

A compelling combination of attributes puts blockchain at the center of an entirely new market for digital record owners, one that allows them to protect, monitor, and control the distribution of their goods. This has profound implications for digital rights management and creators of digital media as well as distributors and consumers of digital content.

# *Blockchain as a Foundation for Reimagining Digital Content, Digital Rights Management, and Trust*

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**Written by:** James Wester, Research Director, Worldwide Blockchain Strategies

The move to a digital world, where digital content of every type (e.g., music, movies, photographs) is now stored and transmitted as data, has made every type of entertainment available on demand to any device at any time. It has democratized entertainment, shifting the balance away from a small number of distributors toward content creators.

But that convenience comes at a price: Data is now vulnerable to being retrieved, copied, altered, and transmitted by bad actors looking to profit illicitly from stolen content. As an example of the extent of the issue, Google reported that it has fielded more than 4.5 *billion* requests to delist websites allegedly infringing on copyrights.

The issue for content creators, artists, digital management agencies, and platforms is how to exploit the many benefits of digital content creation and delivery while dealing with the new tools these advances have given to pirates and purveyors of fake content. The good news is that blockchain technology has become a powerful new weapon in that fight.

A basic role of blockchain is to provide an immutable record of what is digitally "real," meaning the ability to show data recorded on a blockchain is unaltered and untouched. Additionally, smart contracts — self-executing business rules recorded into the blockchain — allow blockchains to be at the center of an entire ecosystem where accessing those records can prompt other actions on the blockchain such as money payments or value movement. This combination of attributes puts blockchain at the center of an entirely new market for digital record owners, one that allows them to protect, monitor, and control the distribution of their goods. This has profound implications for digital rights management and creators of digital media as well as distributors and consumers of digital content.

## *Immutable, Transparent, Decentralized*

Before looking at the potential disruptive effect of blockchain on digital content, one needs to understand how blockchain stores and manages data. In a sequence of interconnected blocks of data, each new data block contains not only new information but also a link to the previous block. That link is made by creating a "hash," or a cryptographically

### **AT A GLANCE**

#### **KEY TAKEAWAYS**

- » The sheer amount of digital content is expanding at an astounding rate, and the current methods are simply inadequate for the task.
- » Blockchain-based networks are clearly more efficient and better methods for managing digital content for all parties concerned.

generated string of data, of the previous block, with each newly created block containing the previous block's hash plus any new transactions, additions, or changes. Any change to data within a hashed record would change all subsequent hashes in linked blocks. Thus, an attempt to change data in a previously recorded block would change its hash and all subsequent blocks in the chain. It is impossible to alter any data without it being apparent, so a blockchain becomes an immutable record.

It's also important to understand that blockchains are not conventional databases with information stored in one place — whether that place is on-premises or in the cloud. Instead, blockchains are distributed, meaning multiple parties hold all or a portion of the data in separate nodes. To ensure each node is in agreement with other nodes, a network's protocol manages validating and recording transactions in the ledger through a process of consensus among participants in the network using algorithms. Like the data itself, the consensus algorithms are completely decentralized, meaning no participant controls the process. This decentralization means no single party controls the data storage or updating of records. It eliminates issues such as fees associated with third parties as well as the possibility that a third party can limit access or control either intentionally or through a system failure.

Along with immutability and decentralization, blockchain offers transparency. Because blockchains are distributed, every participant in the blockchain has visibility into additions and changes to the database. Blockchains can be either permissionless, meaning anyone can participate in adding blocks to the blockchain, or permissioned, meaning a limited number of participants with the necessary permissions are allowed to add blocks to the database. Whether permissioned or permissionless, every participant has certain rights to making changes to the database, offering a secure, transparent method for record keeping and auditing. What's more, this transparency can even coexist with privacy and security because the database can be designed to limit visibility into records while allowing participants the ability to see when and where changes have been made.

## ***The Changing State of Digital Media Management and Distribution***

The immutability, decentralization, and transparency of blockchain have profound implications beyond the technology's initial application for payments and value movement. For instance, in entertainment, media, and telecommunications, the management and distribution of content were the domains of a limited number of large, powerful corporations and organizations that ensured content producers and owners were compensated for the use of their audio, video, photographs, and more.

When that content was available only via physical media — audio on record albums or movies on film — managing access was simply a matter of limiting the copies produced and the distribution of those copies. Once content became digitized — where every copy was an exact duplicate, and storage and distribution could be done via an electronic signal — files containing pictures, movies, music, and so forth could be streamed through the internet or over wireless networks. For consumers, access to digital content meant a wealth of entertainment was available at any time virtually anywhere. However, the companies responsible for managing the distribution of content and ensuring producers were compensated found that their jobs had become difficult if not impossible.

That is not to say that access to digital content is completely unfettered. Even with digital content, access to the content can be limited by keeping it behind paywalls and through subscription or on-demand services — consumption models such as subscription video on demand (SVOD), transactional video on demand (TVOD), and advertising-based video on demand. These evolving models solve problems for content managers, but the models limit the ability of many artists,

especially independent producers of content, to have their videos or music distributed. In other words, companies with the ability to limit consumer access to content also limit the ability of producers to access customers.

Along with the difficulty of managing access and control over the distribution of digital media, technology has created other issues: piracy and fake content. When content was stored on physical media such as magnetic tape or celluloid film, each successive copy would degrade slightly; the copy was never quite as good as the original. With digital media, every copy is exactly the same; there is no degradation because files are duplicated. Multiple "copies" can be downloaded with no worry about the copied content being an inferior quality. Buyers of this pirated content may be unaware that what they are seeing or hearing has been duplicated without the content producer's permission.

A potentially more damaging issue for not only content producers but also consumers is the rise of "fake" and "deep fake" content. Very sophisticated technology now allows bad actors to manipulate digital media to create content that is indistinguishable from original content. Deep fakes go further by adding language, images, and sounds that were not intended — or even created — by the original creator. This fake content can then be passed along as legitimate and damage the reputations of legitimate artists and producers. The goal is to sow doubt and confusion about the veracity of digital content, including news and information.

### ***A Better Way to Manage Digital Content Ecosystems***

Given the changing state of digital content creation, management, and distribution, it is apparent the old methods and models are no longer sufficient. Blockchain offers every part of the content space (from creation to distribution to consumption) new tools — potentially a new ecosystem — for dealing with these changes. Blockchain offers the digital media market the ability to ensure the quality and authenticity of content as well as track downloads and usage of content in a clear and flexible fashion. It also guarantees access to both producers and consumers of digital media. It can even automate contracts and agreements between parties, creating a single source against which disagreements and disputes can be resolved. Blockchain does all of this while eliminating third parties and the costs associated with a centralized model.

The immutability of a blockchain record and the inability to change data surreptitiously make blockchain an ideal technology to build a content distribution and management system. Any data can be encrypted and recorded onto a blockchain, including the data in digital content. Once recorded, the content is then hashed. Any version of that content that does not have an identical hash would mean it is either pirated or altered, ensuring the consumer of that file would know the content he or she is accessing is not real. For applications such as news videos, the application of the technology is obvious: Any video with altered data — fake language or images, for instance — would have a different hash; users accessing that video would be able to compare the video to the original hash to verify the content has not been altered in any way.

One important component of blockchains that has not been mentioned is a smart contract, which can be thought of as self-executing code that runs business rules on a blockchain. That code can prompt actions within the blockchain based on certain criteria or conditions being met (e.g., a smart contract that causes a legitimate copy of content to be shared by a content producer on release of payment from the distributor). The benefit of this is the ability of the ecosystem itself, completely separate from a third party, to mediate between content creators and content distributors, automatically

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sending a payment to the creators when they have a distributor buying their content (or perhaps when a customer uses their content). That intermediary role is usually filled by a third party that takes a small transaction fee for its services. With a blockchain and smart contracts, that role is no longer necessary. The net result is a secure, transparent, and less expensive marketplace for digital content.

Additionally, blockchains can be built to allow full and open participation in the network to anyone or to limit participation to only those with the proper permissions. Regardless of how permissions are designed, blockchains can be built to guarantee that no single entity — distribution company, production facility, or media platform, for instance — can limit access to digital media. That does not necessarily imply an entity is willingly limiting access to content either; a centralized system could fail because of any number of conditions, from malicious actors to natural disasters to system overloads. With the redundancy offered by decentralization, there is no single point of failure, and content producers, distributors, creators, and consumers still have access to digital content regardless of whether any one node is available.

### ***Blockchain and Digital Content Management: The Way Forward***

While blockchain clearly offers a number of advantages versus today's obsolete technologies and systems for digital content management, the evolution to blockchain may take some time. The current scheme has institutional inertia behind it as well as entrenched interests along the entire media content life cycle. Entrenched interests, especially those that currently take their fees from acting as a middleman between producers and consumers, will not yield that role willingly or quickly. However, producers, creators, artists, and consumers can all hasten the advent of blockchain as an underlying technology for a better content management ecosystem.

To date, content distribution options for artists and creators as well as their fulfillment partners — the companies that handle post-production, editing, and more — have been limited. That has changed significantly with the rise of online content sharing platforms for music, images, and video, but the fees and payouts can be quite high, and the platforms are very limited in the scope of the services available throughout the content creation and distribution life cycle. That is changing, however, as blockchain-based platforms that integrate smart contracts for copyright ownership, content access, billing, and payment management are emerging. For digital artists and their partners, the recommendation at this point is to stay abreast of these developments and explore the platform options that are quickly evolving. Creators and artists should work with production and fulfillment partners that are ready and willing to use — and that understand — blockchain networks for content distribution.

For production houses — the media, recording, and distribution companies that have long been third parties between artists and consumers — the advice is much the same: Stay abreast of developments and be ready — and willing — to participate in blockchain-based networks for content distribution. Additionally, these parties can accelerate the development of blockchain networks, and secure a position in the evolving digital rights landscape, by encouraging cooperatives and consortiums to guarantee the authenticity of the assets they distribute. These consortiums would be a necessary first step in developing blockchain as technology for ensuring the content accessed by consumers is legitimate.

This does not mean any individual distribution or content network must wait for the creation of a consortium. The immutability, transparency, and dependability of blockchain can be harnessed to manage content, distribution, and agreements by a single enterprise if it chooses to realize the benefits of the technology.

Other members of the content creation life cycle should take a similar approach, meaning encouraging blockchain as a supporting technology for content verification, authentication, distribution, and management. For instance, providers at the "bottom of the stack," infrastructure players such as hosting and cloud providers, should support the technology because it benefits those companies to store all of that content across distributed nodes. Platform providers can also foster support of blockchain because it offers a secure technology on which they can build out services for content discovery, auditing, and payments.

### ***Considering Tech Mahindra's Blockchain Digital Rights Management Platform***

A notable example of a full content life-cycle management solution that leverages blockchain is the Blockchain-based Contracts and Rights Management System (bCRMS) from Tech Mahindra deployed on IBM Blockchain Platform 2.0 and using Hyperledger Fabric as a protocol. bCRMS addresses the challenges that are currently roiling content distribution, from lack of transparency to piracy to payments from consumers to content creators. It does this by using blockchain's inherent transparency and immutability to guarantee the authenticity of content while providing artists and distributors with a clear, automated system for accessing and paying for content.

The bCRMS solution can also be employed to detect unauthorized use and distribution of content. The inclusion of a digital "watermark" on content, basically special code that is embedded into the content data, enables parties in the value chain to see where content is being distributed and trace any distribution that is not authorized, effectively ending piracy.

Additionally, bCRMS goes beyond content distribution and gives stakeholders across the content value chain a tool for managing the myriad agreements and terms that are required between artists, production houses, and distributors to determine ownership of intellectual property and royalty payments. The types of contracts include pre-production agreements between content owners and artists or talent, post-production agreements between content owners and special services and fulfillment partners handling editor or effects, and distribution agreements that cover the distributors and content owners.

These agreements can be quite complex, but through smart contracts, they are managed seamlessly and automatically, with the blockchain itself providing an audit trail to ensure transparency and fulfillment of obligations such as royalty payments. In addition, contract track and trace capability detects piracy. This replaces the current system, which handles those arrangements through a multitude of individual agreements between content creators, fulfillment partners, platforms, and other third parties, all of which need to be managed and audited.



### Partner Quote

"The media and entertainment industry is undergoing a paradigm shift with an exponential increase in content creation and consumption in recent years. Sophisticated digital rights and contract management systems such as Tech Mahindra's Blockchain-based Contracts and Rights Management System (bCRMS) built on IBM Blockchain Platform 2.0 orchestrates the entire media content life-cycle workflow across pre-production, post-production, and distribution phases by enabling automated smart contracts, track and trace of content using techniques like blockchain-based content hashing and forensic watermarking, along with accurate royalty payment computation."

*Alistair Rennie, General Manager, IBM Blockchain*

### Challenges

bCRMS creates a better solution for addressing many of the issues that are currently affecting digital content creation, management, and distribution, but better is not always immediately successful. Serious challenges still exist in the content distribution and management market. The entrenched third parties that currently earn their revenue from opaque and complex systems present a significant challenge. These entrenched interests have controlled the distribution of content for decades, and they will not willingly give up their position.

Additionally, many content creators, production partners, and platforms consider the current system to be the best or "least worst" possible system. They too are heavily invested in its continued dominance because it effectively erects barriers to newcomers that may offer competition for consumers' attention. There is a powerful incentive to support the status quo by those heavily invested in its continued dominance.

Some doubts that have attached to blockchain because of the early hype surrounding the technology also pose a significant challenge to a solution such as bCRMS. The expectations around the technology have been unrealistic in many use cases, so technology buyers have been reluctant to adopt blockchain as they wait for it to mature. This is especially true in industries that are highly complex, including digital rights management.

It should be mentioned that some challenges remain because of blockchain's association with cryptocurrencies. The technology's use as an enterprise technology is unrelated to cryptocurrencies, but a lack of information and education about blockchain has meant those early connections with cryptocurrencies have lingered. Like all of the challenges mentioned, it can be countered through effective education as stakeholders in the distribution of digital content look to replace a system that is inherently broken.

## Conclusion: The Search for a Blockchain Alternative

Blockchain-based networks such as Tech Mahindra's bCRMS are simply better methods for managing digital content. By using the qualities that make blockchain a solution in other use cases — namely its immutability, transparency, and decentralization — these solutions provide efficiency, auditability, and reliability that can address fake content, piracy, and accessibility issues inherent in the current model.

The changes to the creation, management, and distribution of digital content will only accelerate as the costs of production decrease and the ability to profit from creating content increases. As that acceleration continues, the current methods for managing digital content will become increasingly inadequate. That will mean that more artists, filmmakers, and musicians looking to find an audience for their work will be unable to do so.

## About the Analyst



### **James Wester**, Research Director, Worldwide Blockchain Strategies

James Wester leads IDC's global blockchain research. His coverage area includes the full blockchain stack and looks at the applications of blockchain, distributed ledgers, and decentralized architectures to financial services, healthcare, supply chain, and more.



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#### **IDC Research, Inc.**

5 Speen Street  
Framingham, MA 01701, USA  
T 508.872.8200  
F 508.935.4015  
Twitter @IDC  
[idc-insights-community.com](http://idc-insights-community.com)  
[www.idc.com](http://www.idc.com)

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