# Bitcoin 2.0 : A Peer-to-Peer Electronic Cash System

**"A specter called Bitcoin is wandering around the world."**

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## 1. Preface

In 2009, the first block of Bitcoin was created. Our achievements are manifold. Firstly, we solved the double-spending problem without the intervention of a third party. Secondly, we demonstrated that even in the digital realm, only one original can exist. Thirdly, the possibility of conducting cryptocurrency transactions through peer-to-peer networks. Fourthly, we showed the global citizenry that calculations involving numbers below the decimal point, an issue unresolved by conventional database systems, are no cause for concern.

The history of the credit currency system, which began with the Nixon Shock in 1971, barely extends beyond 50 years. While some may deem it successful, most scholars do not view it in the same light. It's widely accepted that credit currency capitalism is based merely on debt, represented by printed bonds, and that it's backed by the formidable force of state violence. We're well aware of this.

Perpetual national debts, never to be fully repaid, led to the issuance of currency threefold the previous circulation under the guise of stimulating consumption dampened by global pandemics. The physical currency we see now is merely printed paper, its value in continuous decline. The excessively inflated global monetary supply exacerbates wealth inequality, creates disparities between nations, and inevitably brings hyperinflation. The $1 in your possession holds its greatest exchange value today. This teaches us an empirical lesson the unlimited printing of credit currency continually diminishes its value while it's held.

After Bitcoin Peer-to-Peer Electronic Cash System was implemented in White paper and code, it faced trials from certain powers. Foremost, ‘otaku’ libertarians (free-market absolutists), centered in the United States, seized control of the Bitcoin Foundation. They notably granted legitimacy to the use of Bitcoin as a means of transaction in dark web markets, such as Silk Road, based on the TOR (The Onion Router) browser. Additionally, through gambling games like 'Satoshi Dice', they gathered Bitcoins mined by others and ultimately sold stakes to a wealthy Pakistani who was not fully aware of the game, thereby accumulating capital. This game also caused network overloads similar to DDos attacks on the Bitcoin system. With this capital, they built an exclusive community from the early minority, negating state intervention in capital control and thoroughly blocking

access to global citizens.

The irony here is that while advocating for a system free from central control, they themselves strengthened central control, exponentially increasing their capital. The exchanges they created are a prime example of this.

These libertarians boldly abandoned Bitcoin ‘One CPU One VOTE’ principle for unregulated capital growth, developed high-performance custom semiconductors (Applicaiton Specific integrated Circuits : ASIC), restricted widespread participation in mining, and even engaged in 'hard fork' to 'copy currency' thereby rapidly expanding their capital.

Moreover, they created new coins by merely adjusting the image and mining quantities, based on the same code as Bitcoin. This has further undermined the trust in Bitcoin code and their actions continue to this day.

As a result, the current Bitcoin system has morphed into a centralized system, vastly different from its original design. It is no longer a payment system but is sustained by considerable power consumption and powerful semiconductors, and has been co-opted by a few libertarians into a speculative store of value within the capitalist financial industry. A minority of mining equipment manufacturers and powerful capital-backed mining corporations, along with these libertarians, have turned Bitcoin into a myth representing freedom in their exclusive league.

The second group involves anarchists and advocates of the common good, experimenting in various ways. They participate in blockchain projects with a moral justification and a commitment to justice, considering the interests of global citizens more than the libertarians. While their projects are small, they discuss the commons or attempt to restore the essence of cooperative movements and P2P. However, the overall cryptocurrency market has already been dominated by the capital of libertarians.

It's insufficient to counteract the power of capital, and these projects are often subject to acquisition, mergers, or technology theft, rendering their impact on capitalist society minimal.

But all change and revolution always start from the periphery and the weakest links. The most pressing debate in the current reality is whether a means of transferring and storing value can aid the people in the Third World and whether a P2P platform that offers a common exchange value to all humanity in an efficient and cost-effective manner is feasible.

Bitcoin and our chosen Bitcoin 2.0 version, MicroBitcoin, each hold several meanings in their embedded numbers. The choice of mining only 21 million units is not random, nor is the significance of the eight decimal places, or the four-year halving period accidental. Similarly, the mining quantity of 61 billion in MicroBitcoin and the fees for tokens created on MicroBitcoin Layer-2 also carry meanings tied to significant numbers in human history. It is hoped that many developers and users will uncover the enigma presented by MicroBitcoin.

## 2. Before delving into the technical details

The significance of Layer-2 in what can be termed as Bitcoin 2.0, or MicroBitcoin, firstly means that the mainnet, MicroBitcoin, does not hold a fixed, stable exchange value. Despite its large issuance, it is used solely for transaction fees for tokens and STs on Layer-2. MicroBitcoin itself cannot be used for a fixed, stable exchange value but will hold value for community decision-making purposes.

Secondly, the MicroBitcoin platform allows anyone, even those without programming knowledge, to create new tokens or Security Token (ST) with just a few clicks. Once a Ticker is issued, it cannot be duplicated, ensuring unique token names. Additionally, token creators can set options to further issue or burn their issued tokens, enhancing the platform's openness and applicability across various fields.

We aim to realize the original purpose of Bitcoin inception by implementing the world's first true P2P electronic currency payment system on Layer-2 through MicroBitcoin. Some might question why not build a platform from scratch that implements this concept, separate from Bitcoin. But our goal is to create a 'Bitcoin 2.0' project that inherits Bitcoin philosophy and code while incorporating the most flexible and creative technology among existing cryptocurrencies.

We earnestly hope that developers worldwide will join to infuse new proposals and creative ideas. Material resources, being finite, must be managed by the community, whereas immaterial resources should be widely disseminated to open new horizons. Grounded in the spirit of the commons, we aim to expand this project as a tool for greater development of the global community.

**Abstract**. MicroBitcoin is decentralized blockchain intended to serve for micro-economy payments. It inherits Bitcoin UTXO set and initially has been implemented as an hard fork. After more than one year after launch some limitations began to arise, in particular extensive size of blockchain inherited from Bitcoin network and poor performance of PoW algorithm during block validation. To solve those issues on 9 October 2019 community switched to new network essentially abandoning old one. New MicroBitcoin network is featuring UTXO set snapshot, smaller block size, new block reward formula and cpu focused Proof-of-Work algorithm.

## 3. Prerequisites of new network launch

Initially original MicroBitcoin network has been launched 11 July 2018 as an hard fork of Bitcoin network. Main focus was on ASIC[1] resistance and faster block time to be

[1] https://en.bitcoin.it/wiki/ASIC

more suitable for micro-payments. To make interaction with currency units easier decimal poin was shifted by 4 places making 1 BTC equal to 10,000 MBC.

First MicroBitcoin block was mined at 11 July 2018 causing hardfork by replacing default sha256d hash function with NIST SHA-3 candidate Groestl[2] algo which didn't had ASIC implementation at the time and because of that was considered ASIC resistant. Time proven that this assumption was wrong after Baikal released[3] BK-G28 featuring Groestl support on 26 October 2018. Since this time BK-G28 miners had been main source of hash power on MicroBitcoin network fundamentally corrupting decentralization. After extensive research we stopped on Rainforest[4] PoW algo by Bill Schneider. On 6 March 2019 MicroBitcoin network hardforked to Rainforest and on 7 May 2019 to second version of Rainforest (also known as RFv2) which fixed some flaws of original algo.

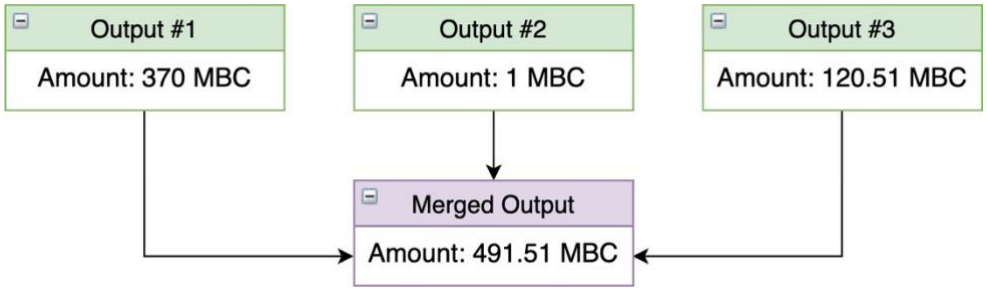
After a while it became clear that Rainforest v2 algorithm is way to slow during PoW validation phase and in combination with more than 200 GB of blockchain size make it very hard to sync/keep full node of MicroBitcoin essentially undermining decentralization. This situation became the main reason behind launch of new network.

## 4. Snapshot

Since MicroBitcoin network operates on UTXO[5] model where final address balance is basically sum of all unspent outputs, moving balances from one network to another is rather trivial task.

We took all UTXOs starting from block 525,000 (first MBC block) to block 1,137,200, copied them and merged. For example if address had 3 unspent outputs in old network, they had been merged into one output with sum of amounts.

Example:




All snapshoted outputs is located in genesis[6] block of new MicroBitcoin network and can be checked in explorer.

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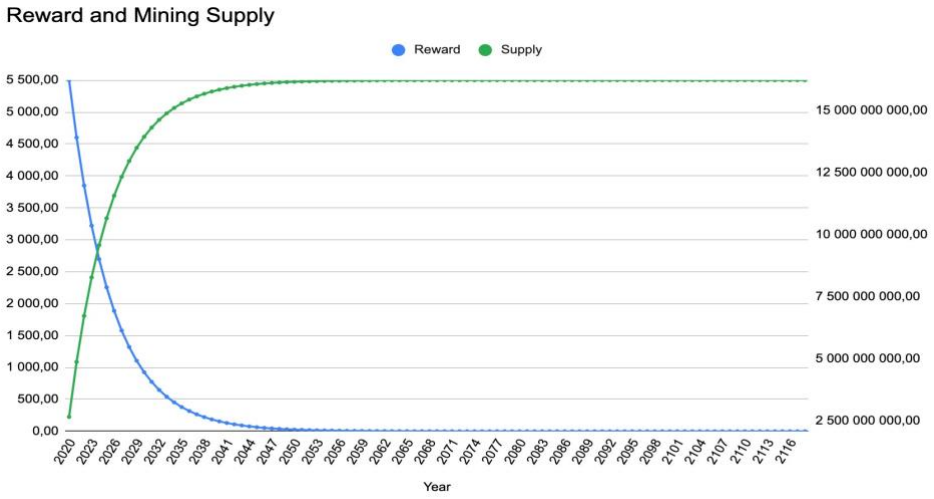
[2] https://www.groestl.info
[3] https://bitcointalk.org/index.php?topic=5057818.0
[4] https://www.slideshare.net/bschn2/the-rainforest-algorithm
[5] https://www.investopedia.com/terms/u/utxo.asp
[6] https://en.bitcoin.it/wiki/Genesis_block

## 5. Supply and emission

At the moment of new network launch total supply was over-minted for the current userbase, big chunk of funds haven't been moved since hard fork. To improve this situation coins which haven't been moved since block 525,000 (initial network launch height) hasn't been snapshoted and essentially burned. In total 44,386,397,362.4252 MBC has been activated. Approximately 2,700,000 BTC has moved since hard fork.

For better distributrion of new coins block emission schedule has been adjusted. Instead of halvings[7] which reduces block reward by 50% each 4 years new reward smoothly decrease each new block reward. Base reward is decaying by 30% each epoch which is around 2 years.

Graph for reward and mining suply:




Reward formula implementation in C++.

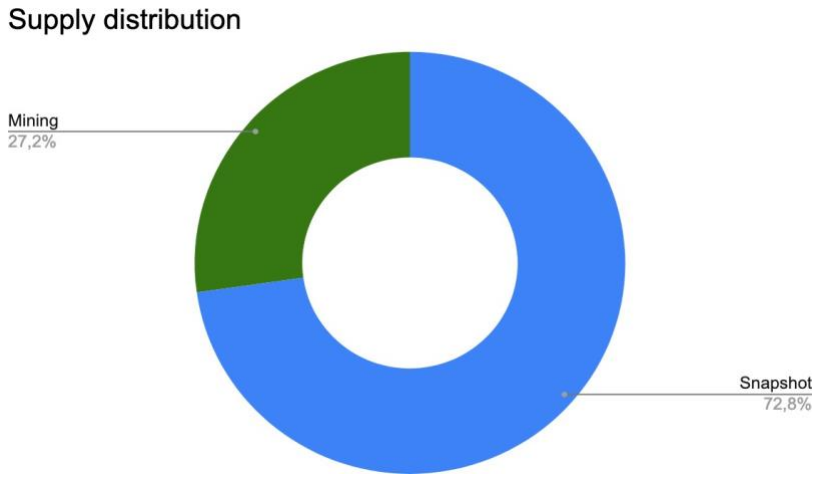
```cpp
#include <iostream>
#include <cmath>

// Amounts of satoshit per coin
const int64_t COIN = 10000;

int64_t reward(int height) {
  // Initial reward per block
  const int64_t reward = 5500 * COIN;
  // Reward decreasing epoch (2 years)
  const int epoch = 525960 * 2;
  // Decrease amount by 30% each epoch
  const long double r = 1 + (std::log(1 - 0.3) / epoch);
  return reward * std::pow(r, height);
}
```

[7] https://en.bitcoin.it/wiki/Controlled_supply

The total supply is limited to 61 billion MBC, of which 44,386,397,362.4252 MBC were activated through a snapshot from the previous network. However, among the MBC not converted from the BTC snapshot, Satoshi Nakamoto holdings will be activated only upon his request, acknowledging his contributions and support for BITCOIN 2.0, and will be time-locked to restrict usage. The remaining 16,613,602,638 MBC will be mined over approximately 100 years.




## 6. Block size

To make network more reliable, prevent block spamming and create better and fair fee market in terms of 1 block per minute model block size has been decreased to 300kb. Implementation is inspired by Bitcoin Core developer Luke Dashjr proposal[8].

## 7. Power2B Proof-of-Work algorithm

To encourage decentralization and idea of "One-CPU-One-VOTE" proposed[9] by Satoshi in original whitepaper of Bitcoin we used modified YesPower[10] hash function called Power2B[11] which was designed to be CPU-friendly, GPU-unfriendly, and FPGA/ASIC-neutral. It combines computationally expensive and sequential memory-hard hashing in a way that slows down GPUs to CPU-like speeds, and limits potential advantages for FPGAs and ASICs. So far YesPower proven to be decent CPU focused algorightm by providing security for dozens different cryptocurrencies.

Our Power2B modification replaces SHA256 based PBKDF2 and HMAC with blake2b[12]

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[8] https://github.com/bitcoin/bitcoin/compare/v0.17.1...luke-jr:example_300k-0.17
[9] https://bitcoin.org/bitcoin.pdf
[10] https://www.openwall.com/yespower/
[11] https://github.com/MicroBitcoinOrg/Power2B
[12] https://blake2.net

based implemetations in essence keeps YesPower original design intact. This has been done to make implemetations of FPGAs and ASICs for original YesPower incompatible with Power2B. This would require developers to create MicroBitcoin specific implementations of software/hardware and strengthening network security overall as an result.

## 8. Difficulty adjustment algorithm

MicroBitcoin network uses LWMA3[13] difficulty adjustment algorithm authored by zawy12. It sets difficulty by estimating current hashrate by the most recent difficulties and solvetimes. It divides the average difficulty by the Linearly Weighted Moving Average (LWMA) of the solvetimes. This gives it more weight to the more recent solvetimes. It is designed for small coin protection against timestamp manipulation and hash attacks. The basic equation is:

next_difficulty = average(Difficulties) × target_solvetime / LWMA(solvetimes)

## 9. Comparison to other Bitcoin hard forks

Here is table chart with comparison MicroBitcoin with other Bitcoin hard forks

| | Bitcoin | BitcoinCash | BitcoinGold | MicroBitcoin |
|---|---|---|---|---|
| **Total Supply** | 21M | 21M | 21M | 61B * |
| **PoW Algorithm** | SHA256 | SHA256 | Equihash | Power2B |
| **Mining Hardware** | ASIC | ASIC | CPU/GPU | CPU |
| **Block Creation Interval** | 10min | 10min | 10min | 1min |
| **Difficulty Adjustment** | Bitcoin DAA | SMA | LWMA2 | LWMA3 |
| **SegWit** | Yes | No | Yes | Yes |
| **Block Size** | 1mb | 32mb | 1mb | 300kb |

Keep in mind that MicroBitcoin have 4 decimal places instead of 8 like in case of Bitcoin. So in terms of Satoshi units[14] supply of MicroBitcoin is only 3x larger than supply of Bitcoin.

[13] https://github.com/zawy12/difficulty-algorithms/issues/
[14] https://en.bitcoin.it/wiki/Satoshi_(unit)

## 10. Token Layer

Blockchain technology, due to its inherent design, presents a unique set of issues when trying to implement new features. In order to preserve consensus when adding new features, all network peers must agree on a new set of rules - a hard fork. While building the Token Layer for MicroBitcoin, we took into account our previous experiences with hard forks and decided to use another approach: subnetworks built using blockchain data embedding. This is the perfect way to introduce new features like tokens within the existing ecosystem without hard forking or introducing new breaking changes to the existing consensus.

### 10.1 Overview

As the network grows, new ideas for features and improvements will appear. This usually consists of modifying the underlying consensus rules and requiring the majority of the network peers to update their software. This is, at the very least, inconvenient for network members and requires investing time and effort into maintenance. Furthermore, the community may not accept the newly proposed changes, which would lead to a network split, which is considered undesirable in most circumstances as it fragments community.

Soft fork is one solution to this problem, which was introduced by Bitcoin developers. The gist of it is adding new rules to consensus, making previously valid blocks invalid, for example, by limiting block reward after a certain percentage of the network accepts new rules by updating to a new software version. While pre-soft fork software can still process blocks created by update nodes as they are still part of consensus, new nodes won't accept blocks created by old software as it breaks newly established and agreed-upon rules.

On the other side, hard forking is modifying rules in such a way that previously invalid blocks become valid, for example, by adding token functionality to the network and essentially introducing new kinds of transactions with their own structure[15].

The emergence of layer 2 networks resulted from the limitations imposed on the underlying blockchain networks and the obstacles posed by both soft and hard forks. They introduce novel features in a distinct network that is governed by distinct rules and governed by consensus, which operates independently of the base network. A notable example of such an approach is the Lightning network[16] built on top of the Bitcoin blockchain, which facilitates instant payments off-chain and uses the base network to finalize those payments by broadcasting transactions and closing the payment channel. Omni Layer[17] is another good example of this approach to introducing new features to the underlying network without breaking consensus. It works by embedding its own payloads in `OP_RETURN`. This allows anyone to go through the Bitcoin blockchain and rebuild the current state of the Omni Layer by processing encoded payloads.

### 10.2 Design

Considering previous approaches of introducing new features we decided to use blockchain data embedding via `OP_RETURN` output as the basis for our Token Layer.

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[15] https://petertodd.org/2016/forced-soft-forks
[16] https://lightning.network/
[17] https://www.omnilayer.org/

`OP_RETURN` opcode is a standard way of attaching extra data to transactions is to add a zero-value output with a scriptPubKey consisting of `OP_RETURN` followed by data[18].

It's possible to attach up to 83 bytes of encoded payload in single transaction using this approach. For payload encoding, we decided to use Message Pack[19] as it provides a compact and efficient way to serialize and transmit data. Since we are working with rather limited storage capacity per transaction, efficient data storage is crucial.

A protocol is a set of rules and conventions that define how data is formatted, transmitted, and processed over the MicroBitcoin network. It enables all Token Layer clients to understand and interpret the information they exchange, allowing for seamless and standardized communication between them.

Token Layer works by scanning the MicroBitcoin blockchain. During this process, the client goes through each block, looking for `OP_RETURN` outputs in its transactions. If such output is found, the Token Layer client checks the first byte and compares it with the current chain ID, a unique identifier that is used to differentiate between different subnetworks. The chain ID byte is followed by a protocol payload encoded using Message Pack.

Token Layer uses Bitcoin-style satoshis to represent all amounts along with decimals specified by the token creator, which can range from `0` to `8`. For example, 10,000 TEST tokens with 2 decimals would be represented as 1,000,000 satoshis. The easiest and most obvious data type to store satoshi values in Message Pack is binary, which represents a byte array[20] since we can specify how much space we would need for our value field. We will convert integer values into a big-endian 10-byte array, which should be enough to cover most of the Token Layer requirements.

The token ticker has a set of limitations imposed on it, such as that it can only be uppercase, have Latin letters, numbers and `.` and `-` symbols. The length of the token ticker should be in the range of 3-32 characters. It also solves a couple different issues that are present in other similar solutions. For example, it can be used to represent different token types: root, sub, unique and owner.

Root token is base token type which can be used without any limitations. When root token created with `reissuable` field set to true Token Layer automatically creates owner token which is denoted by `!` symbol at the end of ticker: `TEST` (root) and `TEST!` (owner).

Owner token is used to represent ownership over root token as well as authorizing such actions as issuance of additional supply and creation of sub/unique tokens on top of root name. When issuing sub token same rules are applied.

Sub token can only be issued on top of an existing root token by its owner and is denoted by `/` symbol. As an illustrative use case, someone can issue `COMPANY` token and issue `COMPANY/STOCK` which can prove the authenticity of that token.

A unique token is used to represent non-fungible things and can only be created in 1 unit with 0 decimals, denoted by `#` symbol. As well as sub tokens, it requires a root token to be issued on top of them. An example of such an approach would be someone issuing `COLLECTION` root token and `COLLECTION#ART` on top of it.

Lastly, in order to manage such a complex system, the Token Layer has a

[18] https://en.bitcoin.it/wiki/Script
[19] https://msgpack.org/index.html
[20] https://github.com/msgpack/msgpack/blob/master/spec.md#type-system

governance system in place. It has an admin address that can issue special types of transactions that can ban, unban, change token creation or issuance costs, and update the fee address that will receive funds from token issuance. The admin address is set on network launch and can be updated only through hardfork. This system would ensure that such events as hacks and changes in underlying currency price fluctuations could be mitigated swiftly.

### 10.3 Protocol

Each protocol message has two permanent fields: version and category. The version field can be used in the future if modifications to the token layer protocol are needed. The category field defines what each given message does, for example, token issuance, transfer, burning, etc. Depending on the category, the message payload can contain additional fields like token metadata or the transfer amount. Unless the data structure matches all requirements for given category, the message will be discarded.

#### Create token message

This message is responsible for creating new tokens. It requires additional output to the governance address in order to pay the creation fee, this is done to prevent spam and token ticker squatting. Each token ticker is unique and can be used only once. Tokens have `reissuable` field that, if set to true, creates an additional owner token, for example, if the user creates token `TEST` he would also receive owner token

`!TEST`.

Category fields:

- `reissuable`: bool - defines whether owner can increase supply of this token
- `value`: bytes - token supply value encoded in bytes
- `decimals`: int - token decimal places
- `ticker`: str - token ticker

Example raw data:

```
{
    "v": b"\x00\x00\x00\x00\x00\x00\x00\x0fB@", # Value - 1000000 satoshis
    "r": False, # Reissuable - false
    "t": "TEST", # Ticker - TEST
    "d": 2, # Decimals - 2
    "c": 1, # Category - create
    "m": 1, # Version - 1
}
```

Example encoded message:

`86a176c40a000000000000000f4240a172c2a174a454455354a16402a16301a16d01`

#### Issue token message

This message is responsible for increasing token supply. It can be use only if token `reissuable` is set to true and user has owner token. This category required additional output to the governance address in order to pay the creation fee.

Category fields:

- `value`: bytes - token additional supply value encoded in bytes
- `ticker`: str - token ticker

Example raw data:

```
{
    "v": b"\x00\x00\x00\x00\x00\x00\x0fB@", # Value - 1000000 satoshis
    "t": "TEST", # Ticker - TEST
    "c": 2, # Category - issue
    "m": 1, # Version - 1
}
```

xample encoded message:

`4a176c40a000000000000000f4240a174a454455354a16302a16d01`

**Transfer token message**

This category is responsible for transferring tokens between address balances. It requires additional output to the receiver address with a small marker amount, which would help Token Layer clients identify the transfer receiver. If `lock` field is set to `int` value, the receiver won't be able to spend the tokens he received until the specified height.

Category fields:

- `lock`: int or null - optional block height until which transfer will be locked and unspendable
- `value`: bytes - token transfer value encoded in bytes
- `ticker`: str - token ticker

Example raw data:

```
{
    "v": b"\x00\x00\x00\x00\x00\x00\x0fB@", # Value - 1000000 satoshis
    "t": "TEST", # Ticker - TEST
    "l": 100, # Lock - block #100
    "c": 3, # Category - transfer
    "m": 1, # Version - 1
}
```

Example encoded message:

`85a176c40a000000000000000f4240a174a454455354a16c64a16303a16d01`

**Burn message**

This message is responsible for burning tokens on address balance. It equires no additional outputs and can be performed by any token holder.

Category fields:

- `value`: bytes - token burn value encoded in bytes
- `ticker`: str - token ticker

Example raw data:

```
{
    "v": b"\x00\x00\x00\x00\x00\x00\x00\x0fB@", # Value - 1000000 satoshis
    "t": "TEST", # Ticker - TEST
    "c": 6, # Category - burn
    "m": 1, # Version - 1
}
```

Example encoded message:
`84a176c40a000000000000000f4240a174a454455354a16306a16d01`

**Cost message**
This admin message is responsible for changing MBC cost of token creation/issuance. Can be used only by Token Layer governance addresses.

Category fields:

- `lock`: int or null - optional block height until which transfer will be locked and unspendable
- `value`: bytes - token transfer value encoded in bytes
- `ticker`: str - token ticker

Example raw data:

```
{
    "v": b"\x00\x00\x00\x00\x00\x00\x00\x0fB@", # Value - 1000000 satoshis
    "t": "TEST", # Ticker - TEST
    "l": 100, # Lock - block #100
    "c": 3, # Category - transfer
    "m": 1, # Version - 1
}
```

Example encoded message:
`85a176c40a000000000000000f4240a174a454455354a16c64a16303a16d01`

**Ban message**
This admin message is responsible for banning token balances at the specified address. It requires additional output to the ban address with a small marker amount, which would help Token Layer clients identify address to be banned. No additional fields are required.

Example raw data:

```
{
    "c": 4, # Category - ban
    "m": 1, # Version - 1
}
```

Example encoded message:
`82a16304a16d01`

**Unban message**

This admin message is responsible for unbanning token balances at the specified address. It requires additional output to the unban address with a small marker amount, which would help Token Layer clients identify address to be unbanned. No additional fields are required.

Example raw data:

```
{
    "c": 5, # Category - unban
    "m": 1, # Version - 1
}
```

Example encoded message:

`82a16305a16d01`

**Fee address message**

This admin message is responsible for updating fee address which would receive MBC payments for token creation and issuance. It requires additional output to the new fee address with a small marker amount, which would help Token Layer clients identify new fee address. No additional fields are required.

Example raw data:

```
{
    "c": 7, # Category - fee address
    "m": 1, # Version - 1
}
```

Example encoded message:

`82a16307a16d01`

**Links**

Official Website: https://microbitcoin.org
GitHub: https://github.com/MicroBitcoinOrg/
Explorer: https://microbitcoinorg.github.io/explorer/#/
Web Wallet: https://microbitcoinorg.github.io/wallet/#/
API: https://api.mbc.wiki/
Discord: https://discord.gg/8zg2nTV
Telegram: https://t.me/microbitcoinorg
Twitter: https://twitter.com/MicroBitcoinOrg
Forum: https://mbc.wiki
BitcoinTalk: https://bitcointalk.org/index.php?topic=3982489.msg37769108
Reddit: https://www.reddit.com/r/MicroBitcoinOrg/
Token Layer: https://github.com/MicroBitcoinOrg/Tokens