The price paid by a consumer to a producer is the product of the pricing level for that card and the floating "base" price when the card is opened.

Producers can get paid handsomely for cards that are opened by a lot of consumers.

REFERRERS

As a social network, Channels determines what users see based on the people or organizations that they follow. A user who sees a card that he thinks his own followers will enjoy can repost it. In return, a small percentage of the publisher's income from this card will be paid as a "referral fee". Thus curating content is also rewarded.

PROMOTERS

Two kinds of promotion in this network are, more or less, counterparts to traditional online advertising mechanisms. A publisher of a card chooses one of two types of pricing on that card.

The first is the amount he or she is willing to pay to appear in the feed of users who are not already following the channel in which it is published. This is the counterpart to the so-called CPM or "impression" fee in internet advertising. This fee is paid to consumers who see the card in their feed for at least 2 seconds, regardless of whether they open it. This is paid at most once to any individual consumer.

Alternatively, the publisher sets an "open fee". In this case, the advertiser will pay consumers who open their card and keep it open for at least 10 seconds.. This reward is the equivalent of the CPC ("cost per click") in internet advertising today.

Promoters are able to target users of greatest interest by specifying characteristics of the users, including geography and their interests based on words appearing in their feed.

Promoters set payment fees per card along with maximum budgets. The network chooses which cards to promote into which feeds so as to maximize the value to all users. That is, Channels conducts an implicit auction of promotional space available in user feeds. Unlike ad networks, Channels has no conflict of interest because all transactions are directly between promoters and the consumers who view and open their cards.

Advertisers compete on a level playing field based on the quality of the content and the amount they are willing to pay. Anyone who wants to increase the reach of their content can compete as well for additional attention from consumers.

CARD DEVELOPERS

The key ingredient in Channels is the card. We want to foster competition among developers to create new types of cards that can deliver engaging content in innovative ways. To accomplish this goal, we allow anyone to develop new cards and sell them on Channels. All it takes is basic web programming skills (HTML and javascript). We provide free tools to make this even easier.

Some content producers, such as news outlets, may develop cards uniquely suited to their own content.

Sometimes a card's technology may be more interesting that its content, such as a game.

But most publishers will see their value as the content they are creating and will choose a card that best presents that content. This allows a market in which card developers collect a royalty fee for their card designs as a fraction of the viewing fee or the consumer reward for opening the card.

Unlike closed networks (like Apple's IOS), Channels places no restrictions on cards. Every card type is hosted in a public GitHub repository. There is no approval process needed before a card can be used on the network.

EARLY CONTRIBUTOR PROGRAM

Getting a new social network off the ground is challenging. Users will only come if there is interesting content. Producers will only come if there is money to be made. Advertisers will only provide that money if there are users.
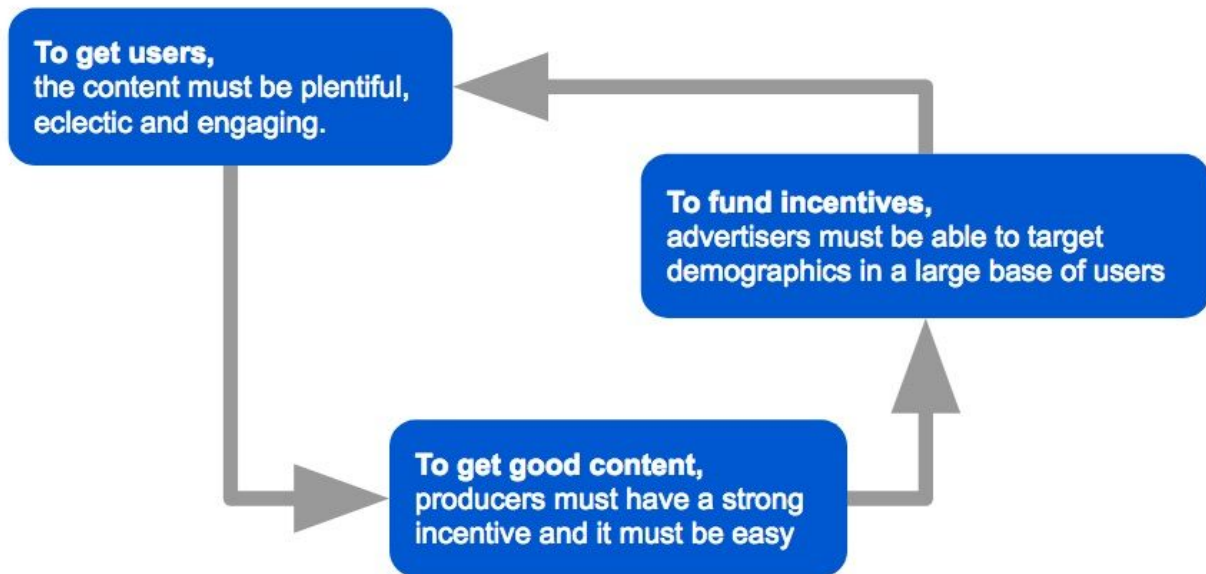
The so-called "empty room" problem is very relevant here. Why would someone come to Channels if it has no content? And why would someone publish a card in Channels if there are no users coming to see it?

We solve this problem using a multi-pronged solution.

First, we are establishing a subsidy system to bootstrap the network until advertisers come onboard. When a user makes a payment to a publisher for their card, the network itself will make subsidy payments to the user that will eventually restore their balance. The user is deciding which content to pay for. This is an indirect way for publishers to get paid starting on the first day even when there are no advertisers purchasing attention from consumers.

Second, we are enabling withdrawals as soon as the network goes live. The network maintains a balance for every user. It also maintains the "withdrawable balance" for each user. All earnings other than subsidies and payments for consumer attention are withdrawable. So as soon as a publisher has earned a coin, the network will allow that publisher to sell that coin. The initial exchange rate between ChannelCoins and US Dollars will be 1:1, so for each coin in a user's withdrawable balance, the user will be able to withdraw $1. Eventually the user will have several options for how to withdraw these coins. To start with, they can be paid into their Paypal account.

CONTENT PRICING

Publishers make the following choices:

- Impressions fee: paid to consumers other than followers who see that card on screen for at least 2 seconds;
- Open reward: paid by the producer to consumers who open that card and keep it open for at least 10 seconds;.
- Open pricing level (between 1 and 10): determines a multiplier on the network's current base open price and paid after the consumer has held a card open for at least 10 seconds;
- Target audience: restrictions on consumer geography, channel subscriptions, and words appearing in their feeds
- Budget: a limit on the total amount that the publisher is prepared to pay to promote the card. When this is exhausted, the network will stop offering the card to other users. The network cannot guarantee the exact budget limit will be enforced. And,
- Budget Expansion: for cards with an impression fee but also an open pricing level, the publisher can choose that a percentage of their earnings can be reinvested in promotional fees to expand the reach of the card.

This pricing model effectively establishes a blind auction for promotional fees and open rewards. Since each target audience may be different, Channels does not endogenously determine market prices for impressions or open rewards. We will provide some recommendations on promotional pricing to reach a certain audience based on recent transactional data.

BASE PRICING DETERMINATION

The network continuously determines the base price, B , from the experiences of the last 24 hours. This price is multiplied by pricing level to determine what a consumer pays to open that card.

The base price apportions future producer revenue based on recent historical consumer revenue indirectly using a control system:

$$\frac{\delta B}{\delta t} = C * \left(T - \frac{\sum_i p_i}{\sum_i s_i}\right)$$

where T is the targeted fraction of content that is promotional, $\sum_i p_i$ is the recent total number of promotional cards presented, $\sum_i s_i$ is the recent total number of cards presented, and C is a damping constant to control how quickly base price responds to changes.

The effect is to move the base price up or down so that the *typical* user experiences a targeted ratio, T, of content that is promotional within their feed. When serving fewer than this number of ads, the base price increases to generate more income for producers. When serving too many ads, the base price is reduced resulting in lower content fees, reducing the need for promotional revenue.

Note that this price determination is being made using overall rates on the network. Individual users who consume an unusually large amount of expensive content will see more ads served to them than our target which will be acceptable given the value they are getting from the content. And those finding relatively little worthy of their attention will be seeing almost no advertising. In both cases, the user has a good experience.

In the phases, the base price determination will also be regulated based on an available subsidy balance. In other words, the network will commit to a total amount of subsidies per day, and as that balance grows or shrinks, the base price will be affected accordingly.

PROMOTION INJECTION ALGORITHM

Typical ad networks are designed, presumably, to maximize the revenue to the ad network itself. Channels is different because transactions do not directly involve the network. Advertisers pay the consumers who see their ads and open them. Where a typical ad network will place an ad that maximizes the expected revenue for that ad (e.g., multiplying the CPC price offer and the probability that it will get clicked), the Channels algorithm has different goals.

The goal of the content placement algorithm in Channels is to balance consumers' experience with producers' returns. This is achieved as follows:

- All content published into channels that a user is following will appear in the user's feed;
- No content published into channels that a user has blocked will appear in their feed;
- Other content may be presented to a user based on interests so as to maximize producer revenue;
- Users whose coin balance is above a certain threshold will not see promoted content;
- Users whose balance falls below a threshold will see promoted content injected into their feed (impression fees) that maximizes aggregate publisher revenue;
- Users whose balance falls further will see promoted content injected so as to maximize that user's expected revenue from that content (based on data from other users)

The aim of this algorithm is that consumers have good experiences. As they open interesting content (reducing their balances), they'll start to see some other popular promoted content that will earn them a bit (offsetting the reduction). But this content may actually cost them more if they open it. As they consume even more, they will see things that look more like ads having rewards for opening. If they choose not to open them and continue to consume, they will see a growing proportion of advertisements. Opening content with rewards offsets the cost of content they purchase, and the proportion of advertisements they see will trend back down.

The thresholds for injecting revenue-generating content and for doing so more aggressively is very important. They are not fixed values. They increase every time a user generates income other than with his own attention -- i.e., by publishing or making referrals. Users can lower their threshold at any time, but cannot increase it except through publishing and referral income. This is important because this allows a user's balance to increase without it being reduced again as they consume content. In other words, any income that you earn through publishing and referrals can be withdrawn from the network at any time you choose. Because you can't raise your own threshold, there is no way for someone to earn more money by watching advertisements than they spend on content.
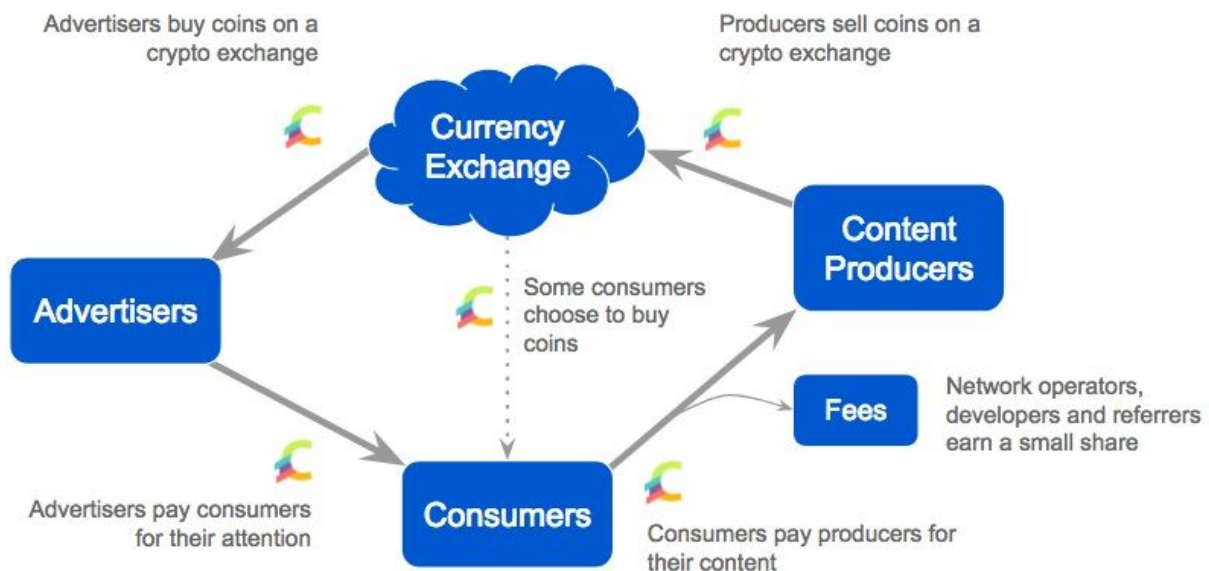
$$T = \sum I_p + \sum I_r - \sum W$$

That is, a user's promotional threshold, T, is the sum of all of that user's production income, I_p, and referral income, I_r, less the total amount that the user has withdrawn, W. This threshold is the account balance below which the network will inject promotional content into the user's feed.

ECONOMICS

Channels is a standalone economy. There are two types of products: content and attention. Advertisers compete in a blind auction for attention. Consumers pay for content based on the pricing level of the content and the floating base market price. Assuming most consumers will choose not to pay out of their own pockets for content, the base market price is set so as to transfer all of the advertising revenue through consumers to producers. The base market price at any time reflects the recent advertising revenue and content consumption so as to keep these two markets in equilibrium.

Advertisers buy coins on a crypto exchange

Producers sell coins on a crypto exchange

Currency Exchange

Some consumers choose to buy coins

Content Producers

Advertisers

Fees — Network operators, developers and referrers earn a small share

Advertisers pay consumers for their attention

Consumers

Consumers pay producers for their content

Pure consumers have no way to earn more money in this network than they spend on content. (The algorithm stops providing earning opportunities for consumers when their balance exceeds a certain level.)

Ignoring consumers who choose to pay for content themselves, when this economy is in equilibrium, advertisers will be paying coins to consumers for their attention. The consumers, in aggregate, will pay these coins to producers. To continue advertising, advertisers will have to

buy coins, and producers will be the ones holding them. So advertisers will buy coins from producers on a cryptocurrency exchange.

Subsidies serve the same purpose as advertisers and will eventually be displaced by advertisers.

CRYPTOCURRENCY

All transactions in this network are performed using a new cryptocurrency called ChannelCoin. This cryptocurrency will eventually be backed by a smart contract on the Ethereum blockchain. Like other cryptocurrencies, anyone will be free to buy and sell ChannelCoin in standard cryptocurrency exchange markets. This is how producers will translate their earnings into other currencies (like US dollars) and how advertisers will acquire the coins they need to advertise on this network.

Consumers who do not wish to sell any of their attention to advertisers will need ChannelCoin to purchase the content that interests them. They also could purchase ChannelCoin on a currency exchange but this may be inconvenient for many users who don't already participate in these cryptocurrency exchanges. Therefore the network can act as a proxy for these users and sell them coins using conventional means (such as in-app purchases in fiat currency) using the fair market exchange rate (less any transaction fees such as app store fees).

The ChannelCoin smart contract is a typical cryptocurrency contract with a few extra features. It allows buying and selling of ChannelCoin using Ether. The bid/ask spread is determined so as to control the currency supply based on the total transaction rate (GDP) of the Channels network. It is well known that too much or too little currency in circulation will destabilize prices and lead to inflation. A banking committee of the not-for-profit controlling organization will have some control over the parameters for this algorithm to be determined. Another feature of this smart contract is to support off-chain transactions and banking (see below), especially to mint new currency to create an initial balance for each new user. Finally, the smart contract includes a crypto-royalty feature to reward the network designers (see below).

This cryptocurrency will be released in phases, allowing for improvements to be made as the network grows. Conversions between different generations of the currency will happen automatically and neutrally for all currency holders.

In the first phase, ChannelCoin will not be backed by a blockchain currency. Instead, the network will manage the ledgers unilaterally. Transactions will still be cryptographically secure (meaning that every payment is signed using a private key). Coins can be purchased from the network using conventional payment systems (credit card, Paypal, etc.) Coins can be sold to the network

by requesting a withdrawal, at which point the network will send the proceeds to the user's Paypal account. In this early phase, the exchange rate between ChannelCoins and US Dollars will be maintained as 1:1.

BANKING

This network depends on a high volume of rapid tiny transactions, but today's blockchain transactions are slow and relatively expensive. So the Channels network depends on off-chain "retail" banks that act as intermediaries in the transaction flow. This works very much like conventional retail banks in the real world. When you want to purchase something, you use your debit card. Your bank reduces your account balance by the specified amount and increases the balance of the payee. In the world of Channels, these transactions are cryptographically validated, but do not involve blockchain actions. Instead both parties trust the bank as an intermediary and maintain off-chain balances of ChannelCoin in their accounts there.

The network design allows for multiple competing banks. In that case, transactions between users with accounts at different banks work much as they do in real-world banks. Some transactions use bank-to-bank transfers which are insured by a consortium organized by a central bank. These banks eventually settle imbalances using blockchain transactions.

Users can deposit money to or withdraw money from their off-chain accounts using blockchain transactions. When they make a payment to a bank's account, that bank credits their off-chain account accordingly. When they request a withdrawal, the bank transfers money into their on-chain account using a blockchain transaction. Users must maintain a minimum off-chain balance in order to make a withdrawal.

CENTRAL BANKING

The central bank of the Channels economy is made up of three parts: the Ethereum smart contract(s) governing the currency, a network entity (servers) that monitors and takes actions on the network, and a banking committee of the operating entity who make decisions about overall strategy.

The goal of this central bank, like any other, is to maintain a healthy economy. That means that there should be the right amount of currency in circulation, inflation should be kept under control, and confidence in the currency should be protected.

Unlike some cryptocurrencies today, Channels does not benefit as an economy from excessive currency speculation. Speculation can lead to exchange rate volatility and that can create a lot of

uncertainty from advertisers because of wildly fluctuating prices for advertising. So part of the role of the central bank is to provide a counterweight to speculators. This is accomplished through monetary policy -- adjusting currency supply and interest rates in response to market conditions. If the exchange rate (price) of the currency is growing rapidly, the central bank can sell more currency. Conversely, if the exchange rate drops quickly, the central bank can use its reserves to buy back (and destroy) currency. The smart contract handles some of this automatically, with the banking committee able to set parameters and intervene as necessary.

Interest rates are handled in this economy much the same as they are in the real world. The central bank pays interest (in additional currency) to all currency holders using the retail banks as an off-chain mechanism to do this efficiently.

TAXES and FEES

Most social networks are controlled by a single for-profit corporation. This stunts innovation and misaligns motivations between the network operator and the users.

The main players in the Channels network are the consumers, producers, and advertisers. But others participate in this economy as well. The operation and promotion of the network itself must be paid somehow. Financial incentives for those who create new cards that producers want to use will result in better outcomes for everyone. Those who curate content and refer their followers to the best content should be rewarded. And those who created the network in the first place deserve to be rewarded.

These secondary players are all funded out of taxes and fees that are paid as part of the content consumption cost. A network tax, projected to be 3%, is added to cover the cost of operating the network and is paid to the network operator (eventually a not-for-profit corporation). A royalty of 5% is paid to the our account as the network creators. If the payment is being made by a consumer who got the card through re-posting, then a 2% referral fee is paid to the referrer. Out of the net proceeds to the producer after these fees, a percentage royalty is paid to the developer of the card that was used. (Each card developer declares the royalty percentage that they demand.)

USER IDENTITY

Each user in this network is uniquely identified using an address that is derived from a public/private key pair that is generated by their client, or that they generate themselves. A new

user to the network chooses a client and that client automatically generates a keypair for them and a corresponding address.

Because every user conducts transactions, each needs a valid Ethereum blockchain address. That does not mean that each user must install a wallet or participate in the cryptocurrency market. It just means that they have Ethereum accounts if and when they ever need to buy or sell ChannelCoin (or any other Ethereum-based cryptocurrency).

Transactions between users on the Channels network happen off-chain through the bank as described above. They are cryptographically secured using signing based on the key pairs involved.

Before a user can post to a channel or participate on an active card, they must first augment their identity with additional information. They choose a handle (e.g., @jdoe) and provide their name and other information they choose to share with others on the network. Like Twitter, Channels can verify this supplementary identification but normally does not.

It is worth noting that new Channels users will arrive and find that they already have an account automatically established for them. They don't have a handle assigned to them, but the Channels client has already created a public/private keypair for them and they can immediately participate in transactions using that anonymous identity. That keypair never leaves the client device. When they register a handle, they also provide a password that is used to encrypt the private key and delivers the resulting string to the network. The network never sees the password and therefore is immune to hacking. When a user "signs in", they are simply requesting the encrypted private key from the network for a given identity (based on their handle) and the password is used by the client to establish the keypair for that user.

When users post to Channels, they are normally posting to their own channel which is identified based on their own handle. We may eventually allow creation of additional channels that can be shared by multiple users.

ORGANIZATION

We, as the network creators, will operate the network in its early days. But once the network is operating smoothly and generating a sufficient transaction flow, we will transfer control to an independent not-for-profit organization that will continue to operate the network based on a charter that is voted on by the Channels community.

As described earlier, the operating company is funded through a small consumption tax on the network which is deemed sufficient to maintain a reliable network.

INTELLECTUAL PROPERTY

In return for the crypto-royalty described above, the network creators will transfer ownership of all intellectual property to the not-for-profit operating company.   All of the code for the network is being constructed as open-source to ensure transparency and we expect the operating company to continue this approach for ongoing development.

IMPLEMENTATION

The first generation of Channels is under construction.

The server back-end is implemented using NodeJS servers hosted in Amazon AWS in a horizontally scalable architecture with a MongoDB cluster for persistent storage along with S3 for file storage. This code is being developed in a GitHub repository at https://github.com/ChannelsNetwork/channels-server.

The client-to-server protocols are based on secure REST services. Each REST call is signed by the client using the user's private key. In this way, the server can verify the identity of the user. Clients can upload arbitrary files to the server to support cards, using a standard multipart-form HTTP upload. Clients are charged by the network (in ChannelCoin) a periodic fee for their cumulative storage.

A new mutation protocol is used to support shared state on cards so that card viewers can collaborate with each other through the card when appropriate.

The client is a web-based client developed using standard client-side web technologies, including web components and Polymer.

Our first cards are being developed internally using HTML and Javascript built on top of Polymer and built on top of the web components emerging standards.

The first ChannelCoin smart contract will be developed on the Ethereum blockchain.

SECURITY

All content posted to Channels is available to all users. Users remain anonymous through the key pair their client generates for them and they can choose what, if any, additional information to share concerning their identity.

However, especially because financial transactions are involved, the network needs to remain very secure. This is accomplished by following most of the best practices that have been developed in the industry.

All REST calls use SSL (i.e., HTTPS). This secures all communications between clients and the Channels servers. Authentication between client and server happens using cryptographic signatures on each REST call using the public/private key pair of the client. Because the address of the user is derivable from the public key, identity of the user is always known with confidence by the server.

Banking on this network also happens using signed REST calls. When blockchain transactions occur, these will use the Ethereum web3 client library to ensure secure transactions.

The Channels servers employ standard firewall protections guarding against most conventional attacks.

PROTECTION AGAINST BAD ACTORS

Many details about the protocols and operation of the network have been designed to eliminate or constrain bad actors. We anticipate that because financial transactions are involved, there will be those who look for loopholes to exploit to earn funds they don't deserve or to steal funds.

Our first protection against bad actors is transparency. Part of the reason to develop the entire network using open-source code is to allow the world to inspect every line of code. If there is a vulnerability, this is the best way to eliminate it as quickly as possible.

Another source of protection is crowdsourcing. We make it easy for anyone to report inappropriate content or behavior. Part of the job of the operating company is to follow up on these reports and to take action accordingly -- blacklisting the bad actors, for example. At the same time, we do not want to impose censorship except for the most extreme cases so will use flags (such as NSFW) to protect casual consumers from content they may not want to see.

Because financial incentives are now available, we anticipate an interest in driving pornography and other extreme content into this network. Rather than blacklisting such content, we plan to isolate it. Content producers are required to self-rate their channels using a MPAA-style scale. Consumers will not see content above their configurable rating level (defaulting to PG-13) and can report content that is improperly rated.

A very important part of the content algorithm described earlier is that users will not be fed promoted content when their balance is above a certain threshold. This is a critical and simple way to avoid users who want to exploit this network as a way to harvest revenue by simply clicking on ads. They are free to do that, but there is no way for them to profit from it financially. That is because of the additional restriction that withdrawals are allowed only for amounts in excess of this balance threshold. If users earn money as producers, of course, they can easily exceed this balance and withdraw money whenever they choose.

Similarly, users cannot generate promotional revenue simply by following those that they know produce cards carrying promotional rewards. A user may be interested in a particular advertiser's cards but no promotional rewards are paid for cards appearing in one's feed from those one follows.

Another bad behavior would be to repost content that could produce income for your followers in a way that would be a backdoor to allowing users to effectively earn money they could withdraw from the network through advertising consumption. To close this loophole, promotional fees are not payable on cards that appear in another user's feed because of reposting. In other words, if you find an advertisement that you find compelling, you are free to repost that to your followers, but your followers will not be paid promotional fees or rewards for opening that card.

So-called "click bait" is another effect we have considered. If consumers have to pay for something based on its headline, we know that we will see clickbait producers in volume fighting for their money. We have added a simple rule that dramatically reduces the incentive for click baiting. When users open cards with content that they find objectionable for any reason (even because it is uninteresting to them) they can block that channel and the total price paid for that card will be rebated to the user. The clickbait producer can't even get paid for the first click if their content is very undesirable.

We've also added delayed payments as described above as a middle ground before blocking. If you open a card and see little value there, you will not have to pay if you do not spend more than 10 seconds on a card. This creates an incentive for producers to publish content that is engaging to the user rather than trying to make it up on volume.

Another bad actor is the currency speculator -- especially ones that try to "corner the market". One might think that it is in everyone's interest to have speculators drive up the value of the currency. But that's not true. Consumers ultimately suffer in this case because that currency volatility will inhibit advertisers from spending money, resulting in less revenue for content producers, resulting in less content for those consumers. Speculation also tends to result in behaviors like hoarding or fast-selling that create stability problems. To avoid this, we institute conventional central banking mechanisms described earlier that act to stabilize the value of the currency -- acting as a guard against excessive speculation.

No doubt we will encounter other bad behaviors as the network grows. In each case, we will be looking for natural feedback systems that inhibit or eliminate these.

ABOUT US

Hivepoint is a startup in Palo Alto, California. Channels is the culmination of a number of collaboration ideas we've been incubating over the past couple of years.

Our founder is Kingston Duffie who came from the computer networking industry and founded three startups before this one: Whitetree (acquired by Alcatel-Lucent), Turnstone (IPO), and Fanfare (acquired by Spirent). The team also includes Carl Hubbard, Preet Shihn, Denise Savoie, and Nathan Neulinger.

CONCLUSION

This paper describes the Channels network that is currently under construction. It has the potential to disrupt the internet advertising market. Cryptocurrency enables transactions directly between advertisers, consumers, producers, and developers and card technology merges diverse content onto a single platform.

Contact us via Twitter