Blockchain

The operating system for music

A solution to the music copyright mess

Democratizing copyrights

This document describes an open source approach to managing and storing copyrights on a decentralized ledger. By harnessing the power of blockchain technology Revelator aims to pave the way for all participants in the music industry (whether an artist, label, publisher or streaming service) to access and use a public, trustless and highly secure database. By allowing open access to this information we can introduce a much needed transparency, allowing all parties to better manage and monetize the complex world of music copyrights.

This document starts by describing the current problems in the fragmented world of music copyrights, then proceeds to introduce the notion of "blockchain technology" and demonstrate how it can alleviate much of the pain associated with this complexity. We also discuss scale issues and point to possible solutions.

The problem with song copyrights

Digital rights management in the music industry has, over the years, become painfully complex. Determining such basic information as who wrote a song and who owns a recording can be a herculean task. The lack of transparency and a central database that organizes information about music has created major hurdles when trying to license a song, determine rights owners, and pay the right parties on time. Without an easy avenue to validate rights, would-be licensors are forced to embark on musical goose chases whenever they need to ascertain ownership.

"No one predicted the digital revolution thirty years ago when entering information in a database".

Bruno Guez

How DRM works today

For every song that is born, there are writers, musicians, managers, recording artists, record companies, publishing companies and (the list goes on) who can claim rights to it. As D. A. Wallach put it, "If someone writes and records a song, they effectively create a basket of rights." The problem with this model is that it is extremely difficult to determine how much to pay to whom. Payments not only get held up, but they sometimes never even reach the right recipients. It's a broken system.

Why there is no transparency

While every member of the music chain suffers from this complex, inefficient, and outdated system, no one seems to have the incentive to improve it. Data is siloed in the databases of record companies, publishers, and collecting societies, and they don't want to share it. Because they don't have authority over one another, and are only required to share information with their artists, no one can force anyone else to share their data.

And with good reason. They don't want to pay up when they don't have to. They don't want to expose how poor their reporting and money collecting is. They don't want to reveal that their priorities are elsewhere, and they choose not to invest in infrastructure to improve their systems. Yet, to be fair – they also do not have the resources to easily offer transparency of their data.

This is where technology comes in. With the right technology, data can become transparent, accessible, and easier to understand. Artists will – for the first time – get a clear picture of their performance and finances in real time. For example, by learning where their audience is, they can plan which cities to tour in. Actionable insights and better decisions are the natural result of live, transparent information.

Today, everyone is trying to make it in the dark. Closed systems and centralized authorities are continuing the bad habits of data siloing and lack of visibility. But if we remove some of these obstacles and make access to information open and free for all, artists everywhere can make better decisions to boost their careers.

Blockchain Technology - A solution

Blockchains are a recent technological innovation that is suited to address many of the pain point that currently plague the overly complex world of music copyrights. In what follows we shortly describe what blockchains are and what pain points of the music copyright industry it can address.

Blockchains

A blockchain is a decentralized ledger powering Bitcoin-like digital currencies.

This ledger is public and duplicated across a "peer to peer network" while still maintaining a coherent state (agreed upon by all participants) without requiring trust or a central authority.
The ledger entries validity is ensured cryptographically and every so often (for example, 10 minutes on average on the Bitcoin network) new valid entries are bundled into a new "block".

The chain of blocks (hence "blockchain") constitutes the agreed upon state of the ledger. It's security relies on the fact that it becomes exponentially harder to change the content of a block the deeper it is in the chain.

Blockchain promotes a decentralized paradigm for data storage security, that is:

- **Transparent:** All the data is public, no one can manipulate the data out of sight.

- **Redundant:** Everyone holds a copy of the data, no one owns it or can "take it offline".

- **Permissionless, global & open:** Everyone can participate for free.

- **Immutable:** Changing record history is prohibitively difficult.

Blockchain applications

While originally designed as the backbone for a digital currency, it was soon realized that one can use blockchains for other purposes. For example, colored coins provide a novel way of manipulating digital assets by associating metadata with negligibly cheap Bitcoin transactions ("Bitcoin dust") that unambiguously represent the creation or transfer of digital assets.

Multisignature addresses and smart contracts

The Bitcoin blockchain supports more than just sending value over the internet.
One interesting ability, is a multisignature (or "multisig" for short) address which splits ownership between multiple parties (like a safe deposit box that needs more than one key to be opened). For example, the copyrights to a song can be shared between all 5 members of a band in such a way that doing a deal with a new label, requires at least the digital signatures of 3 band members to execute the transfer transaction or contract.

More generally one can speak of "Smart Contracts" (or self enforcing contracts) that are programs executing a contract, without the need of an outside enforcer. Because the Bitcoin blockchain is decentralized and immutable, everyone can trust a smart contract that runs on it.
For example, one can describe a contract where upon buying a song on iTunes, the value is immediately distributed with certain percentages (say 30%, 30%, 40%) between 3 predescribed parties (e.g. Apple, the record label and the artist). Even more, the colored coins protocol supports a highly flexible rules engine where one can encode much of the legal complexity of a given copyright and have it execute automatically.

Blockchain Technology for music copyrights

Blockchain based technologies (and colored coins in particular) can address two different classes of problems that currently plague the music copyright industry.

Data Openness and Standardization

Once music metadata becomes standardized, publically available, free and not owned by anyone, it will be much easier to convince all involved parties to come on board and use it.
Legal ownership of a piece of music will be immutably burned into the blockchain database, easily verifiable and indisputable.
Applications for parsing and analyzing this freely available music metadata will alleviate much of the headache currently involved in figuring who owns a piece of music.
Artists can directly see their revenue stream and facilitate direct contact with their fanbase.

Copyright Ownership and Transfer

Transferring and trading music copyrights will become as easy as sending an email and available on mobile apps, enabling a secondary market of music rights to flourish.
Smart contracts will allow automatic and instantaneous payments to relevant parties, or expiring a copyright after a predesignated amount of time.

Challenges for Blockchain Technology

The Bitcoin Blockchain is currently the most market ready tool for this proposition, it's the first and longest running blockchain with a proven security model and by far the biggest network effect. But, decentralized solutions are

trustless and usually less efficient for quickly processing and storing large amounts data.

Although we are not storing the information directly on the blockchain but rather use the blockchain as a validation ledger that effectively renders the information immutable, we still face some problems with this young technology:

- **Size:** The amount of data that can be attached to any one record (transaction) is quite limited. For example, only one free metadata field (OP_RETURN, currently limited to 40-80 bytes of data) per transaction, is allowed.

- **Bandwidth:** The Bitcoin blockchain currently supports ~7 transactions per second (TPS)

- **Cost:** Recording data on the blockchain can be done by anyone but involves a fee (bitcoins).

- **Time:** It can take up to an hour for records to become sufficiently immutable.

Those problems are already being addressed while this young technology gains momentum. But once we see bottlenecks start to form we might use a hybrid solutions (Bitcoin + other blockchain) or enhance the capabilities and publish more public data using a dedicated "Blockchain for music".

A blockchain copyright template

In this section we present a short code snippet serving as an example of publishing the copyrights to a piece of music on the Bitcoin blockchain using the colored coins SDK.

```
{amount: 1,
 metadata: {
  assetName: 'Song',
  issuer: 'Revelator',
  description: '"Nothing but Love" by Bruno Guez & Sunny Levine',
  urls: [
   {
    'official video',
    'https://youtu.be/fxvkI9MTQw4',
    'flv',
    '767b13fc3a176a63ddc7ef7ad236192596948f8e7992d3eba35a1efcd2d634bc'
   }
  ],
  userData: {
   meta: [
    {
     'Title',
     'Nothing but Love',
     'String'
    },
    {
     'Track',
     '~/music/nothing_but_love.mp3',
     'mp3'
    },
    {
     'Performers',
     {
      Guitar: 'Giuseppe Patane',
      vocals: 'Mozella',
      Bass: 'Sunny Levine',
      Drums: 'Bruno Guez'
     },
     Json
    },
```

```
    {
     'ArtWork',
     '~/Pictures/nothing_but_love.png',
     'Image'
    }
   ]
  },
  credits: {
   written_By: {
    writer_1: 'Bruno Guez',
    writer_2: 'Sunny Levine'
   },
   {
    published_by: {
     publisher_1: 'Quango Selector  (BMI)',
     publisher_2: 'Love Rhino Music (ASCAP)'
    },
    {
     Additional_Production_by: 'Peter McEvilley'
    },
   },
   rules: {
    fees: [{}],
    expiration: {},
    minters: [{}],
    holders: [{}]
   }
  }
 }
}
```

Conclusion

Blockchain technology can simplify much of the unnecessary complexity that exists in the music copyright industry by promoting a free, public database of music copyrights. Issuing music metadata, songs and recordings as digital assets on a blockchain can make them easily tradable and the use of smart contracts can automate much of the associated legal cobweb. All actors in the industry are expected to benefit from this technology which will make their contributions and resulting revenue streams transparent and immediate.

Welcome to the new music industry!