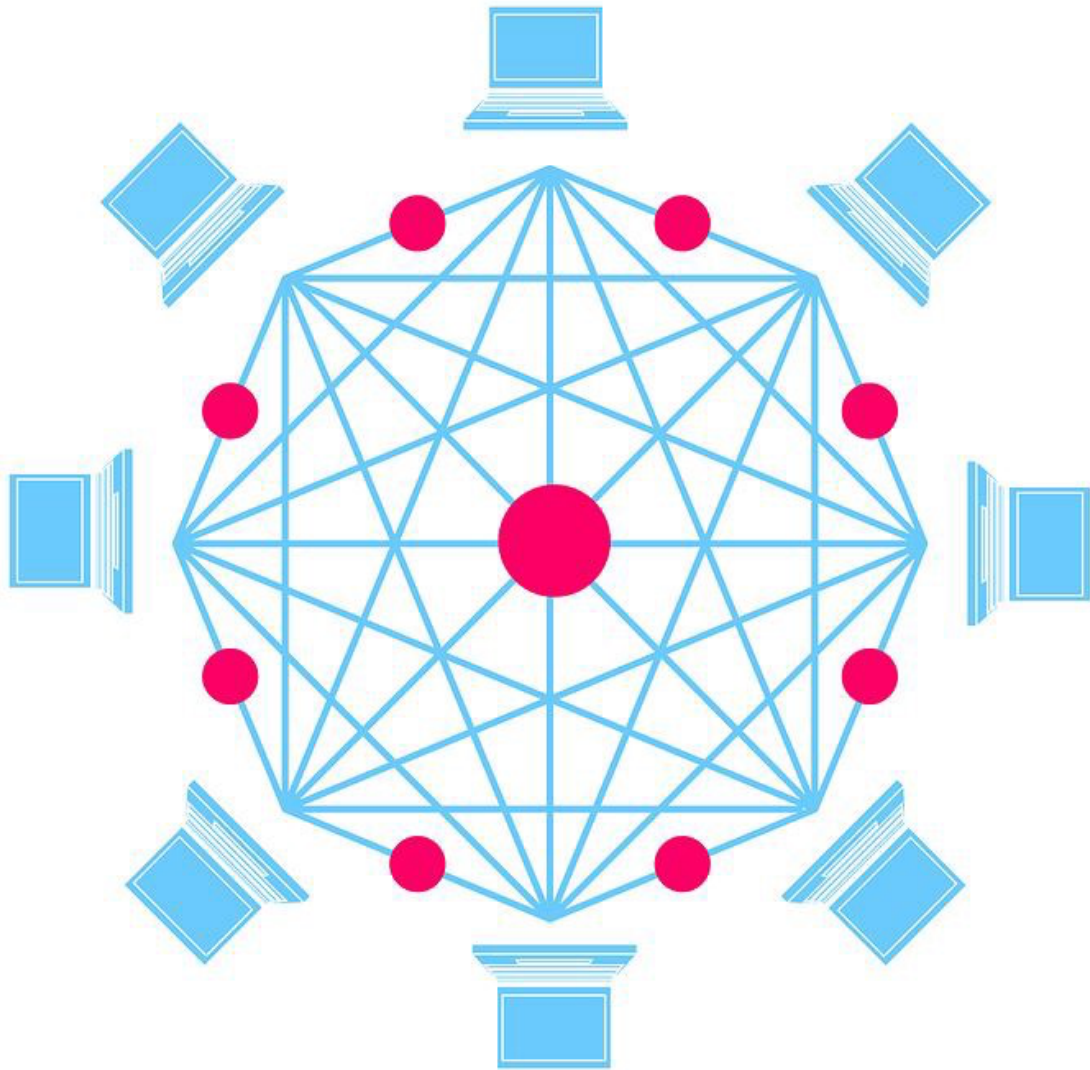




“Explain the definition, commercial uses and legal implications of blockchain on the music and entertainment industries.”

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Legal & Business Affairs
BMTY7002
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1. Introduction

In 2017, the world became gripped by a hysteria caused by a somewhat misunderstood cryptocurrency: Bitcoin. During the year, the value of one Bitcoin rose an incredible 1,244%, from \$998 on 1st January 2017 to \$13,412 a year later (Webster, 2020). This meteoric rise, which included an incredible peak of almost \$20,000 on 17th December 2017, became worldwide news (Webster, 2020). Comparisons were drawn between the Bitcoin price bubble and the Dutch *Tulpenmanie* (Tulip Mania) of the 17th Century, and sure enough, like the Tulip Mania, the bubble burst (Webster, 2020). In late 2017 and early 2018 the value of Bitcoin fell almost as rapidly as it had risen. For much of the public, the news stories about the incredible rise and fall of Bitcoin was their first exposure to blockchain technology. Some people made lots of money and some lost lots, however not many people understood the blockchain technology behind it all.

The concept of Bitcoin was first published as a white paper in 2008 by a mysterious person (or persons) called Satoshi Nakamoto, however the underlying blockchain technology which Bitcoin utilises was first theorised in 1991 by research scientists Stuart Haber and W. Scott Stornetta (Narayanan *et al*, 2016). They envisaged a world in which 'all text, audio, picture, and video documents are in digital form on easily modifiable media', a world not too dissimilar from ours today (Haber and Stormetta, 1991). In their minds however, this digital world created a problem: 'how can one certify', without any risk of forgery occurring, 'when a document was created or last modified?' (Haber and Stormetta, 1991). Haber and Stormetta's article, *How to Time-Stamp a Digital Document*, suggested two solutions to this problem; the second of which, crucially, removed the need for a centralised time-stamping service, therefore forming the basis of Nakamoto's concept for Bitcoin (Haber and Stormetta, 1991).

It is important to note that blockchain and Bitcoin are not one and the same: Bitcoin is one manifestation, or one application, of blockchain technology in the same way that a French fry is one way to use a potato! Blockchain (the potato) forms the basis of the end product but can be utilised in different ways to create widely varied results: baked, mashed, chunky chips, crisps etc. More technically put; blockchain technology allows the creation of an open, secure public ledger of data, but the content of that data can vary massively. Bitcoin is the first mainstream application of this technology which utilises it for worldwide, peer-to-peer payments, but the potential uses for blockchain stretch far beyond cryptocurrency and financial services. These include, but are certainly not limited to: smart contracts, monitoring and legitimising supply chains (such as prescription drugs), digital voting in elections, logistics and asset tracking, digital identification, tax regulation/payment, and copyright protection and royalty payment.

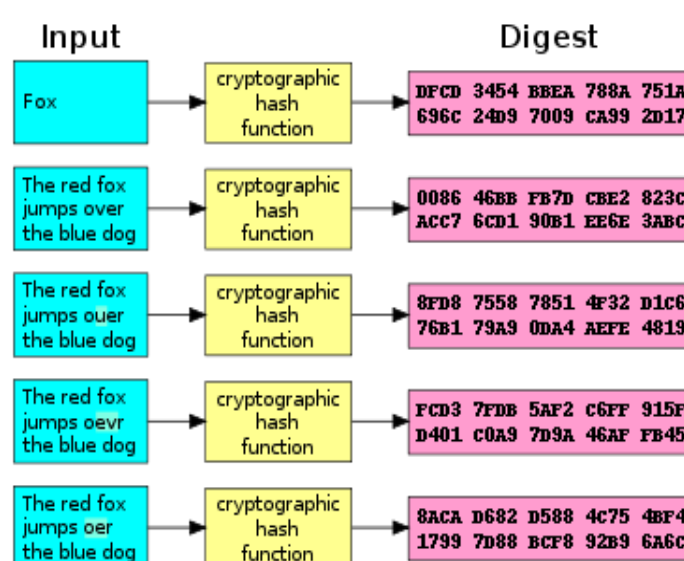
The common denominator for all these potential applications of blockchain technology is trust. Blockchain creates a ledger which is public, immutable and unforgeable, and therefore trustworthy. As a result of this, blockchain technology has the power to replace the trust we put in a centralised authority such as banks, the Electoral Commission, or PRS. This essay will endeavour to explain how blockchain works and study the possible commercial uses and legal implications of blockchain for the music and entertainment industries, with specific focus on copyright protection and royalty payments.

2. What is blockchain technology?

In broad terms, blockchain can be defined as a 'distributed, decentralised, public ledger' that records transactions or data in a verifiable and permanent way (Fortney, 2019) (Iansiti and Lakhani, 2017). To fully understand this concept, it is helpful to break blockchain into its two halves: the *blocks* and the *chain*.

Each *block* contains some form of information or data; to understand the potential of blockchain it is important to appreciate that this data could be anything. In the case of Bitcoin, this data is the details of a financial transactions: the sender, the recipient, and the value of Bitcoin exchanged. This individual block is like one page of an accountant's big, old-fashioned ledger, which would contain a list of transactions with information such as dates, money exchanged, the two parties involved and perhaps signatures of receipt of payment.

Each block also contains something called a *hash*. This hash is cryptographic and comparable to a fingerprint in that it uniquely identifies the specific block and all of its contents. A hash is a long string of numbers and letters which is nonsensical to the human eye. Crucially, the contents of the block (the data) is intrinsically linked to the hash because the data itself determines the nature of the hash through a cryptographic hash function (see image, right). Therefore, if any of the data in the block is altered, even very slightly, then the hash completely changes. Think of this as the unique page number in the accountant's ledger, but one which changes if any of the details on the page are altered.



([https://en.wikipedia.org/wiki/Cryptographic hash function](https://en.wikipedia.org/wiki/Cryptographic_hash_function))

The third and final component of every block is the *hash of the previous block*. When a new block (a new page of data in the accountant's ledger) is created, this block contains the hash information from the previous block, thus creating the *chain* element of blockchain. This chain of blocks is fundamental to the security of blockchain technology. As described in the previous paragraph, if any of the data within a block (Block A) is altered/tampered with then the hash of that block automatically changes with the new data. If this occurs, then the *hash of the previous block* in the following block (Block B) will be incorrect and the entire chain of blocks beyond Block A become invalid and untrustworthy. As such, for the data in Block A to be successfully tampered with or altered then each following block (Block B, Block C etc.) would also need to be consecutively altered to give each of them a new hash and a *previous hash* which matches the newly changed hash of the block before. This creates too much work to even be possible, let alone worthwhile, and all other users in the network would immediately be made aware of the invalid previous hash, indicating which specific block had been altered. This concept is the basis of blockchain's security because the creation of a chain of blocks makes each individual block almost impossible to alter.

When a block is added to the chain it is distributed via a peer-to-peer network to all members. A peer-to-peer network replaces the need for a centralised server by employing users as mini-servers themselves, known as *nodes*. Over time the chain of blocks (or accountant's ledger) grows bigger and bigger as more blocks (pages) are added. In much the same way as an accountant would be able to refer back to previous pages in their ledger, previous blocks within the chain remain open and accessible (but immutable). However, the similarities between blockchain and the accountant's ledger end here. Whereas the accountant, and probably manager/CEO, are the only people with access to the ledger, blockchain is open to everyone; all members of the network can look back through the blockchain and view any blocks of data, past or present. In the accountant's ledger example, the accountant is the centralised authority who exclusively controls the creation, verification and viewing of the data within the ledger. Blockchain, however, is decentralised and public, and this is its greatest asset.

Having said this, a blockchain can be made permissioned; in other words, private. A private blockchain network requires permission from a centralised *owner* of the network to enable users to access the blockchain information; 'users are not freely able to join the network, see the recorded history, or issue transactions of their own' (Dob, 2020). Permissioned networks could be of great use to firms and organisations for recording and sharing private and internal information, much like they may use an intranet today.

The final element to blockchain technology, particularly relevant to the music and entertainment industries, is the capability for smart contracts. A smart contract is 'a self-executing contract with the terms of the agreement between buyer and seller being directly written into lines of code' (Frankenfield, 2019). This agreement exists across a blockchain network which irreversibly tracks, validates and logs any smart contract transactions that occur (Frankenfield, 2019). In short, this technology removes the need for any middlemen, acting like a vending machine: you select what you want, drop the money in and the machine instantly drops the product you selected (Rosic, 2017). In practice, a user would send money (cryptocurrency) to another user, the receipt and verification of which would automatically trigger the code to digitally send back the product/good. This entire transaction would be recorded automatically onto a blockchain and therefore any disputes about money/goods not being received could be easily solved. As in the following section, these smart contracts have the potential to be of particular use to the music and entertainment industries.

3. Commercial uses within the music and entertainment industries

Today's music and entertainment industries are dominated by *middlemen*. PRS, record labels and distribution companies could all be considered middlemen, acting between the artists/producers and the consumers. Blockchain technology and smart contracts reduce the need for these middlemen and could therefore be extremely disruptive to these industries, be it for better or for worse.

One area which blockchain could be commercially useful is in the collection of royalties for musicians, producers and directors etc. A combination of blockchain and smart contract technology could create a system which could more accurately and more swiftly pay the content creators their royalty share for their work. Currently, royalty collection services, such as PRS and PPL, pool together all royalties within their territory and then calculate a split between all artists, paying out every three months. This process is backdated and therefore takes at least six months for artists to receive their royalties, and even longer for royalties from abroad. It also relies entirely on trusting the centralised authority of a collection service, as well as the venues/TV companies etc accurately declaring what royalties they owed.

However, blockchain technology creates the possibility for the establishment of a ledger which automatically (or manually) records data about public performances such as the song title, artist, songwriters, performers, and details about the audience size; all the details PRS and other collection societies consider at the moment. This information could be provided in real-time and transparently accessible to everyone, crucially including the artists and content creators themselves. By combining this data with smart contracts coded into the blockchain, artists could also receive their royalty payments directly and immediately upon the verification of the block. The blockchain technology would remove the need for a centralised collection service and also eliminate the six-plus month wait for royalty payments to be received.

Similarly, blockchain technology has the potential to disrupt the business models of DSPs such as Spotify and Apple Music. Currently DSPs pay record labels and distribution companies the share of streams that their songs have achieved in that week as a percentage of all songs. However, blockchain technology creates the potential for customers to directly pay the artists/record labels on a micropayment basis, fundamentally altering the role of DSPs within the industry. Blockchain technology could record what tracks each individual user was streaming, following which a smart contract written into the ledger could then automatically and directly charge the user a micropayment on a pay-per-stream basis. This payment, of which the DSP would take a cut, could then be sent directly to the registered copyright holder of the specific track (most likely a record label), who could then instantly recognise the royalty splits within their own negotiated smart contract with the artist. The time between the user selecting and listening to the track and the record label and all associated rights holders of that track receiving their fair share of royalty, could be almost instantaneous, and all recorded and verified on an accessible blockchain.

Not only would this give the artists instant payment, but also create a system where fans directly reward their favourite artists for their work, rather than paying a subscription which is pooled and then distributed as a share of overall plays. Users who stream large amounts

of music may be unhappy with this system if it resulted in them paying significantly more per month than on a subscription basis, however they would feel some satisfaction that their money was going directly to the labels and respective artists that they were actually listening to. This kind of pay-per-view/pay-per-stream system could also work within the entertainment industry with platforms such as Netflix, BBC iPlayer, 4OD etc charging users a micropayment to watch their content rather than monthly subscription payments or the licence fee.

Blockchain technology and smart contracts certainly have the power to disrupt the music and entertainment industries, and the onus falls heavily on these industries to be proactive rather than reactive to ensure that they capitalise on the positive potential of blockchain. Both the entertainment and music industries were very slow to uptake the potential of the internet when MP3 and file-sharing decimated their profits in a matter of years. Both industries should learn the lesson from this and recognise and harness blockchain's comparably strong commercial potential, rather than allowing it to become as disruptive and damaging as file-sharing and Napster.

4. Legal implications of blockchain technology

Blockchain undoubtedly has the potential to be extremely disruptive to the music and entertainment industries, and in a creative world already surrounded by copyright controversies and grey areas, the legal implications of blockchain are equally unclear. Firstly, blockchain creates the opportunity to build a transparent ledger which clarifies beyond doubt the metadata and copyright owners of music and entertainment content. This data could be input immediately following the creation of content, and once within the blockchain would be immutable and accessible for all to see. As in the previous section, this data could then be linked through a smart contract to instantly send royalty payments to these content creators listed within this metadata. However, this would by no means be a flawless system as people could relatively easily falsely claim copyright of content that does not belong to them and input this into the blockchain; this would become a particularly difficult issue to resolve because of the immutability of the blockchain. Furthermore, blockchain offers little assistance to subjective copyright infringement claims, such as the dispute between Pharrell Williams/Robin Thicke and Marvin Gaye's estate.

Another legal question mark around blockchain use within the music and entertainment industries, and in general, is the uncertainty around which jurisdiction has authority in a worldwide, open network with users from all corners of the planet. In these industries there is such a plethora of contracts between all the various parties: musicians, labels, PRS, publishers, DSPs etc. Blockchain and smart contracts could be created to govern and automate the relationships between all these various parties, but in such a global industry and on a global blockchain system what jurisdiction should have authority? Furthermore, if copyright is falsely claimed on a blockchain by someone who is not the actual copyright owner, to whom does the rightful copyright owner make their claim? A final legal implication of blockchain technology is that it will clearly not obviate the requirement for lawyers within the music and entertainment industries. Even if a global smart contract could be created for these industries, there would certainly remain a need for lawyers and judges to regulate the plethora of issues that would be thrown up by this disruptive technology.

5. Brief Conclusion

There is little doubt that blockchain technology has the potential to disrupt and arguably revolutionise all sorts of industries, of which the music and entertainment industries are certainly included. Within these industries it is the complicated subjects of copyright and royalty payments which blockchain technology particularly threatens to disrupt. If industry-leading companies such as major labels and major channels, as well as DSPs such as Spotify and Netflix, are proactive and adopt the potential of blockchain technology, rather than challenge it and push it away, then they may well be able to positively commercially harness its power. Having said this, blockchain technology will not entirely solve the difficult topic of copyright ownership and so it should be seen as a step in the right direction rather than an all-encompassing solution.

Words: 2,731

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