Indie Protocol

A fast and incentive driven blockchain protocol for the indie digital age.

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Abstract

Indie is a blockchain protocol that supports community building and content publishing with cryptocurrency rewards. It combines industry-grade blockchain technology, with concepts from many blockchain networks, and lessons learned from building decentralized applications and their communities. An important key to inspiring participation in any community, currency or free market economy is a fair accounting system that consistently reflects each person's contribution. Indie protocol is the first to attempt to accurately and transparently reward an unbounded number of individuals who publish *content*, without requiring paywalls or advertizing models, and shift the source of content monetization from the audience to the business chain, that extracts economic value from the *content*.

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Introduction

Indie Protocol is a community effort to build an Industrial-grade Decentralized Blockchain platform that is capable of high-performance processing of digital content publishing, provision and licensing operations, and serves the creator economy by empowering financial freedom without holding creators, creations or audiences hostage.

Indie Protocol is a technology that supports the digital generation of content creators, entrepreneurs, investors, and developers, with a common interest in building and participating in a free market for digital content. Consensus technology has the power to do for economics what the internet did for information. It's about time to use this technology to enable the discovery and aggregation of digital content in real-time, previously unobtainable. Then digital content distributors can get access to all independent (Indie) content, and where the free market enables price discovery for the access and fair distribution of the proceeds back to the creators.

Problems

In the digital content age, the content became portable and easily reproduced, packaged and published by the creators themselves, without any middle man between the creators and their audience. This innovation gave greater tools for the creator economy, but a lot of powerful middle man saw their business models completely obliterated in just a matter of a few years. This resulted in an insane backfire from those organizations, like in fight for survival mode, that has only created a race to the bottom for all content industries. They used all the tools at their disposal to try to continue relevant, even at the cost of innovation, accessibility and, most importantly, the creators livelihoods.

Intellectual Property Battles *The modern concept of intellectual property was developed in England in the 17th and 18th centuries.* (1) But there are references to intellectual property systems that go as far back as the 15th century. And these battles are not new: *"Literary property" was the term predominantly used in the British legal debates of the 1760s and 1770s over the extent to which authors and publishers of works also had rights deriving from the common law of property.* (1)

> **Disambiguation** The term Intellectual Property, as defined by World Intellectual Property Organization (WIPO), refers to the creations of the mind, such as inventions, literary and artistic works, designs, symbols, names and images used in commerce. Copyright on the other hand, means the exclusive and assignable legal right, given to the creator for a fixed number of years, to print, publish, perform, film, or record literary, artistic or musical material. Copyright is just a type of intellectual property, and that's exactly the one that we want to address.

The Copyright laws came about in the 15th and 16th centuries, right after the invention of the printing press. (2) Well, in the middle ages there was not much cultural dissemination. Mostly the audiences for creators of that time were the higher status persons, and to reach them the creative works needed to be translated, printed and shipped all over the planet, in order to meet a significant number of people. This had to be done by the publishing corporations, and they had to secure their rights to use and reproduce the intellectual property of the creator, and that would generate income for them and the author as well - it was a win-win at that time.

But, almost 6 centuries later, wanting to enforce those laws to digital copies, that can be made in milliseconds in a computer that everyone caries in their pocket makes no sense, right?

The goal of copyright laws was always, first of all protect the creator's interests, meaning the dissemination of their works, and assure that the creators would always take a fair share of the revenue generated by the publishing and distribution organizations. At the time there was a considerable amount of effort and upfront investment from the organizations side, so the share for the creators had to be a small one.

Today, the effort and upfront investment required was reduced by 90%, but the share of the creator didn't get the appreciation it deserved.

Digital Media Content It's almost impossible to succeed in imposing access restrictions to digital media content. So many attempts were made already, like with the Digital Rights Management (DRM) platforms, all of them were unsuccessful. And the aim of the copyright laws was never to restrict the exposure of the works, but exactly the opposite! It seems that we are in a last resort attempt to continue in business by the publishers, to invert the reasoning behind the copyright laws, which was always to protect the creators and allow for greater dissemination of their works, and start imposing restrictions of access where there were none anymore.

With digital media content it makes no economic sense to monetize the copies, as there is no economic value in something that we can make as many as we can, and effortlessly. And the creators work every day to produce their creative works, in order for them to be seen, listened, read, or felt by their audience, that's the whole point of the creation, right? This means that any blockers that we impose to the natural dissemination of the creative works, in the digital age, will serve no good for the creator, as they prevent or reduce the most important goal of being a creator in the first place.

Digital Media Content Distributors The digital media content distribution also went digital, so the major digital content distribution today is made by platforms, like YouTube, Spotify, Apple Music, Flickr, Amazon or Kindle, and many more. They're the only economic actors to extract value from the creative works of others, and they are the ones to decide who gets paid and who doesn't and in what terms. Does this seem fair or even rational? Historically the user of the content had to pay for it, not to buy the content, but to cover for access costs of publishing and distribution, and the liability of paying the creator was always in the hands of the publishing and distribution channels. So why are they shifting that liability to the user now, and still keep the major piece of the pie?

We at Indie Protocol defend that the client for the creative works is not the end user, as it's for them that the creator created the works in the first place. The clients are the distribution platforms, and they are the ones that need to humble down and start paying for access to the content they want in their distribution channels, not the end user. The distribution platforms can innovate in business models to generate more attention, and still be profitable while paying what is fair and right for the access to media content that belongs to the creators. Also, wouldn't it make more sense if a free market was created around the creative works access by the distribution platforms, so that price discovery for the value of that access could happen? This is exactly what Indie Protocol brings to the table.

Indie Solution

Bitcoin was the first fully autonomous system to utilize distributed consensus technology to create a more efficient and reliable global payment network. The core innovation of Bitcoin is the Blockchain, a cryptographically secured public ledger of all accounts on the Bitcoin network that facilitates the transfer of value from one individual directly to another. For the first time in history, financial transactions over the internet no longer require a middle man to act as a trustworthy, confidential fiduciary.

Indie Protocol enables the creation of Decentralized "Blockchain as Organization's" (BaO's). It enables a Creative Community to launch a network, and enables participants to decide the Blockchain's future direction and governance aspects of the network. Also the protocol defines a set of incentive rules that create a free market for any type of digital media content.

Indie Protocol looks to extend the innovation of the Blockchain to all digital content creators, that rely upon the internet to publish, distribute and license their works. Whether its music, books, photographs, video or audio podcasts, movies, or many other types of content, a digital public ledger allows for the

creation and distribution of incentives to empower the creator economy in ways never before possible. The advent of BaO's ushers in a new paradigm in organizational structure in which Blockchains can run without any human management and under the control of an incorruptible set of business rules. These rules are encoded in publicly auditable open source software distributed across the computers of the community participants, who effortlessly secure the organization from arbitrary control. Indie Protocol does for content what bitcoin did for money by utilizing distributed consensus technology to enable creators BaO's that are inherently global, transparent, trustworthy, efficient and, most importantly redistribute the generated cashflow fairly among all the creators, not just a few.

Digital Media Content

Indie Protocol is designed from the ground up to address the major barriers to adoption and monetization of a digital media content economy. Our thesis is to substitute the autocratic nature of the current digital media content distribution platforms by a free market that will define the price for the scarce media throughput of a decentralized media content network, and also enabling a peer to peer licensing mechanism with NFT proofs. Economic incentives enabled by cryptocurrency can dramatically facilitate the growth of a new digital media content platform, as seen previously in projects like DTube or DSound.

The challenge faced by Indie Protocol is to derive an algorithm for scoring individual contributions that most community members consider to be a fair assessment of the subjective value of each contribution. In a perfect world, community members would cooperate to rate each other's contribution and derive a fair compensation. In the real world, algorithms must be designed to be resistant to intentional manipulation for profit, as seem with vote buying in Steem/Hive social medias. Any widespread abuse of the scoring system could cause community members to lose faith in the perceived fairness of the economic system.

Existing platforms operate on a one-user, one-vote principle. This creates an environment where rankings can be manipulated by Sybil attacks and the service providers must proactively identify and block abusers. People already attempt to manipulate the Reddit, Facebook, and Twitter scoring algorithms when the only reward is web traffic or censorship.

Indie Protocol is designed around a relatively simple concept: everyone's meaningful contribution to the community should be recognized for the value it adds. When people are recognized for their meaningful contributions, they continue contributing and the community grows. Any imbalance in the give and take within a community is unsustainable. Eventually the givers grow tired of supporting the takers and disengage from the community.

The challenge is to create a system capable of identifying the contributions that are needed and their relative worth, using a methodology that can scale to an unbounded number of people.

User Contributions

In Indie Protocol there are several ways to contribute to the network and get rewarded for doing so.

Publish Content A content creator can publish digital media content to the platform. Publishing a content requires paying a small fee in the core utility token (IND). The content is registered in the Indie Blockchain, the media itself is stored on Indie's private IPFS network, and the content NFT serves as content registry proof. Content NFTs are bound to the creator account and are non-transferrable. For the content registration, the frontend will probably have to package the media in many formats, and some metadata needs to be stored onchain, like content title, category, etc (network specific). The content weight will be evaluated every reward period and will receive the rewards depending on the weight it collected. The weight is calculated by an algorithm that takes into account several factors, like creator stake, content presence in tops of category, and content presence in users collections for the category. Presence in collections that actually got to the tops of content distributors and/or were

updated this cycle will weight more. With the content publishing, the creator has the option to create as many licensing options as the network supports, like print license for a book or synchronization license for music, and the creator establishes the pricing in internal usd token (iUSD), or let the platform handle the pricing based on demand. Each of the licensing options will allow users to buy and receive the respective licensing NFT. There are options for single-use, time bound or perpetual licenses.

Publish Collections Any user can create their own collections. In a music or video network they can have a type of playlists, or albums. If in a book publishing network the types could be reading list, or best-sellers. Collections can be anything (network dependant). Collection NFTs are bound to the creator account and are non-transferrable, just like content. Collections can also be licensed, if all the content in them provides that licensing type, otherwise the user can license just the content that is allowed. Collections also are weighted by the platform, and the evaluation takes into account the stake of the creator, inclusion of high weighted content, and presence in the content distributors tops for collections. Collections that are not updated will slowly loose their weight, and attempts to game the system will be identified and flagged by the curators for committee review.

Drop Collectibles Any verified content creator can create and schedule collectible NFTs drops. Our NFTs are tradeable in the internal market, and will be exportable to other networks through our gateway contracts. On the internal market, we guarantee that the defined royalties will be enforced on-chain, when any NFT is traded and transferred. As a difference for other implementations, the bidder will have to cover the royalties, not the ask side. Since all the trading happens on-chain in the internal NFT smart-contract, all frontends that will enable these markets will have no way to change the rules, as many already did on other networks. Another important thing is that we'll also build an implementation of an NFT gateway contract, that will be deployed in other networks that enforces the NFT royalties, so the creators can choose the best approach for their use case. We cannot foresee the adoption of that contract by the marketplaces, but we hope to help change the state-of-the-art of NFT royalties.

Curate Content Any user with a minimal stake can apply for becoming a curator. The committee will review the application, the user history and decide. A curator has the responsibility for finding bad quality content, content published in the wrong categories, abuse and any other type of attempt to game the system. When they flag a content, they will pay a small fee in core utility token (IND). If the committee accepts the flag, which will happen after a number of flags defined by the committee, the curator will receive 10 times the fee (defined by the committee), and the content will be banned from the platform and rewards. The committee has no way to remove it from the blockchain, but at least it will not pollute the user interfaces anymore.

Develop A developer can create his own frontend for the Indie Protocol, and start collecting fees immediately from the accounts they register, without any approval or consent. Or if the project needs funding, the developer can write a blog post with the detailed idea, the funding needed, and a timeline, submit for community approval and start building if it is approved. The payment will be vesting in an escrow contract until the project is accepted. The developer can define multiple phases if he so whish, in case the project is large or complex. The developer should check prior approved projects and specially the ones that weren't, to avoid losing the application fee.

Become a Committee Member Becoming a committee member requires a minimum stake and some popularity in the network to get voted in. Any user of the platform with stake can vote for committee members, so a bit of political campaign might be needed to land a position in the committee. It'll help to engage with the community, contribute in any way possible, get a feel of what the community is about and it's values. Being a committee member requires a lot of responsibility and work, but comes with some rewards every day, so it's important to reserve some bandwidth for the job!

Staking Although the user stake doesn't generate any yield, by having a stake the creator becomes more influential in the platform. Also, the creators published content will become more valuable with more stake, thus helping it reach new highs in the network ranking and achieve higher rewards. When unstaking, there will be a cool down period of 4 weeks, during which the stake will not be taken into account for the protocol. After that period, the liquid core utility token IND will appear in the users balance automatically.

Other Contributions not Rewarded The end users of the digital media content will not necessarily have an account at the Indie Protocol network, so interactions and likes on the frontends are completely content distributor dependent. They will submit those statistics back to Indie Protocol in an asynchronous manner, just for display and sorting purposes, but they won't have any weight in the rewards.

Contributions by Content Distributors

The content distributors, in order to be and remain in active status in Indie Protocol and have access to the content on the platform, need to push statistics per content category in order to help the platform fine-tune the contents relative value by the users. But there's more they can do to get rewarded.

Register Accounts

Statistics

Publish Collections

Governance

On Indie Protocol, decisions are made by the holders of IND core native token weighted by the amount of IND staked. In order to improve voting participation and simplify the life of IND holders, voters can either vote directly or delegate voting power to so called proxies. This is similar to a representative democracy, where selected persons decide the course of action. Those leaders have to account for their actions and can be unelected by the core token holders. Unwanted actions includes censoring, favoring, or simply failure to produce blocks in a timely manner. However, the difference to a democracy is that voters in the community have their vote weighted by the amount of IND that they stake in their account.

At any time, voters have to decide on the following aspects of Indie Protocol.

Committee

The Committee comprises a board of members that have control over a few Blockchain parameters such as block size, block time, witness reward, and over 30 others. They are also in charge of the approval of account verifications (Verified Creator and Content Distributor) and content curators. Additionally, the committee can change the fee schedule which defines the minimum fee for each operation offered by the system. All users with stake can cast a vote for how many members the committee should constitute as well as vote for a particular set of members.

Being an active member of the committee comes at a cost for executing all administrative and managerial tasks. Indie Protocol acknowledges this fact by rewarding committee members in core IND tokens per schedule cycle (block producers cycle). Depending on the valuation of IND, the committee can modify the amount of IND rewarded per cycle. As a start, committee members are rewarded with 1 IND per cycle. Those IND are taken from the working budget. Should the committee member be required to produce extra work for the blockchain, besides regular approvals of accounts or parameter changes, then

they are encouraged to submit a worker proposal to the network to be approved and paid by the working budget as any worker.

Block Production

Block production in Indie Protocol is arranged through DPoS, which requires block producers to register themselves and campaign for sufficient votes from IND holders, before they can start producing blocks on the Blockchain, and consequently get rewarded per produced block. Given the governance system and quick re-tallying of votes, a misbehaving block producer can be dismissed within hours. Next to the actual selection of block producers, the voters also have a say over how many block producers should exist.

Block production comes at a cost for running and maintaining equipment. Indie Protocol acknowledges this fact by rewarding block producers in core IND tokens per produced block. Depending on the valuation of IND, the committee can modify the amount of IND rewarded per block. As a start, each block is rewarded with 1 IND. Those IND are taken from the working budget.

Workers

Last but not least, the voters have control over who receives funding from the Working Budget of the Blockchain. A worker applies for project funding and needs to campaign for sufficient votes before being rewarded. Similar to block producers and committee members, the rigorous voting system allows almost immediate removal by IND holders and proxies.

A certain amount of the daily available tokens can be allocated to make development possible by means of workers for project funding. Anyone can set up a worker on Indie Protocol and ask for a daily allowance in IND. If the IND holders approve a particular worker, the IND tokens are transferred from the daily budget. A limit defines the maximum amount of the daily budget that is given to all approved workers. Consequently, those workers that have received more votes from IND holders will receive their funds first. This means that workers, even if approved, may not be funded if the aforementioned threshold is hit. Furthermore, workers constantly stand under the scrutiny of the IND holders who can disapprove (e.g. fire) workers that do not deliver.

Core Tokens

The native utility core token of Indie Protocol is IND (symbol is supposed to change for each network launched), it serves as a utility token and is offering governance properties to its holders. Governance describes the process of governing the Blockchains many variable aspects, in a way it can adapt to future changes more easily.

Internally there is another token called iUSD, that is pegged to the US Dollar. This token corresponds to an IND baked note, that can be redeemed for 1 USD of IND at any point in time. The committee is the issuer of this token and it will be created for paying rewards, licensing fees or collectibles royalties for creators.

The rewards and royalties on the system are paid as default by: 50% in staked IND and 50% in liquid iUSD. The creator can decide at reward claim to receive 100% in staked IND if he so choose.

Supply

In this section, we would like to discuss the actual supply of the core IND token in more detail. Firstly, we define the max supply as that supply that can at most be in circulation, similar to how there will only ever be up to 21 million BTC on Bitcoin Blockchain. Furthermore, the circulating supply represents that

amount that currently is liquid, in circulation and held by participants on the Blockchain. Obviously, the circulating supply will always be smaller than or equal to the max supply, less the staked supply and subtracting the working budget. For voting only the staked supply applies.

Initial Allocation

Indie Protocol was built without any ICO, token sale or any capital raise, just the time and effort of the core developers and community members on GitHub. It was based on code developed by Graphene and given to the world for anyone to use under the MIT license.

Indie Protocol communities will make their own decisions related to the initial allocation of their core token when they launch their network. They will initiate their network when they decide that the core functionality reached a ready state, and that they have the backing of the infrastructure providers for block producing.

In the genesis block of Indie Protocol the max supply, subtracted by the circulating supply of the core token (if any initial allocations were made), should be allocated to the Working Budget. This Working Budget, or also often referred to as reserves or treasury, is the life blood for the protocol to function. The max supply of IND is put in place on the Blockchain and can never change.

It is worth noting that revenues made from transactions fees are not shared with holders nor stakers of IND, but instead go back into the working budget, to pay for recurring network costs, reward the creators, and to allow future development. There is no reward for holding the core IND token in any way.

Blockchain Architecture

This is the start of the technical part of the paper, so for non-technical reader you are probably done this far. But you're much welcome to continue reading, of course...

Indie Protocol is a Blockchain Platform built as open source code, based on the Industrial-grade Graphene blockchain core, that powered leading networks like BitShares, Steemit or EOS.io.

Indie Protocol high-level architecture includes the following components, which are described individually.

Blockchain

Indie Protocol serves as a journal (e.g. a ledger) of user-signed instructions that become a binding agreement as soon as they are included into a block. After inclusion into a block, the agreements are stored indefinitely by means of a hash-linked-list (the Blockchain). From this ordered sequence of transactions, a current state (think: account balances) can be determined by processing all transactions consecutively starting at the very first block. As we will see later, the software will ensure that instructions that are stored in the Blockchain have been successfully authenticated and validated. For validating and processing of operations, a common set of rules define the consequences of particular actions, which are part of the of the Blockchain protocol.

Networking

Indie Protocol merely defines a means of storage and can be used in a non-distributed, single-participant fashion as well as in a distributed internet-based mesh network often referred to as Peer-2-Peer (P2P) network. In the latter case, multiple parties are connected with each other in a way that incoming transactions are forwarded to every other connected participant. A transaction ultimately reaches a so called block producer. A block producer verifies incoming transactions against a hard-coded protocol and bundles them into a single block that is added to the existing Blockchain. At this point, a transaction

is considered confirmed and executed. The effects of an executed operation on the current state are defined in the Blockchain protocol.

Consensus

Consensus is the process by which a community comes to a universally recognized, unambiguous agreement on a piece of information. In the context of Blockchains, consensus means agreement about the validity rules for transactions (i.e., the protocol), and the order in which they have been observed by the Blockchain. This ultimately results in an agreement about the state that is build deterministically from the those validity rules and the sequence of transactions. The most commonly known consensus scheme is Proof-of-Work (PoW), that is used by many Blockchains. Most dominant disadvantage is the heavy power consumption and the scalability in terms of transactions per second and confirmation times.

Indie Protocol makes use of a lesser known algorithm called Delegated Proof of Stake (DPoS) that was developed specifically to replace the wasteful 'mining' process, increase throughput and reduce reaction times of the Blockchain. It is a tremendous improvement when it comes to consumption of electricity and transaction throughput.

DPoS allows to generate a new block at fixed rate (block production/confirmation time) with minimal computational requirements. This means that the Blockchain can process more transactions in significantly less time and at almost no cost when compared to PoW-based Blockchains. Block production is performed by a set of so called block producers that take turns. After every turn, the order of block producers is randomized in a deterministic manner such that all parties agree on the new order.

Protocol

The most essential part of Blockchain technologies is here referred to as Blockchain protocol. It defines the behavior of the entire system including consequences and side-effects when processing transactions. Users utilize particular features by crafting a transaction that contains a particular letter-of-interest (also referred to as operation).

Since the Blockchain, as a storage, only stores incremental changes (e.g. transfers), the final balance of each account together with other information needs to be tracked separately in the so called current state. It is important to note that the protocol is deterministic in the sense that the very same state is generated when applying the same sequence of operations (as provided by the Blockchain). This makes Blockchain technologies tamper proof and auditable.

In Indie Protocol, many operations are available, and each of them hooks into the Blockchain protocol at least three times:

- **Validation**: During validation, the raw instructions (sometimes referred to as payload) are checked for consistency. E.g., in case of a transfer, we ensure that the amount to transfer is positive.
- **Evaluation**: In the evaluation step, the operation-specific instruction is validated against the current state of the Blockchain. In case of a transfer, we here ensure that the amount to be transferred is available in the account of the sender.
- **Application**: This step takes action in the sense that it modifies the current state. In the case of a transfer, we here reduce the account balance of the sender and increase the account balance of the receiver according to the amount of tokens transferred.

Example: Transfer operation

Consider a simple transfer operation that sends funds from one account to another. Here, the protocol defines the validation rules such that negative amounts are prevented. The evaluation ensures that the sender cannot transfer more than what is in his account balance. When applying a transfer from Alice to Bob, Alice is credited the transferred amount while Bob receives the amount. Here, transfer refers to

the operation type, while the sender, receiver, and amount refers to the operation-specific instructions. Obviously, different operation types come with different instructions.

Extensibility

The Software behind Indie Protocol is extensively modularized and implements its operations independently of each other. This allows for adding new features once the corresponding code, which implements validation, evaluation and application methods, reaches maturity. In a sense, operations on Indie Protocol are smart-contracts and allow for extending the range of functions of the system. In contrast to other smart-contracting platforms, however, Indie Protocol requires new features to be vetted by the core developers and approved by the IND holders before they can be installed by means of a network-wide protocol upgrade. As a consequence the platform is considered much more solid as new features require to go through multiple stages of quality assurance. These protocol upgrades are well coordinated and already happened successfully many times in the past on DPoS blockchains.

Performance and Scalability

Indie Protocol is designed from the ground up to process more transactions every second than VISA and MasterCard combined. Indie Protocol can confirm transactions in an average of just 1 second, limited only by the speed of light. High performance Blockchain technology is necessary for cryptocurrencies and smart contract platforms to provide a viable alternative to existing digital media technology platforms. To achieve this industry-leading performance, Indie Protocol was designed to meet the following:

- Keep everything in memory.
- Keep the core business logic in a single thread.
- Keep cryptographic operations (hashes and signatures) out of the core business logic.
- Divide validation into state-dependent and state-independent checks.
- Use an object oriented data model.

By following these simple rules, Indie Protocol is able to process 100,000 transactions per second without any significant effort devoted to optimization. It should be noted that the performance achieved by Indie Protocol is highly dependent upon having a compatible transaction protocol. It would not be possible to achieve the same level of performance in a protocol where the Core Business Logic is run in a virtual machine that performs cryptographic operations and references all objects with hash identifiers. Blockchains are inherently single-threaded, and the performance of a single core of a CPU is the most limited and least scalable resource of all. Indie Protocol is designed to get the most out of this single thread of execution.

Identity

Indie Protocol makes use of human-readable account names that have to be registered together with public-keys in the Blockchain prior to its usage. Thus, the Blockchain acts as a name-to-public-key resolver similar to the traditional domain name service (DNS). These named accounts enable users to easily remember and communicate their account information instead of using error-prone cryptographic addresses. Another benefit of having human-readable names is that creators can register their verified creator name, with proper validation by the committee, and become publicly verifiable *provenance* for the creations published in Indie Protocol.

Permissions

Indie Protocol designs permissions around accounts, rather than around cryptography, making it easier to use. Every account can be controlled by weighted combination of other accounts and/or keys. This

creates a hierarchical structure that reflects how permissions are organized in real life, and makes multi-user control over funds easier for users. Hence, Indie Protocol does technically not have multi-signature accounts, but has multi-account permissions. That said, each public/private key pair is assigned a weight, and a threshold is defined for the authority. In order for a transaction to be valid, enough entities must sign so that the sum of their weights meets or exceeds the threshold.

Authorities

Indie Protocol employs a state-of-the-art hierarchical private key system to facilitate regular keys and backup keys. Regular (basic) keys are publishing and performing non-financial operations, financial (active) keys are for performing financial operations, while a separate backup (owner) key can be used to recover access to an account in case of loss of the basic or active keys. Ideally the owner keys are meant to be stored offline, and only used when the account's keys need to be changed or to recover a lost key. Most software that supports Indie Protocol also encapsulates these key management functions in a way that the user experience is not even aware of the inner complexity involved.

Transactions

When users want to interact with Indie Protocol, they construct so called transaction and transmit them to the network. These represent messages that contain instructions about what operation(s) a user wants to use. A common operation is the simple transfer operation that comes with transfer-specific instructions that provides the necessary information for this action, such as the sender, receiver, the amount to transfer as well as an optional memo. To allow multiple operations to take place subsequently, multiple operations can be bundled into a single transaction. To identify against the system, transactions are cryptographically signed by the users. These signatures authenticate a user and provide authorization for the operations in the transaction.

Proposed Transactions

Additionally, Indie Protocol allows users to propose a transaction which requires approval of multiple accounts in order to execute. These transactions are only partially valid and do not execute until they are completely valid. The user proposes a transaction, then signatory accounts add or remove their approvals from this operation. When a sufficient number of approvals have been granted, the operations in the proposal are used to create a virtual transaction which is subsequently evaluated. Even if the transaction fails, the proposal will be kept until the expiration time, at which point, if sufficient approval is granted, the transaction will be evaluated a final time. This allows transactions which will not execute successfully until a given time to still be executed through the proposal mechanism. The first time the proposed transaction succeeds, the proposal will be regarded as resolved, and all future updates will be invalid.

The common use-case would be similar to so called multi-signature transactions which must be signed by two parties. Classical crypto currencies had the issue that such proposed transaction had to be communicated on separated channels until all required signatures have been collected. With Indie Protocol is possible to propose a transaction on the blockchain and have the required signatures be added by the respective parties.

Working Budget

The difference between max supply and circulating supply is called the Working Budget and has often in the past been referred to as the reserves.

Indie Protocol has a daily budget to use for development. This budget has an upper limit of funds that can be used from the working budget every day.

From this daily budget, payments for block production and committee, as well as project funding are made. Of course, the IND stakers have the choice and need to approve IND tokens leaving the working budget.

Fees

Similar to most other Blockchains, interacting with Indie Protocol comes with a fee for using its features (i.e. operations). Each operation comes with its own fee. Additional to block production and project funding which can drain tokens from the working budget, there are transaction fees paid by users of Indie Protocol that go back into the working budget.

As a consequence, the total amount of IND in the working budget as well as the total in- and out-flow highly varies over time. However, if compared to most proof-of-work-based Blockchains that constantly reward a (more or less) fixed amount of tokens to miners, Indie Protocol has a chance to have the working budget grow and consequently the circulating supply shrink. This is the case if the total transactions fees outweigh the tokens used for block production and project funding.

While, the IND holders have choices to either increase or decrease the funds used for block production and project funding, the committee has the choice to adapt the transaction fees by means of updating the fee schedule. In contrast to other Blockchains, Indie Protocol comes with fixed fees instead of a fee market. The fee schedule defines which feature of the Blockchain requires which amount of transaction fee for using it.

Referral Program

Indie Protocol has an integrated one-level referral system. Basically, everyone interacting on Indie Protocol needs to deduct a small transaction fee. From that fee (currently) 50% go into the Working Budget (for future funding of development etc.) and the other 50% go into the referral program from where, the registrar (frontend who paid the registration fee and enabled the user registration) as well as the referrer (who invited the user to register) receive a 25% reward each.

Verified Creator

Any account in Indie Protocol is considered a creator, as the protocol doesn't require an account for the users to access the content (the audience will be users in any frontend app, not on the protocol itself as they will not be publishing content). Although, any frontend users can opt-in to register if the frontend enables that function, and then they can publish content.

A creator can request the committee to become a Verified Creator. The requisites for the application are defined specifically for each network, but generically the creator would have to have a minimum amount staked in the protocol, pay the application fee and be verified by the committee as the real creator and not a copy cat. When an account is upgraded to a so called Verified Creator status, their human readable name can be changed to match the real creator name, and it no longer generates registrar and referrer rewards (although they receive the upgrade fee reward still) and the verified creator starts to receive a 50% refund on all fees.

Content Distributors

There is a special kind of account in the protocol, which is the distributor account. It has a similar application process as the verified creators, and in a way it is similar to the block producer accounts, as it will have a separate signing key to push content statistics feeds to the protocol. Any content published by these accounts will not receive the statistics fed by the same account, as that would be a clear conflict

of interest, and distributor status can be revoked if the committee verifies that they are colluding with any account for profit extraction.

A distributors market determines the ones that are active at each point in time. Each distributor is evaluated for each content category that they are submitting feeds for, and with these transactions they can send any amount of fees - imagine this like a paid subscription for the content they are using from the protocol. Their position in the rank is calculated by their stake and by the fees they have sent to the working budget with these weights: 25% stake median of current period, 25% total fees paid, 50% fees paid the current period.

The committee determines the number of active distributors at any point in time, so that a competition is created to be at the highest ranks. The distributor ranking is always public and serves as a public display of the distributors contributions to the creators in the protocol. The distributors that become inactive by falling out of the top tier will not be able to access content from the protocol, and their status can be revoked if the committee verifies that they are subverting the protocol rules of content access.

Legal Disclaimer

Indie Protocol is the code-base for many Blockchain Networks to be launched and ran by a network of voted block producer nodes (Blockchain nodes) around the world, similar to other DPoS blockchains as an infrastructure. Indie Protocol is not a company, a trademark nor a brand, Indie Protocol doesn't have any legal responsibilities as a platform nor as code; users of Indie Protocol might have responsibilities or legal obligations for using it toward their legal jurisdiction depending on their usage and the means behind it.

Our code is released as is, with a MIT license. It's up to the users of our open source code to decide what to do with it. Any Blockchain Network launched using Indie Protocol's code will be launched by their own community, and completely independent from Indie Protocol's core team, as we don't operate any client interfaces, provide any services, provide any channels, internet domains, block producer nodes or API nodes.

The core utility token of any Indie Protocol based network is used as utility for Blockchain operations fees and as power to participate in assigning active committee Blockchain users, assigning active witness nodes of Blockchain users and vote to issue utility token for development workers which are submitted by Blockchain users.

References

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2. Copyright wikipedia page https://en.wikipedia.org/wiki/Copyright