

## Abstract

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The Basic Income Token Protocol is an implementation of a Decentralized Autonomous Organization (DAO) that provides Universal Basic Income. The Basic Income currency is designed to be used as a transactional currency. It has been designed for low transaction latency, the ability to scale to thousands of transactions per second, low transaction fees, and dispute resolution for transactions. Income is distributed on a daily basis to all participants and represents a UBI. This paper is written to give a clear understanding of how the Basic Income Token Protocol works.

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## Introduction

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Universal Basic Income is a critical societal movement that must exist for the world to continue to function as jobs continue to be replaced by automation<sup>[1]</sup>. We live in a world with more abundant

resources than ever before, yet there are still people who struggle to make ends meet. It is our duty as humans to ensure that every person has access to the core necessities of life. The Basic Income Token Protocol is a proposal that lays the framework for a DAO with the purpose of distributing Universal Basic Income. Worldwide adoption of the Basic Income Token Protocol will allow the dream of Universal Basic Income to become realized. The protocol has been designed with practical and proven solutions, with additional functionality to aid mass adoption.

## **Account Types**

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To create a transactional currency that provides basic income, some form of structure is required to ensure the following remain true:

1. A unique individual should only be allowed to have one account that receives basic income.
2. Accounts not tied to individual identities must be permitted to exist for business and privacy reasons.
3. The system must remain decentralized to avoid single points of failure.
4. Rules must be able to be modified over time to allow for the changing needs of an active economy.

To solve these issues the Basic Income Token Protocol proposes 4 different account types that together, fill these different responsibilities.

## **Basic Income Citizens**

Basic Income Token Citizens are unique individuals that have been validated by an Identity Provider. Citizens have the ability to add claims to the blockchain once every day (days begin and end at midnight UTC). Basic Income Tokens will be awarded based on the number of days passed--with a maximum of seven. For example, if the three days have passed and a user makes a claim with the current production rate at 100 tokens, 300 tokens will be awarded.

### **Basic Income Entities**

Basic Income Token Entities are not connected to a personal real-world identity and therefore do not receive Basic Income. These accounts still must be approved by Identity Providers before being created. An Identity Provider must be linked to all Basic Income Token Entities, however Identity Providers are not allowed to make transactions on behalf of a Basic Income Token Account. Delegated Nodes and Identity Providers both inherit from the Basic Income Account type.

### **Delegated Nodes**

Delegated Nodes are responsible for maintaining full nodes and creating new blocks. Each election cycle Basic Income Token Citizens will sign votes to help choose which Delegated Nodes they would like to represent them. This means that Delegated Nodes act as elected officials with the capability to vote on proposals to add/remove other Delegated Nodes and Identity Providers.

### **Identity Providers**

Identity Providers are responsible for validating the identity of Basic Income Citizens and creating new citizens by generating a keypair

for each new Basic Income Token Citizen and including the identity on the blockchain. Identity Providers have the added responsibility of protecting Basic Income Token Citizens whose keys they control with buyer and seller protections.

**Identity Providers** have the following capabilities:

- Add new Citizens
- Freeze/Unfreeze Basic Income Token Citizens they have verified
- Make transactions on behalf of Basic Income Token Citizens they have verified
- Delete Basic Income Token Citizens they have verified
- Rescue orphaned Basic Income Token Citizens

## **Income Distribution**

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The goal of the Basic Income Token Protocol income distribution model is to provide a fair method of providing tokens to all Basic Income Token Citizens. The distribution method also must ensure that the amount of tokens entering the system should never cause a decrease in value. To more quickly reach the state where a mature economy has formed, early users will receive extra daily tokens during Stage One.

Tokens are distributed to users on a daily basis with a maximum of seven unclaimed days of tokens. A Basic Income Token Citizen must explicitly claim their tokens at least once per week to convert their *Unclaimed tokens* to normal *tokens*. Days are marked by blocks that occur between 00:00 UTC to 23:59 UTC.

The total number of tokens targeted to be added to the economy in Stage One is 70 Billion. After this stage has been reached, Stage Two will limit the number of new tokens that enter the economy to a healthy inflation rate.

## **Stage One**

In Stage One, income will be generated at an accelerated rate, so the economy can grow to maturity within a shorter time period. During this stage, Basic Income Token Citizens will receive Basic Income Tokens dependent on the number of Basic Income Token Citizens that are in the ecosystem. The formula to calculate the *Income Distribution Multiplier* is as follows:  $(781250 / (5^{\log_{10}(\text{users})}))$  with a maximum value of 100, and minimum value of 1.

## **Stage Two**

After the 70 Billion cap has been reached by following the formula of Stage One, Stage Two will come into effect. During this stage, new Basic Income Tokens will be given out to users at an inflation rate decided by the [Delegated Nodes](#) to all users in the ecosystem. It's their responsibility to choose an inflation rate that will avoid devaluing existing currency while ensuring the distribution is sufficiently large.

## **Referral System**

When a new Basic Income Token Citizen joins, there's an option to include the public key of the Basic Income Token Citizen that referred them. Referral bonuses are calculated using  $5 * \text{Income Distribution Multiplier}$ . For example, if there are 100,000 Basic

Income Token Citizens at the time of a referral, the bonus would be 500 Basic Income Tokens.

## **DAO Based Governance**

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Governance is an integral part of the Basic Income Token Protocol as it allows for outside data to be safely used for identity verification and economic control. However, the decentralized and autonomous elements of the Basic Income Token Protocol allow certain rules to be set in stone. These rules ensure a fair system exists where nobody has the ability to cheat in a way that is possible with centralized systems.

The Basic Income Token Protocol features an internal system that simulates a decentralized government. Basic Income Token Citizens have the responsibility to elect representatives known as [Delegated Nodes](#) that will have various powers within the government. These Delegated Nodes are required to both maintain the blockchain, forge new blocks, and vote on proposals.

### **Election of Delegated Nodes**

Each Basic Income Token Citizen has the ability to cast one vote on the network during each election of Delegated Nodes. The Delegated Nodes that receive the most votes will be elected to serve during that election cycle. The number of Delegated Nodes is decided by the following formula:  $\text{Max}(10, (\text{Basic Income Token citizens}/100000))$

### **Election Duration**

Elections will occur every six months for the first five years. Citizens will have a two-week time period in which they may cast their vote for their preferred Delegated Node. After the voting period has ended, a one-month grace period will begin--giving time for newly-elected nodes to prepare for their responsibility, and to prevent any potential splits in the chain.

## **Delegated Node Voting**

Delegated Nodes have the following abilities

- Elect new Identity Providers.
- Ban existing Identity Providers.
- Revert the chain state to sometime within the past 72 hours.
- Ban Delegated Nodes.
- Elect replacement Delegated Nodes.
- Choose the inflation rate in Stage Two.
- Vote on the salary for Delegated Nodes.
- Vote on the Salary Multiplier for Identity Providers.
- Vote to approve or disapprove funding proposals.

To perform these abilities, a proposal must be submitted to the blockchain by one Delegated Node. All other Delegated Nodes on the network will then vote on the proposal. Any proposal that receives 50% + 1 votes within 24 hours of submission will be executed.

## **Transaction Capabilities**

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The Basic Income Token Protocol is built to be a transactional currency. This means that exchanging money in the form of Basic

Income Tokens needs to be *at least* as convenient and safe as traditional banking systems. Four main factors have been focused on that will allow transferring Basic Income Tokens to be as simple as clicking a button or swiping a credit card.

## **Transactions Per Second**

Due to the controlled nature of the Delegated Node network, nodes can work to forge blocks extremely fast with a targeted time of three seconds per block. Other algorithms that have implemented proof-of-stake algorithms (such as EOS--which has the same functionality of having selected speaker nodes that forge blocks<sup>[2]</sup>) have proven that it's possible to scale such a system to 50,000 transactions per second<sup>[3]</sup>. For comparison, Visa is able to scale to 24,000 TPS <sup>[4]</sup>.

## **Low Transaction Fees**

Transactions have no inherent cost on Basic Income Token, however Identity Providers have the ability to set transaction fees--allowing them to have funds to resolve transaction disputes. The Basic Income Token Protocol reserves 80% of each block to be used exclusively by Identity Providers. The space is further partitioned by Identity Provider--proportional to the number of Basic Income Token Citizens each has verified with a minimum of 10 transactions per block. It's therefore the responsibility of Identity Providers to ensure that spam transactions are not added to the chain. The remaining 20% of each block will be open for transactions with a bidding system--in a similar manner to how Bitcoin functions <sup>[5]</sup>.

## **Buyer / Seller Protections**

Transactions are able to be signed either by a Basic Income Token Citizen's private key or the private key of an Identity Provider. This gives Identity Providers the ability to reverse transactions. Non-authorized transactions should only be used to settle disputes between buyer and sellers on the platform. When reversing funds is not possible, Identity Providers have the responsibility to use the money earned from transaction fees to settle any issues.

## **Transaction Latency**

A single confirmation of a transaction will usually occur within three seconds after publishing a transaction. Normal transactions should be signed by Identity Providers on behalf of a Basic Income Token Citizen when the citizen initiates an action. Therefore, any transaction signed by an Identity Provider has a high level of trust-as an Identity Provider is very unlikely to attempt a double-spend attack and can be trusted after a single confirmation. Transactions signed by individual citizens should wait for multiple transactions before being treated as final; this follows the same logic laid out in Bitcoin's Whitepaper [\[6\]](#).

## **Compensation**

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Compensation for Delegated Nodes and Identity Providers are a core part of the Basic Income Token Protocol. This compensation is used to heavily disincentivize bad behavior as these bad actions would result in heavy financial losses. Compensation also has the added benefit of making sure that the entire economy can continue to run smoothly for an indefinite period of time as funds will never be depleted.

Both Delegated Nodes and Identity Providers receive a salary in Basic Income Tokens for their service. Salary will be paid out on a daily basis at the same time Basic Income Token Citizens receive their daily income. The Basic Income Tokens generated will initially be drawn from the 70% pool dedicated to regular token distribution. Once that pool has been fully distributed, Basic Income Tokens for salaries will be created in addition to the Stage Two inflation distribution.

### **Delegated Node Salary**

Delegated Nodes will each receive an equal salary. The Delegated Nodes themselves will vote on their own salary--with the constraint that the salary must stay within a certain percentage of the previous salary. In the event that Delegated Nodes attempt to abuse this power, it's the responsibility of Basic Income Token Citizens to vote out the nodes.

### **Identity Provider Salary**

The *Salary Multiplier* for Identity Providers is decided by the Delegated Nodes. An Identity Provider's salary is determined by multiplying the number of Basic Income Tokens that have been claimed by Citizens under that specific Identity Provider by the Salary Multiplier. For example, if the Salary Multiplier is 0.01 and the Identity Provider has 100,000 active validated citizens that claimed 5,000,000 tokens during that day, the Identity Provider will receive 50,000 tokens at the first block after midnight UTC.

### **Reserved Funds**

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30 Billion Basic Income Tokens will be reserved; these tokens are not controlled by any central source. Delegated Nodes have the ability to award these funds to proposals with a majority vote. It's the responsibility of the Delegated Nodes to assign these funds on an as-needed basis to Identity Providers, Delegated Nodes, Basic Income Token Citizens, or Basic Income Token Entities in an effort to further the success of the Basic Income Token Protocol.

## **Funding Proposals**

When a Basic Income Token Citizen or Identity Provider requires funds to perform some task, they must submit a public funding proposal. This proposal will be written in plain text, signed with the requester's private key and then added to the blockchain. Nodes will then have one week to vote on the proposal. Non-votes are counted as "No"s. A majority consensus is required for the funds to be transferred.

## **Consensus Protocol**

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A new consensus mechanism is used in the Basic Income Token Protocol that allows for extremely fast block times while still being trustable. The Basic Income Token Protocol uses a new consensus mechanism called DPOI (delegated Proof of Identity). The mechanism works almost identically to DPOS (delegated Proof of Stake) <sup>[7]</sup>. The primary difference is that in DPOS people have a say proportional to the amount of stake they own in the currency. In DPOI, each Basic Income Token Citizen has the ability to cast a single vote regardless of the stake they own.

## **Selecting Forgers**

When Delegated Nodes are elected, they are placed into an ordered list of Delegated Nodes that are permitted to forge blocks. The ordering is determined by the amount of votes that each Delegated Node has received during an election. Nodes will then take turns forging blocks round-robin. When it's a node's turn to create a block, they will have a ten-second window to forge a block. If no block is forged during this duration, the next Delegated Node on the list will also have permission to forge a new block. This will be achieved by using a timestamp server [\[6\]](#).

## **Consensus**

Consensus is decided by following the longest chain. Delegated Nodes that attempt to perform a double-spend attack by signing multiple blocks will promptly be banned by other Delegated Nodes.

## **Protections**

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Due to the decentralized government system implemented by the Basic Income Token Protocol, there are potential attack vectors that should be carefully analyzed. These attacks have been outlined along with their potential impact and preventative measures.

### **Skip Attack**

If nodes are in the order <Bad Node> <Good Node> <Bad Node>, then the two bad nodes can collude to skip over the good node. When it's the first bad node's turn to create a block, it can create a block immediately, and only broadcast to the next bad node in the list. The second bad node can then wait ten seconds, sign the node, and then broadcast it normally. The chain with the two bad

nodes will be accepted since it's longer. While this attack is normally harmless, it does allow colluding bad nodes to take control of the network with only 25% +1 of the nodes if the nodes happen to be optimally placed.

### **Incubation Period**

All new Basic Income Token Citizens that join the Basic Income Token Protocol will be placed into an incubation period of one week. This prevents an Identity Provider from creating fake Basic Income Token Citizens to quickly create Basic Income Tokens for themselves--and gives Delegated Nodes sufficient time to ban the offending Identity Provider.

### **Sybil Attacks**

Identity Providers are disincentivized from performing Sybil attacks as it comes with the risk of getting banned from the platform by Delegated Nodes. Additional safeguards such as the incubation period and the blockchain rollback capability of Delegated Nodes also exist to help mitigate any abuse. Basic Income Token Citizens can attempt to submit fake documents to gain additional basic income, however they are disincentivized from doing so since being caught would result in losing both sources of income. It's expected that a few fake accounts may be created, but Identity Providers will be required to have very strict levels of regulation on how they approve new Basic Income Token Citizens, which should eliminate most abuse.

### **Round Robin Order Attack**

A group of colluding bad actors could collude to all try to receive a similar number of votes, allowing them to be placed in similar locations within the round-robin ordering. (See [Selecting Forgers](#).) A double-spend attack could then be completed with only a handful of bad nodes. This attack, however, can only occur once before being detected. Large transactions should wait for a sufficient amount of confirmations to combat this. Small transactions should be insured by Identity Providers.

### **Deactivation of an Identity Provider**

In the event that an Identity Provider attempts to perform fraud, they can be banned by Delegated Nodes. In the event that damage has already been caused by the action of the Identity Provider, Delegated Nodes can vote to revert the chain to a previous state with an Identity Provider banned. This will cause a large amount of economic damage but is meant as a last resort to enable the Basic Income Token Protocol to not be devastated by an attack and to disincentivize Identity Providers from acting poorly. Basic Income Token Citizen accounts that belong to that Identity Provider would consequently be orphaned until they were claimed and validated by another Identity Provider.

### **Constitution**

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Due to the fact that the Basic Income Token Protocol directly interacts with the real world through decentralized governance, there are certain rules which cannot be programmatically enforced yet are crucial for the Basic Income Token Protocol to function as intended. Delegated Nodes or Identity Providers that perform

actions in contradiction to the items listed in the constitution should be banned.

- Users shall all be treated equal and given the same amount of Basic Income Tokens regardless of their background.
- Identity Providers should share a decentralized internal system of identities to guarantee Sybil accounts cannot be created. The internal system should also make any potential transitions of Basic Income Token Citizens easier to accomplish.
- Delegated Nodes should be banned for the following reasons:
  - Regularly not performing their duty to vote on proposals.
  - Not forging new blocks during their turn within dBFT.
  - Refusal to include block data that does not support them.
  - Unreasonable policy voting that demonstrates harmful favoritism.
- Official announcements should always be signed to protect against forgery.
- The inflation rate should be balanced with the following factors in mind:
  - Avoiding an inflation rate that would overly devalue existing Basic Income Tokens.
  - Real-world effects that would result from a change in the rate.
  - The amount of income required to provide the basic necessities in life.
- Identity Providers should be banned for the following reasons:
  - Weak approval process allowing Sybil accounts--whether due to malice or negligence.

- Failing to provide adequate dispute resolution for transactions.
- Not performing their duty to approve new Basic Income Token Citizens.
- Unwillingness to cooperate with other Identity Providers on the platform.
- Proposals that are approved for funding should remain relatively liberal when the protocol is in its early stages and should slowly become stricter over time.
- Identity Providers should shield the user from the knowledge that there is a one-week incubation period and that transactions can take a few seconds to process. From the user's perspective, it's important that Basic Income Token appears to function as efficiently as a centralized system. In the event something does go wrong, it's the responsibility of the Identity Provider to take the loss to remedy the situation.

## **Connection To Basic Income Token**

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The Basic Income Token Protocol is simply the protocol that has been outlined above. Basic Income Token will be the initial Identity Provider on the Basic Income Token Protocol and all Tokens that exist on Basic Income Token at the time of launching the Basic Income Token Mainnet will be transferred at a 1:1 ratio. Basic Income Token Citizens will be required to undergo stricter Identity Verification requirements at this time to comply with KYC<sup>[8]</sup> and AML<sup>[9]</sup>.

## **Basic Income Token Features**

Basic Income Token is designed to be an extremely user-friendly platform that requires no prior knowledge of cryptocurrency--setting the standard for future Identity Providers. Basic Income Token provides an API as well as a marketplace to make it as easy as possible to transfer Basic Income Tokens for goods and services.

## References

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- [1] <https://www.mckinsey.com/global-themes/future-of-organizations-and-work/what-the-future-of-work-will-mean-for-jobs-skills-and-wages>
- [2] <https://github.com/EOSIO/Documentation/blob/master/TechnicalWhitePaper.md#transaction-confirmation>
- [3] <https://www.youtube.com/watch?v=UC6RYwYPnpU>
- [4] <https://usa.visa.com/run-your-business/small-business-tools/retail.html>
- [5] [https://en.bitcoin.it/wiki/Transaction\\_fees](https://en.bitcoin.it/wiki/Transaction_fees)
- [6] <https://bitcoin.org/bitcoin.pdf>
- [7] [https://www.researchgate.net/publication/318131748\\_An\\_Overview\\_of\\_Blockchain\\_Technology\\_Architecture\\_Consensus\\_and\\_Future\\_Trends](https://www.researchgate.net/publication/318131748_An_Overview_of_Blockchain_Technology_Architecture_Consensus_and_Future_Trends)
- [8] [https://en.wikipedia.org/wiki/Know\\_your\\_customer](https://en.wikipedia.org/wiki/Know_your_customer)
- [9] <https://www.investopedia.com/terms/a/aml.asp>
- [10] <https://github.com/CirclesUBI/docs/blob/master/Circles.md>

**Note** This Basic Income Token Protocol is designed to evolve over time. Improvements will be made as new technology is developed or it becomes clear that a change would improve the system. The core principle of distributing a Universal Basic Income will NEVER change.

Here are examples of changes / improvements that may come in the future:

- Identity verification performed in a decentralized manner similar to circles <sup>[10]</sup>--if proven effective against Sybil attacks.
- Separating the responsibility of running a platform from verifying identities.
- A bounty program to find Sybil accounts.
- A smart contract-enforced insurance system provided by identity providers.
- Having subsystems for individual countries with unique currencies while remaining automatically exchangeable.
- Hashed biometric data stored on the chain as added protection against Sybil attacks.